

United States Centennial Commission.

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INTERNATIONAL EXHIBITION,  
1876.

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REPORTS AND AWARDS

GROUP XXIII.



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EDITED BY

FRANCIS A. WALKER,

CHIEF OF THE BUREAU OF AWARDS.

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PHILADELPHIA:  
J. B. LIPPINCOTT & CO.

1877.

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~~Gr. XX III~~

# SYSTEM OF AWARDS

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[*Extract from Circular of April 8, 1876.*]

Awards shall be based upon written reports attested by the signatures of their authors.

The Judges will be selected for their known qualifications and character, and will be experts in departments to which they will be respectively assigned. The foreign members of this body will be appointed by the Commission of each country and in conformity with the distribution and allotment to each, which will be hereafter announced. The Judges from the United States will be appointed by the Centennial Commission.

\* \* \* \* \*

Reports and awards shall be based upon inherent and comparative merit. The elements of merit shall be held to include considerations relating to originality, invention, discovery, utility, quality, skill, workmanship, fitness for the purposes intended, adaptation to public wants, economy and cost.

Each report will be delivered to the Centennial Commission as soon as completed, for final award and publication.

Awards will be finally decreed by the United States Centennial Commission, in compliance with the Act of Congress, and will consist of a diploma with a uniform Bronze Medal, and a special report of the Judges on the subject of the Award.

Each exhibitor will have the right to produce and publish the report awarded to him, but the United States Centennial Commission reserves the right to publish and dispose of all reports in the manner it thinks best for public information, and also to embody and distribute the reports as records of the Exhibition.

## ORGANIZATION AND DUTIES OF THE JUDGES.

[*Extract from Circular of May 1, 1876.*]

Two hundred and fifty Judges have been appointed to make such reports, one-half of whom are foreigners and one-half citizens of the United States. They have been selected for their known qualifications and character, and are presumed to be experts in the Groups to which they have been respectively assigned. The foreign members of this body have been appointed

(iii)

by the Commission of each country, in conformity with the distribution and allotment to each, adopted by the United States Centennial Commission. The Judges from the United States have been appointed by the Centennial Commission.

To facilitate the examination by the Judges of the articles exhibited, they have been classified in Groups. To each of these Groups a competent number of Judges (Foreign and American) has been assigned by the United States Centennial Commission. Besides these, certain objects in the Departments of Agriculture and Horticulture, which will form temporary exhibitions, have been arranged in special Groups, and Judges will be assigned to them hereafter.

The Judges will meet for organization on May 24, at 12 M., at the Judges' Pavilion. They will enter upon the work of examination with as little delay as practicable, and will recommend awards without regard to the nationality of the exhibitor.

The Judges assigned to each Group will choose from among themselves a Chairman and a Secretary. They must keep regular minutes of their proceedings. Reports recommending awards shall be made and signed by a Judge in each Group, stating the grounds of the proposed award, and such reports shall be accepted, and the acceptance signed, by a majority of the Judges in such Group.

The reports of the Judges recommending awards based on the standards of merit referred to in the foregoing System of Awards, must be returned to the Chief of the Bureau of Awards not later than July 31, to be transmitted by him to the Centennial Commission.

Awards will be finally decreed by the United States Centennial Commission, in compliance with the Act of Congress of June 1, 1872, and will consist of a special report of the Judges on the subject of the Award, together with a Diploma and a uniform Bronze Medal.

Upon matters not submitted for competitive trial, and upon such others as may be named by the Commission, the Judges will prepare reports showing the progress made during the past hundred years.

Vacancies in the corps of Judges will be filled by the authority which made the original appointment.

No exhibitor can be a Judge in the Group in which he exhibits.

An exhibitor, who is not the manufacturer or producer of the article exhibited, shall not be entitled to an award.

The Chief of the Bureau of Awards will be the representative of the United States Centennial Commission in its relations to the Judges. Upon request, he will decide all questions which may arise during their proceedings in regard to the interpretation and application of the rules adopted by the Commission relating to awards, subject to an appeal to the Commission.

A. T. GOSHORN,  
*Director-General.*



[*Extract from Director-General's Address to Judges, May 24, 1876.*]

“The method of initiating awards which we have adopted differs in some respects from that pursued in previous exhibitions. In place of the anonymous verdict of a jury, we have substituted the written opinion of a Judge. On this basis awards will carry the weight and guarantees due to individual personal character, ability, and attainments, and to this extent their reliability and value will be increased. It is not expected that you will shower awards indiscriminately upon the products in this vast collection. You may possibly find a large proportion in no way raised above the dead level, nor deserving of particular notice. The standard above which particular merit worthy of distinction begins is for you to determine. In this regard I have only to express the desire of the Centennial Commission, that you should do this with absolute freedom, and when you meet with a product which you consider worthy of an award, we desire you to say, in as few words as you may deem suitable, why you think so.

“This, gentlemen, is all we ask of you in the Departments of Awards. Opinions thus expressed will indicate the inherent and comparative merits, qualities, and adaptations of the products,—information which the public most desires.

“Elaborate general reports and voluminous essays, though of great value as sources of general information, give little aid in determining the reliable or intrinsic merits of particular, individual products.

“The regulations which have been published divide the work of awards into three parts:

“1st. The individual work of the Judges.

“2d. The collective work of the groups of Judges.

“3d. The final decisions of the United States Centennial Commission in conformity with the acts of Congress.

“Each award will thus pass three ordeals, which, doubtless, will be ample and satisfactory.”

## GROUP XXIII.

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### JUDGES.

#### AMERICAN.

JOHN P. REYNOLDS, Chicago, Ill.  
JAMES S. GRINNELL, Greenfield, Mass.  
JAMES BRUCE, Corvallis, Oregon.

#### FOREIGN.

JOHN COLEMAN, Great Britain.  
FERMIN ROSILLO, Spain.  
PEDRO D. G. PAES LEME, Brazil.

EKEDA KENZO, E. OLDENDORFF, JOHN BRADFORD, assigned from Group IV, and  
GEORGE E. WARING, JR., from Group XXVI.

## GROUP XXIII.

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### AGRICULTURAL MACHINES, IMPLEMENTS OF AGRICULTURE, HORTICULTURE, AND GARDENING.

#### CLASS 670.—TILLAGE.

Manual implements,—spades, hoes, rakes. Animal power machinery,—plows, cultivators, horse-hoes, clod-crushers, rollers, harrows. Steam power machinery,—plows, breakers, harrows, cultivators.

#### CLASS 671.—PLANTING.

Manual implements,—corn-planters and hand drills. Animal power machinery,—grain and manure drills; corn and cotton planters. Steam power machinery,—grain and manure drills.

#### CLASS 672.—HARVESTING.

Manual implements,—grain cradles, sickles, reaping hooks. Animal power machinery,—reapers and headers. Mowers, tedders, rakes, hay elevators, and hay loaders. Potato diggers.

#### CLASS 673.—PREPARATORY TO MARKETING.

Thrashers, clover-hullers, corn-shellers, winnowers, hay-making apparatus.

#### CLASS 674.—APPLICABLE TO FARM ECONOMY.

Portable and stationary engines, chaffers, hay and feed cutters, slicers, pulpers, corn mills, farm boilers and steamers, incubators. Churns for hand and power, butter-workers, cans and pails, cheese-presses, vats, and apparatus.

#### CLASS 675.—Dairy fittings and appliances.

#### CLASS 680.—LAYING OUT AND IMPROVING FARMS.

Clearing, stump-extractors, construction of roads, draining, irrigating apparatus, models of fences, gates, drains, out-falls, dams, embankments, irrigating machinery, stack building and thatching.

#### CLASS 682.—TRANSPORTATION.

Wagons, carts, sleds, harness. (See also Group XXVII.) Yokes, and apparatus for road making and excavating. (For traction engines, see Group XVIII.)

#### CLASS 683.—FARM BUILDINGS.

Models and drawings of farm houses and tenements, barns, stables, hop-houses, fruit-driers, ice-houses, wind-mills, granaries, barracks, apiaries, cocooneries, aviaries, abattoirs, and dairies.

GROUP XXII

AGRICULTURAL MACHINES, IMPLEMENTS OF AGRICULTURE, HORTICULTURE AND GARDENING.

Class 670 - Tillage  
Class 671 - Planting  
Class 672 - Harvesting  
Class 673 - Harvesting and separating  
Class 674 - Harvesting and separating  
Class 675 - Harvesting and separating  
Class 676 - Harvesting and separating  
Class 677 - Harvesting and separating  
Class 678 - Harvesting and separating  
Class 679 - Harvesting and separating  
Class 680 - Harvesting and separating  
Class 681 - Harvesting and separating  
Class 682 - Harvesting and separating  
Class 683 - Harvesting and separating  
Class 684 - Harvesting and separating  
Class 685 - Harvesting and separating  
Class 686 - Harvesting and separating  
Class 687 - Harvesting and separating  
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Class 692 - Harvesting and separating  
Class 693 - Harvesting and separating  
Class 694 - Harvesting and separating  
Class 695 - Harvesting and separating  
Class 696 - Harvesting and separating  
Class 697 - Harvesting and separating  
Class 698 - Harvesting and separating  
Class 699 - Harvesting and separating  
Class 700 - Harvesting and separating

GENERAL REPORT  
OF THE  
JUDGES OF GROUP XXIII.

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INTERNATIONAL EXHIBITION,  
Philadelphia, December, 1876.

PROF. FRANCIS A. WALKER, *Chief of Bureau of Awards* :

SIR,—I forward you herewith the general report of the Judges of  
Group XXIII.

Respectfully yours,

JOHN COLEMAN,  
*Chairman.*

## GROUP XXIII.

AGRICULTURAL MACHINES, IMPLEMENTS OF  
AGRICULTURE, HORTICULTURE AND GAR-  
DENING.

In presenting this report on awards of agricultural machines, the Judges are desirous of expressing their appreciation of the American and Canadian exhibits, which indicated a highly satisfactory progress. They regret that the English manufacturers did not consider it to their interest to contribute; a comparison between the two greatest exporting countries of the world would have been both interesting and instructive. We have been informed that the reasons assigned by English makers for their absence were, first, that the tariff rendered American business impossible; and, secondly, the heavy expense attending such an exhibition. These reasons are valid enough as far as they go, but the Philadelphia Exhibition drew together peoples of all nations and languages, all eager for information, many anxious to carry back to their distant homes such machinery as seemed most suitable for their respective localities; and as the English makers, by their absence, left the field of enterprise open to the American exhibitors, a considerably increased foreign trade may be looked for as one result of this truly great Centennial gathering. And the development of a foreign trade will prove of great advantage at a time when production has equaled, and in many cases overrun, demand. Hitherto agricultural machinists have had hard work to keep up to the ever-increasing demand (especially in the Western States) for labor-saving machinery, and their ingenuity has been kept on the stretch; but of late years, owing to the undoubted success of the pioneers, many large firms have been established, who manufacture their specialties by the tens of thousands, and, vast as is the country, we have been astonished at the present manufacturing capabilities, and wonder as to where the produce can be profitably got rid of. At such a time, when the home

trade is depressed, the opening out of new markets must prove of great advantage to the manufacturers, and we hope and believe that this may be one result of the enterprise displayed in bringing together such a complete illustration of the agricultural mechanical resources of the United States and Canada. Considering the vast distances of many of the exhibiting countries, it is not surprising that the foreign collection of agricultural implements was small. France, Germany, Austria, Sweden, and Russia were represented, but only to a very limited degree; it would have been highly interesting had circumstances allowed of a more general comparison. But we trust that the result of the Centennial Exhibition will be the dissemination, far and wide, of efficient machinery, without which good cultivation and profitable returns are impossible.

Before entering into particulars as to the different classes of machines, we would notice the absence (almost entire) of either traction engines or machinery for cultivating the land by steam-power. In the American section there was one exhibit of a steam-power digger, in which the engine was attached to the implement, the digging apparatus consisting of a number of spades attached to a revolving shaft, driven from the engine; the locomotion of the machine being effected partly by steam and partly by the resistance of the soil to the diggers. The patentee was not willing to test his invention in the field, and as all such applications have long since been abandoned in England and elsewhere as impracticable and opposed to the first principles of steam-power mechanics, we could not see our way to a report. It is probable that up to the present time, owing to the land being generally light, the superficial nature of cultivating operations, the comparatively low price of horses and mules, a necessity for steam-cultivators has not yet arisen. But the time may come when such a power will be of great value in prairie cultivation.

A VELING & PORTER, *Rochester, England.*

Traction engines, which are a necessary element in steam-cultivating machinery, are as yet but little employed. We noticed, however, with satisfaction the admirable exhibit of this firm, as well as their steam-roller, which might with advantage be made use of for the better construction of roads in this country. We regret that during the thrashing trials at Schenck's, when these engines rendered valuable service in transporting the machinery from the railroad to the scene of operations, so comparatively few witnessed their marvelous performances; all, however, who were present were unanimous

in expressions of satisfaction, both as regards the power and the perfect accuracy and ease with which one man can drive and steer, going in and out in much less space than a wagon and horses, and turning almost in their own area. It does seem to us that such a controllable power would be of great service in the large farms of the West, especially if, as it is confidently believed, they can be utilized for the reaping of grain.

#### CLASS 670.—TILLAGE.

MANUAL IMPLEMENTS.—Spades, hoes, rakes, etc., were shown by several firms. Ingenious in construction, of excellent material, admirably adapted for their particular uses, and much lower in price than in England; probably owing to both wood and iron being cheaper.

ANIMAL-POWER MACHINERY.—Plows were shown by numerous makers and of varying forms. Those for the Eastern States were of the ordinary type, *i.e.*, without wheels, or with one small wheel at the end of the beam, strong, straight beam with short handles; the mould-board of great strength, short and abrupt, adapted for rough work, and especially for breaking up rough ground; capable of scouring, *i.e.*, keeping the face clean, even in sticky soils, the object being to break up the furrow as much as possible, not to turn it over in an unbroken condition, which is the perfection of plowing in England. These plows are well adapted for their work, but the draft is considerable.

In the Western States gang-plows and sulky-plows are chiefly used. We have a frame on two large traveling-wheels, with a driver's seat in the centre, the plows, which are double in the former and single in the latter, being suspended by beams from the axle. It is held, and correctly so, that the weight of the driver is counterbalanced by the use of large wheels, and the conversion to a great extent of a sliding for a rolling friction; draft might be further economized if the land-side and sole of the plow were replaced by a friction-wheel set at an angle and placed behind the body, as in our modern double-furrow plows; a leverage arrangement allows the driver to raise the plows clear of the ground at the land's end, and also to regulate the depth as the work is in progress. The draft is taken from the beam, the horses being yoked to a pole, and is therefore central.

After the war, these riding-plows came largely into use, owing to the number of maimed plowmen, and during the heat of the struggle hands were at times so scarce that the wives and daughters of the farmers might be seen steering these machines. One of our col-



leagues, Mr. James Bruce, from Carvallos, Oregon, who formerly farmed about 1100 acres, of which 500 acres were arable, assured us that he and his man were able to plow 50 acres a week during the winter season with two gang-plows, each drawn by four mules; this gives over four acres a day for each implement. The occupations being extensive the distance to and from home is often considerable, and it is a great advantage to be able to trot always at the rate of six miles an hour. No opportunity occurred for a trial of plows, but there is no reason to doubt that both the gang- and sulky-plows are capable of doing excellent work.

The Canadians contributed a number of plows, some of excellent design, made very much after the English model, only stronger in the mould-board.

One of the most noticeable of the single-furrow plows was that made by the Acton Plow Company, in which the beam was unusually prolonged, and bent behind the mould-board, securing direct draft. The handles or stilts are very short, and represent nearly the half of a circle. The frame of the plow, of solid wrought-iron, forms part of the beam. In this department we noticed a double and treble furrow-plow, made much like some of ours.

E. Klundth, of Sweden, exhibited six plows, noticeable for construction, quality of material, fairly good finish, and reasonable price. Four of these were designed for the Russian trade, where the soil is generally light and does not clog. These have vertical friction-wheels behind the land-side and projecting three-quarters of an inch below the sole, so that in dry soils the wheel does actually carry the weight. There is also a small wheel behind the mould-board. The Swedish plows have no wheels; the body is cast in one piece with the land-side. The share is of wrought-iron laid with steel, and the beam and handles are in one piece. Another peculiarity which adds to strength is the prolongation of the land-side until it occupies a space between the share and the mould-board. The Göteborg Machine Company also exhibited a large collection of plows from their extensive works, which we understand find employment for 800 men. Most of these have a split beam with strong frame and separate handles; they are not so strong as the last described, but are on a good Scotch model. Owing to the low price of iron and labor, these plows can be bought at home on most reasonable terms.

Cultivators, horse-hoes, etc., of various kinds were shown, some adapted only for single rows with or without expansive apparatus; others, and of these we would more immediately speak, have a double frame, with a driver's seat between large wheels. Such a machine is

specially adapted for cultivating Indian corn, which requires great attention during early growth. We select for description an excellent implement, shown by P. P. Mast & Co., of Springfield, Ohio, which has a movable seat, and can be driven by attendant either walking or riding. Each frame carrying the cultivating tines is hung by a chain from the top of the upright standard. The arm or blade is jointed to the frame, and braced by an iron band, to which a wooden pin is so attached as to render the connection rigid under ordinary pressure. Should the tine or arm come in contact with a stump or fast stone, the pin breaks and the arm, being jointed to the frame, flies back, and thus serious breakage is avoided. This is a clever arrangement, of great utility in land only recently broken. To prevent the corn being cut by the knives, a rotating, toothed wheel attached to an arm which is connected with the frame runs along the surface of the ground. Such a cultivator, placed on 4-foot wheels, runs light and is a very efficient implement; different forms of blades and points can be used, so that if desired the plants can be earthed up after all the weeds are removed. Some farmers object to these machines, on the ground that some corn is injured on the headlands by the horses in turning; they prefer a smaller implement, taking half the interval between the rows at once, completing the space on the return journey; but the great argument in favor of the larger machines is the importance of rapid cultivation for a crop that grows with such amazing rapidity.

Neither American nor Canadian agriculture has as yet adopted steam-culture. Considering the cheapness of fuel and the vast area of many of the farms, together with the flat character of the prairies, this is remarkable. Owing to the superficial character of cultivating operations, the moderate price of horses and mules, and the general prevalence of light land, a necessity for steam-culture has not yet arisen. It is a matter of regret that Americans had not an opportunity of inspecting and seeing the work of English machinery. Traction engines, however, which are as yet but little employed, were shown by Messrs. Aveling & Porter, of Rochester; and those who witnessed the trials of thrashing-machines and portable engines at Schenck's Station were surprised and delighted with their performances. Without their valuable assistance much time must have been lost. In the American section there was one exhibit of a steam-power digger, in which the engine was attached to the implement, the latter consisting of a series of revolving tines or forks. The locomotion of the machine being effected partly by steam and partly by the resistance of the soil to the diggers, the exhibitor was not prepared to test his

invention in the field, where, according to all experience, it would not have succeeded.

#### CLASS 671.—PLANTING.

Grain-drills were entirely confined to the American section. Here, however, the entries were numerous, and the merit in several instances considerable. We subjected these machines to a severe test, including delivery of grain on the level, the hill-side, and up- and down-hill at gradients which would scarcely occur in practice, but which afforded material for a comparison. The result is given in the tables on pages 10, 11. Each experiment represents one-eighth of an acre, sown at the rate, or near the rate, of two bushels per acre of wheat. Experiments were made with oats and peas. The tables relate to wheat only.

The great *desideratum* in a drill is even distribution of seed, one cup delivering as nearly as possible the same as another, and the whole depositing uniformly in whatever position the drill may be placed. Great variations will be observed in some of the records. We proceed to supply reasons. One of the great modern improvements which is now generally adopted is some kind of appliance to secure a force-feed. There are various ways in which this is secured. The most common is to have a roller on the shaft, either fixed or shifting, which, working in a confined position (the seed-cup), carries a certain quantity of grain round with it for each revolution, and the seed falls away from it into the tubes which conduct it to the ground. These rollers are various as to form and surface corrugations; but the great point of difference as to results depends upon whether the roller fills the seed-cup or only occupies a varying portion according to the quantity of seed to be sown. In the latter case it will be readily understood that when the inclination of the drill causes the seed to fall away from the roller, a less quantity of seed will be sown than either on the level or when the seed accumulates over the roller. We therefore unhesitatingly pronounce in favor of those drills which have a fixed feed-roller occupying the entire space of the seed-cup. Then, again, the quantity of seed to be sown is regulated in two ways, either by change-wheels, causing the seed-spindle to revolve faster or slower, or by opening or closing a slide door in the seed-cups. The latter plan has an apparent advantage, viz., that the regulations can be minute and made while the machine is in operation; whereas, with one exception (Farmers' Friend drill), change of gear-wheels can only be done when the drill is stationary. Nevertheless, we are firmly persuaded that the change of wheels, which is the original plan, is decidedly the more accurate. In confirmation of this we would draw attention to the results of trials with Bickford & Huff-

man's and Ludlow & Rodgers' drills, in which the force-feed and seed-cups are identical. The former regulates delivery by change-wheels, the latter by closing the outlet. The force-feed, which is by no means of the best form, consists of a vertical disk-wheel, occupying one side of the chamber, with numerous small elevations proceeding from the centre to the circumference. In Bickford & Huffman's drill the difference between the discharge from different cups during the trials ranged from  $1\frac{1}{4}$  to  $1\frac{3}{4}$  ounces; whereas in Ludlow & Rodgers' drill the range was from  $2\frac{1}{4}$  to  $5\frac{1}{2}$  ounces, a difference so great that we were obliged to withhold our report, although the drill had otherwise many favorable points. We especially notice the force-feed arrangements in the McSherry and Farmers' Friend drills. In the former case the ribs of the wheel are spiral, so that before one rib has finished discharging at one side the next rib has commenced at the other side; thus a regular flow is maintained. A spring-washer attached to this roller prevents the grain being crushed or squeezed against the side of the box. In the Farmers' Friend the force-feed roller is cylindrical, with eight zigzag ribs on its surface, each alternate one running in an opposite direction, being slightly concave. The seed is forced out from both sides of the cup, and a regular, even distribution secured. In both these drills alternation of quantity is effected by change of wheels; but in the Farmers' Friend, by a clever arrangement of a cluster of wheels on a cone, the wheel can be changed by a lever-handle while the machine is in motion. We may notice other salient points of recent improvement common to most of the machines that were exhibited. An arrangement by which the alternate hoes can be set forward seven or eight inches, and thus present a broken line, with more space for the passage of clods, stones, or weeds. This is not a requisite or desirable position when the soil is in a favorable condition, because the closer the hoes are the more will they act as harrows in breaking and pulverizing the surface. A combined leverage, by which raising the hoes out of the ground throws the drill out of gear, and this is such a quick action that not a grain need be wasted. The lower portion of the hoe-frame is hinged, so that in the event of coming in contact with a post, stone, or tree-root, a not unusual accident in many districts, the hoe flies back and accident is avoided. As soon as the obstruction is removed, or rather the machine is set free from the obstruction, the hoe, acted upon by a powerful rubber spring, flies back into its place. This is a very perfect and ingenious arrangement. Then either in front of or behind the seed-box is placed a small seed-distributer, driven from the main wheel by a crank. With this the grass-seeds, clover, and

timothy can be sown at the same time as the grain. The hoes are fixed, and cannot be varied so as to drill the corn at varying widths. This must be considered a disadvantage, and it would be desirable if it could be overcome. We must also notice, as a useful appendix to most of the better machines, a small apparatus for indicating the area traversed during work. This is known as the "Surveyor," and comprises a thread on the seed-spindle, actuating a small-toothed wheel, which drives an indicator on a dial-plate. Without pretending to absolute accuracy, this arrangement gives a close approximation, and is a guide to the operator as to the distribution of his seed, and a tell-tale for the master as to the servant's industry. For planting pulse crops, the seed-cups that are not required to sow may be closed up. On the whole, we are led to believe that great progress has been made in the manufacture of grain-drills, and that American makers are decidedly ahead in this respect.

Fertilizing attachments are supplied by several firms, enabling the farmer to deposit a small quantity of artificial manure with the grain. We subjected some of these to a trial, first with dry and then with damp superphosphate of lime, but the quality of the manure was so poor that it did not allow of a sufficiently severe test to prove efficiency. We do not consider these attachments of much value. It is very seldom that regularity of delivery is possible. Manures, such as Peruvian guano and good phosphate, have a tendency to work into a pasty condition, which renders it impossible to secure even delivery, and it is by no means a proved fact that applying the manure with grain is desirable. Ammoniacal mixtures have, especially in a dry climate, a marked tendency to check germination. Again, in light land, there is danger that some portion of the manure may be washed away before the crop is ready to absorb it. Of the machines that came to trial, Bickford & Huffman's made the best work. This has a series of star-shaped revolving scrapers, working close to the bottom of the box, with cutting edges and slightly concave surfaces, and bringing the manure over the parts which are regulated by a sliding bottom, which determines the quantity delivered. Instead of depositing the fertilizer with the grain, we should prefer its being sown broadcast over the surface when the plants had developed root,—thus, in the case of winter wheat, just at the time when spring growth commences. In the case of spring corn, the application may be made when the plants are about a month old. Not only will the rootlets spring out in search of the manure, but the manure being distributed on the surface, and not buried, the soil will be less likely to be washed down.

EXPERIMENTS.

D. E. McSHERRY & Co., Dayton, Ohio.\*

|                           | 1                  | 2                  | 3                 | 4                  | 5                  | 6                  | 7                 | 8                  | TOTAL.              | MAXI-MUM.          | MINI-MUM.          | VARIA-TION.     | VARIATION PER ACRE FROM LEVEL. |
|---------------------------|--------------------|--------------------|-------------------|--------------------|--------------------|--------------------|-------------------|--------------------|---------------------|--------------------|--------------------|-----------------|--------------------------------|
|                           | Lbs. Oz.           | Lbs. Oz.           | Lbs. Oz.          | Lbs. Oz.           | Lbs. Oz.           | Lbs. Oz.           | Lbs. Oz.          | Lbs. Oz.           | Lbs. Oz.            | Lbs. Oz.           | Lbs. Oz.           | Lbs. Oz.        | Lbs. Oz.                       |
| On level ground.....      | 2 0 $\frac{3}{4}$  | 2 0 $\frac{3}{4}$  | 2 0 $\frac{3}{4}$ | 2 1 $\frac{1}{4}$  | 2 0 $\frac{3}{4}$  | 2 0 $\frac{3}{4}$  | 2 0 $\frac{3}{4}$ | 2 0                | 16 4 $\frac{1}{2}$  | 2 1 $\frac{1}{4}$  | 2 0                | 1               | .....                          |
| Right-hand elevation..... | 2 0                | 2 0 $\frac{3}{4}$  | 2 0 $\frac{3}{4}$ | 2 1                | 2 1                | 2 1                | 2 0 $\frac{3}{4}$ | 2 0                | 16 3 $\frac{1}{4}$  | 2 1                | 2 0                | 1               | - 10                           |
| Left-hand elevation.....  | 2 0                | 2 0                | 2 0 $\frac{3}{4}$ | 2 0 $\frac{3}{4}$  | 2 0 $\frac{3}{4}$  | 2 1                | 2 0 $\frac{3}{4}$ | 2 0                | 16 3                | 2 1                | 2 0                | 1               | - 12                           |
| Down-hill.....            | 1 12 $\frac{1}{2}$ | 1 11 $\frac{1}{2}$ | 1 13              | 1 15 $\frac{1}{4}$ | 1 12 $\frac{1}{2}$ | 1 11 $\frac{1}{2}$ | 1 13              | 1 12 $\frac{1}{2}$ | 14 6 $\frac{1}{4}$  | 1 13 $\frac{1}{4}$ | 1 11 $\frac{1}{2}$ | 2 $\frac{1}{4}$ | - 14 14                        |
| Up-hill.....              | 2 3 $\frac{1}{4}$  | 2 6                | 2 3 $\frac{1}{4}$ | 2 3 $\frac{1}{4}$  | 2 2 $\frac{1}{2}$  | 2 3 $\frac{1}{4}$  | 2 3 $\frac{1}{4}$ | 2 2 $\frac{1}{2}$  | 17 11 $\frac{1}{4}$ | 2 6.               | 2 2 $\frac{1}{4}$  | 3 $\frac{1}{4}$ | + 11 10                        |

FARMERS' FRIEND MANUFACTURING COMPANY, Dayton, Ohio.†

|                           |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                 |        |
|---------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|-----------------|--------|
| On level ground.....      | 1 15 $\frac{1}{2}$ | 1 15               | 1 14 $\frac{1}{2}$ | 1 15 $\frac{1}{2}$ | 1 13 $\frac{1}{2}$ | 1 14 $\frac{1}{2}$ | 1 14 $\frac{1}{2}$ | 1 14 $\frac{1}{2}$ | 15 6 $\frac{1}{2}$ | 1 15 $\frac{1}{2}$ | 1 13 $\frac{1}{2}$ | 2               | .....  |
| Right-hand elevation..... | 1 15 $\frac{1}{2}$ | 1 15               | 1 14 $\frac{1}{2}$ | 1 15 $\frac{1}{2}$ | 1 13 $\frac{1}{2}$ | 1 14 $\frac{1}{2}$ | 1 14 $\frac{1}{2}$ | 1 15               | 15 6               | 1 15 $\frac{1}{2}$ | 1 13 $\frac{1}{2}$ | 2               | - 4    |
| Left-hand elevation.....  | 1 15 $\frac{1}{2}$ | 1 15 $\frac{1}{2}$ | 1 14 $\frac{1}{2}$ | 1 15 $\frac{1}{2}$ | 1 13 $\frac{1}{2}$ | 1 14 $\frac{1}{2}$ | 1 14 $\frac{1}{2}$ | 1 15               | 15 6 $\frac{1}{4}$ | 1 15 $\frac{1}{2}$ | 1 13 $\frac{1}{2}$ | 2               | + 2    |
| Down-hill.....            | 1 10 $\frac{1}{2}$ | 1 11 $\frac{1}{4}$ | 1 11 $\frac{1}{2}$ | 1 10 $\frac{3}{4}$ | 1 10               | 1 10 $\frac{1}{2}$ | 1 10 $\frac{1}{4}$ | 1 10 $\frac{3}{4}$ | 13 5 $\frac{1}{4}$ | 1 11 $\frac{1}{4}$ | 1 10               | 1 $\frac{1}{4}$ | - 16 6 |
| Up-hill.....              | 2 1 $\frac{1}{4}$  | 2 1                | 2 0 $\frac{3}{4}$  | 2 1 $\frac{1}{2}$  | 1 15 $\frac{1}{2}$ | 2 0 $\frac{3}{4}$  | 2 0 $\frac{3}{4}$  | 2 0 $\frac{3}{4}$  | 16 5 $\frac{1}{2}$ | 2 1 $\frac{1}{4}$  | 1 15 $\frac{1}{2}$ | 2 $\frac{1}{2}$ | + 7 8  |

P. P. MAST & Co.—BUCKEYE DRILL, Springfield, Ohio.‡

|                           |                    |                    |                    |                    |                    |                    |                   |                    |                     |                    |                    |                 |        |
|---------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|-------------------|--------------------|---------------------|--------------------|--------------------|-----------------|--------|
| On level ground.....      | 2 0 $\frac{3}{4}$  | 2 0 $\frac{3}{4}$  | 2 0 $\frac{3}{4}$  | 2 0 $\frac{3}{4}$  | 1 15 $\frac{1}{2}$ | 2 0 $\frac{3}{4}$  | 2 0 $\frac{3}{4}$ | 2 1                | 16 3                | 2 1                | 1 15 $\frac{1}{2}$ | 1 $\frac{1}{2}$ | .....  |
| Right-hand elevation..... | 1 13 $\frac{1}{2}$ | 1 13               | 1 12 $\frac{1}{2}$ | 1 13 $\frac{1}{2}$ | 1 12 $\frac{1}{2}$ | 1 13               | 1 13              | 1 13 $\frac{1}{2}$ | 14 8 $\frac{1}{2}$  | 1 13 $\frac{1}{2}$ | 1 12 $\frac{1}{2}$ | 1               | - 12 4 |
| Left-hand elevation.....  | 2 3                | 2 2 $\frac{1}{4}$  | 2 3                | 2 2 $\frac{1}{4}$  | 2 2                | 2 2 $\frac{1}{2}$  | 2 2               | 2 2 $\frac{1}{2}$  | 17 4 $\frac{1}{2}$  | 2 3                | 2 2                | 1               | + 8 10 |
| Down-hill.....            | 1 12 $\frac{1}{2}$ | 1 11 $\frac{1}{2}$ | 1 10 $\frac{3}{4}$ | 1 11 $\frac{1}{4}$ | 1 10 $\frac{1}{2}$ | 1 11 $\frac{1}{4}$ | 1 12              | 1 11 $\frac{1}{2}$ | 13 10 $\frac{1}{4}$ | 1 12 $\frac{1}{2}$ | 1 10 $\frac{1}{2}$ | 1 $\frac{1}{4}$ | - 10 6 |
| Up-hill.....              | 2 6 $\frac{1}{4}$  | 2 5 $\frac{1}{4}$  | 2 7 $\frac{1}{4}$  | 2 6 $\frac{1}{4}$  | 2 4 $\frac{1}{2}$  | 2 4 $\frac{1}{4}$  | 2 5               | 2 5 $\frac{1}{4}$  | 18 14               | 2 7 $\frac{1}{4}$  | 2 4 $\frac{1}{2}$  | 3 $\frac{1}{4}$ | + 21 8 |

HOOSIER DRILL COMPANY, Milton, Ind.§

|                           |                    |                    |                    |                    |                    |                    |                    |                    |                     |                    |                    |                 |        |
|---------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|---------------------|--------------------|--------------------|-----------------|--------|
| On level ground.....      | 2 7 $\frac{1}{4}$  | 2 7 $\frac{1}{4}$  | 2 6 $\frac{1}{4}$  | 2 8                | 2 9                | 2 7                | 2 6 $\frac{1}{4}$  | 2 6 $\frac{1}{4}$  | 19 11 $\frac{1}{4}$ | 2 9                | 2 6 $\frac{1}{4}$  | 2 $\frac{3}{4}$ | .....  |
| Right-hand elevation..... | 2 8 $\frac{1}{4}$  | 2 8 $\frac{1}{4}$  | 2 8 $\frac{1}{4}$  | 2 9 $\frac{1}{2}$  | 2 10               | 2 8                | 2 7                | 2 7 $\frac{1}{4}$  | 20 4                | 2 10               | 2 7                | 3               | + 4 6  |
| Left-hand elevation.....  | 2 9 $\frac{1}{4}$  | 2 10               | 2 8 $\frac{1}{4}$  | 2 10 $\frac{1}{4}$ | 2 10 $\frac{1}{2}$ | 2 9 $\frac{1}{4}$  | 2 8 $\frac{1}{4}$  | 2 9                | 20 12 $\frac{1}{4}$ | 2 10 $\frac{1}{4}$ | 2 8 $\frac{1}{4}$  | 2 $\frac{1}{2}$ | + 8 8  |
| Down-hill.....            | 2 5 $\frac{1}{2}$  | 2 5 $\frac{1}{2}$  | 2 5                | 2 5 $\frac{1}{2}$  | 2 6 $\frac{1}{2}$  | 2 4 $\frac{1}{2}$  | 2 3 $\frac{1}{4}$  | 2 4 $\frac{1}{2}$  | 18 8 $\frac{1}{4}$  | 2 6 $\frac{1}{4}$  | 2 3 $\frac{1}{4}$  | 2 $\frac{1}{4}$ | - 9 4  |
| Up-hill.....              | 2 10 $\frac{1}{2}$ | 2 11 $\frac{1}{2}$ | 2 10 $\frac{1}{4}$ | 2 12               | 2 12               | 2 10 $\frac{1}{2}$ | 2 10 $\frac{1}{2}$ | 2 10 $\frac{1}{4}$ | 21 8                | 2 12               | 2 10 $\frac{1}{4}$ | 1 $\frac{1}{4}$ | + 14 6 |

HAGERSTOWN AGRICULTURAL IMPLEMENT COMPANY, Hagerstown, Md.||

|                           |                   |                    |                    |                    |                    |                    |                    |                    |                     |                    |                   |                 |        |
|---------------------------|-------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|---------------------|--------------------|-------------------|-----------------|--------|
| On level ground.....      | 1 9 $\frac{1}{4}$ | 1 11               | 1 13 $\frac{1}{2}$ | 1 12               | 1 10 $\frac{1}{4}$ | 1 14 $\frac{1}{2}$ | 1 15 $\frac{1}{2}$ | 1 11 $\frac{3}{4}$ | 14 4 $\frac{1}{4}$  | 1 15 $\frac{1}{2}$ | 1 9 $\frac{1}{4}$ | 6 $\frac{1}{4}$ | .....  |
| Right-hand elevation..... | 1 9 $\frac{1}{2}$ | 1 10 $\frac{1}{4}$ | 2 0 $\frac{3}{4}$  | 1 10 $\frac{1}{4}$ | 1 9 $\frac{1}{2}$  | 1 13               | 1 14 $\frac{1}{4}$ | 1 10               | 13 11 $\frac{1}{2}$ | 2 0 $\frac{3}{4}$  | 1 8 $\frac{1}{2}$ | 7 $\frac{1}{4}$ | - 3 14 |
| Left-hand elevation.....  | 1 8 $\frac{1}{4}$ | 1 10 $\frac{1}{4}$ | 1 15 $\frac{1}{4}$ | 1 10 $\frac{1}{4}$ | 1 9 $\frac{1}{4}$  | 1 12 $\frac{1}{2}$ | 1 14               | 1 10               | 13 7 $\frac{1}{4}$  | 1 15 $\frac{1}{4}$ | 1 8 $\frac{1}{4}$ | 7               | - 4 4  |
| Down-hill.....            | 1 9 $\frac{1}{4}$ | 1 11               | 1 15               | 1 10 $\frac{1}{4}$ | 1 10 $\frac{1}{4}$ | 1 13               | 1 13 $\frac{1}{4}$ | 1 10 $\frac{1}{4}$ | 13 12 $\frac{1}{4}$ | 1 15               | 1 9 $\frac{1}{4}$ | 5 $\frac{1}{4}$ | - 3 12 |
| Up-hill.....              | 1 9 $\frac{1}{4}$ | 1 11 $\frac{1}{4}$ | 2 0                | 1 11 $\frac{1}{4}$ | 1 10 $\frac{1}{4}$ | 1 13 $\frac{1}{2}$ | 1 14 $\frac{1}{4}$ | 1 10 $\frac{1}{4}$ | 14 0 $\frac{1}{2}$  | 2 0                | 1 9 $\frac{1}{4}$ | 6 $\frac{1}{4}$ | - 1 14 |

\* Recommended as accurate.

‡ No report, on account of irregularity on hill-sides.

† Recommended as accurate.

‡ No report, on account of great irregularity between experiments.

§ No report, as too great variations on hill-side.

EXPERIMENTS—Continued.

THOMAS, LUDLOW, & RODGERS—SUPERIOR DRILL.\*

|                           | 1                  | 2                  | 3                  | 4                  | 5                  | 6                  | 7                  | 8                 | 9                  | TOTAL               | MAXI-MUM.          | MINI-MUM.         | RANGE.          | VARIATION PER ACRE FROM LEVEL. |
|---------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|-------------------|--------------------|---------------------|--------------------|-------------------|-----------------|--------------------------------|
|                           | Lbs. Oz.           | Lbs. Oz.           | Lbs. Oz.           | Lbs. Oz.           | Lbs. Oz.           | Lbs. Oz.           | Lbs. Oz.           | Lbs. Oz.          | Lbs. Oz.           | Lbs. Oz.            | Lbs. Oz.           | Lbs. Oz.          | Lbs. Oz.        | Lbs. Oz.                       |
| On level.....             | 1 9 $\frac{1}{4}$  | 1 12               | 1 11 $\frac{1}{2}$ | 1 13               | 1 11 $\frac{1}{4}$ | 1 10               | 1 12 $\frac{1}{2}$ | 1 11              | 1 13               | 15 8                | 1 13               | 1 9 $\frac{1}{4}$ | 3 $\frac{1}{2}$ | .....                          |
| Right-hand elevation..... | 1 10               | 1 11 $\frac{1}{4}$ | 1 10 $\frac{1}{2}$ | 1 11               | 1 10               | 1 9                | 1 10 $\frac{1}{2}$ | 1 10              | 1 11               | 14 13 $\frac{1}{4}$ | 1 11 $\frac{1}{4}$ | 1 9               | 2 $\frac{1}{4}$ | - 5 6                          |
| Left-hand elevation.....  | 1 11 $\frac{1}{4}$ | 1 13 $\frac{1}{4}$ | 1 12 $\frac{1}{4}$ | 1 12 $\frac{3}{4}$ | 1 11 $\frac{1}{4}$ | 1 9 $\frac{1}{2}$  | 1 11               | 1 9 $\frac{1}{2}$ | 1 11               | 15 6 $\frac{1}{2}$  | 1 13 $\frac{1}{4}$ | 1 9 $\frac{1}{2}$ | 3 $\frac{1}{4}$ | - 12                           |
| Down-hill.....            | 1 7 $\frac{1}{4}$  | 1 10               | 1 9 $\frac{1}{2}$  | 1 11 $\frac{1}{4}$ | 1 10 $\frac{1}{4}$ | 1 9 $\frac{1}{4}$  | 1 12 $\frac{1}{4}$ | 1 11              | 1 13 $\frac{1}{4}$ | 14 15 $\frac{1}{2}$ | 1 13 $\frac{1}{4}$ | 1 7 $\frac{1}{4}$ | 5 $\frac{1}{2}$ | - 4 4                          |
| Up-hill.....              | 1 11               | 1 13 $\frac{1}{4}$ | 1 13               | 1 14 $\frac{1}{4}$ | 1 12 $\frac{1}{2}$ | 1 11 $\frac{1}{2}$ | 1 13 $\frac{1}{4}$ | .....             | .....              | 16 2                | 1 14 $\frac{1}{4}$ | 1 11              | 3 $\frac{1}{4}$ | + 5                            |

JOHNSTON, GEAR, & TRUMAN.†

|                           | 1                  | 2                  | 3                  | 4                  | 5                  | 6                  | 7                  | 8                  | 9                  | 10       | TOTAL               | MAXI-MUM.          | MINI-MUM.          | RANGE.          | VARIATION FROM LEVEL. |
|---------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|----------|---------------------|--------------------|--------------------|-----------------|-----------------------|
|                           | Lbs. Oz.           | Lbs. Oz.           | Lbs. Oz.           | Lbs. Oz.           | Lbs. Oz.           | Lbs. Oz.           | Lbs. Oz.           | Lbs. Oz.           | Lbs. Oz.           | Lbs. Oz. | Lbs. Oz.            | Lbs. Oz.           | Lbs. Oz.           | Lbs. Oz.        | Lbs. Oz.              |
| On level.....             | 1 10 $\frac{1}{4}$ | 1 10 $\frac{1}{2}$ | 1 10 $\frac{1}{4}$ | 1 10 $\frac{1}{2}$ | 1 10 $\frac{1}{4}$ | 1 10 $\frac{1}{4}$ | 1 9 $\frac{1}{2}$  | 1 9 $\frac{1}{4}$  | 1 9 $\frac{1}{4}$  | .....    | 14 12               | 1 10 $\frac{1}{4}$ | 1 9 $\frac{1}{2}$  | 1 $\frac{1}{4}$ | .....                 |
| Right-hand elevation..... | 1 10 $\frac{1}{4}$ | 1 11               | 1 10 $\frac{1}{4}$ | 1 10 $\frac{1}{2}$ | 1 11 $\frac{1}{4}$ | 1 10 $\frac{1}{2}$ | 1 10               | 1 10 $\frac{1}{2}$ | 1 10 $\frac{1}{4}$ | .....    | 15 0 $\frac{1}{2}$  | 1 11 $\frac{1}{4}$ | 1 10               | 1 $\frac{1}{4}$ | + 2 4                 |
| Left-hand elevation.....  | 1 9 $\frac{1}{4}$  | 1 10               | 1 9 $\frac{1}{2}$  | 1 9 $\frac{1}{4}$  | 1 10               | 1 9 $\frac{1}{4}$  | 1 9                | 1 9 $\frac{1}{4}$  | 1 9 $\frac{1}{4}$  | .....    | 14 5 $\frac{1}{4}$  | 1 10               | 1 9                | 1               | - 3 2                 |
| Down-hill.....            | 1 8 $\frac{1}{4}$  | 1 8 $\frac{1}{2}$  | 1 8                | 1 8 $\frac{1}{2}$  | 1 8 $\frac{1}{2}$  | 1 8                | 1 7 $\frac{1}{2}$  | 1 7 $\frac{1}{4}$  | 1 8                | .....    | 13 9                | 1 8 $\frac{1}{2}$  | 1 7 $\frac{1}{2}$  | 1               | - 0 8                 |
| Up-hill.....              | 1 12 $\frac{1}{4}$ | 1 12 $\frac{1}{2}$ | 1 12 $\frac{1}{2}$ | 1 12 $\frac{1}{2}$ | 1 12 $\frac{1}{4}$ | 1 11 $\frac{1}{2}$ | 1 11 $\frac{1}{2}$ | 1 11 $\frac{1}{4}$ | 1 11 $\frac{1}{4}$ | .....    | 15 13 $\frac{1}{4}$ | 1 12 $\frac{1}{4}$ | 1 11 $\frac{1}{2}$ | 1 $\frac{1}{4}$ | + 8 10                |

H. L. & C. P. BROWN—THE EMPIRE GRAIN DRILL, Shortsville, N. Y.‡

|                           |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                     |                    |                    |                 |        |
|---------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|---------------------|--------------------|--------------------|-----------------|--------|
| On level.....             | 1 7 $\frac{1}{4}$  | 1 8 $\frac{1}{4}$  | 1 8 $\frac{1}{2}$  | 1 9                | 1 8 $\frac{1}{2}$  | 1 7 $\frac{1}{4}$  | 1 7 $\frac{1}{4}$  | 1 7 $\frac{1}{2}$  | 1 6 $\frac{1}{2}$  | 1 7 $\frac{1}{4}$  | 14 15 $\frac{1}{4}$ | 1 9                | 1 6 $\frac{1}{2}$  | 2 $\frac{1}{2}$ | .....  |
| Right-hand elevation..... | 1 7 $\frac{1}{4}$  | 1 8 $\frac{1}{4}$  | 1 8 $\frac{1}{2}$  | 1 9                | 1 8 $\frac{1}{4}$  | 1 7 $\frac{1}{2}$  | 1 7 $\frac{1}{4}$  | 1 8                | 1 6 $\frac{1}{4}$  | 1 8                | 15 0 $\frac{1}{4}$  | 1 9                | 1 6 $\frac{1}{4}$  | 2 $\frac{1}{4}$ | - 0 8  |
| Left-hand elevation.....  | 1 9                | 1 9 $\frac{1}{2}$  | 1 10               | 1 10 $\frac{1}{4}$ | 1 10 $\frac{1}{2}$ | 1 9 $\frac{1}{4}$  | 1 9 $\frac{1}{2}$  | 1 9 $\frac{1}{4}$  | 1 8 $\frac{1}{2}$  | 1 9 $\frac{1}{4}$  | 16 0 $\frac{1}{4}$  | 1 10 $\frac{1}{4}$ | 1 8 $\frac{1}{2}$  | 2 $\frac{1}{4}$ | + 8 8  |
| Down-hill.....            | 1 6 $\frac{1}{4}$  | 1 7                | 1 6 $\frac{1}{4}$  | 1 7 $\frac{1}{2}$  | 1 7 $\frac{1}{2}$  | 1 6 $\frac{1}{4}$  | 1 6 $\frac{1}{4}$  | 1 6 $\frac{1}{4}$  | 1 6                | 1 7                | 14 12 $\frac{1}{4}$ | 1 7 $\frac{1}{2}$  | 1 6                | 1 $\frac{1}{2}$ | - 1 8  |
| Up-hill.....              | 1 12 $\frac{1}{4}$ | 1 13 $\frac{1}{4}$ | 1 13 $\frac{1}{4}$ | 1 14               | 1 14               | 1 13 $\frac{1}{2}$ | 1 13 $\frac{1}{4}$ | 1 13 $\frac{1}{4}$ | 1 12 $\frac{1}{4}$ | 1 13 $\frac{1}{4}$ | 18 8 $\frac{1}{4}$  | 1 14               | 1 12 $\frac{1}{4}$ | 1 $\frac{1}{4}$ | + 28 8 |

BICKFORD & HUFFMAN, Macedon, N. Y.§

|                           |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                     |                    |                    |                 |       |
|---------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|---------------------|--------------------|--------------------|-----------------|-------|
| On level.....             | 1 13               | 1 13               | 1 12 $\frac{1}{2}$ | 1 13 $\frac{1}{4}$ | 1 12 $\frac{1}{4}$ | 1 13 $\frac{1}{4}$ | 1 13 $\frac{1}{2}$ | 1 13 $\frac{1}{2}$ | 1 14               | 1 12 $\frac{1}{4}$ | 18 2 $\frac{1}{2}$  | 1 14               | 1 12 $\frac{1}{4}$ | 1 $\frac{1}{4}$ | ..... |
| Right-hand elevation..... | 1 12 $\frac{1}{4}$ | 1 13               | 1 12 $\frac{1}{4}$ | 1 12 $\frac{1}{4}$ | 1 12 $\frac{1}{4}$ | 1 13 $\frac{1}{2}$ | 1 13               | 1 13               | 1 13 $\frac{1}{4}$ | 1 12 $\frac{1}{4}$ | 17 15 $\frac{1}{2}$ | 1 13 $\frac{1}{2}$ | 1 12 $\frac{1}{4}$ | 1               | - 1 8 |
| Left-hand elevation.....  | 1 13 $\frac{1}{2}$ | 1 13 $\frac{1}{4}$ | 1 13               | 1 13               | 1 13 $\frac{1}{2}$ | 1 13 $\frac{1}{4}$ | 1 13 $\frac{1}{4}$ | 1 13 $\frac{1}{4}$ | 1 14 $\frac{1}{4}$ | 1 13 $\frac{1}{2}$ | 18 6 $\frac{1}{4}$  | 1 14 $\frac{1}{4}$ | 1 13               | 1 $\frac{1}{4}$ | + 2 2 |
| Down-hill.....            | 1 12 $\frac{1}{4}$ | 1 12 $\frac{1}{4}$ | 1 12 $\frac{1}{4}$ | 1 12 $\frac{1}{4}$ | 1 11 $\frac{1}{4}$ | 1 12 $\frac{1}{4}$ | 1 12 $\frac{1}{4}$ | 1 12 $\frac{1}{2}$ | 1 13 $\frac{1}{2}$ | 1 13 $\frac{1}{2}$ | 17 13 $\frac{1}{2}$ | 1 13 $\frac{1}{2}$ | 1 12 $\frac{1}{4}$ | 1 $\frac{1}{4}$ | - 20  |
| Up-hill.....              | 1 14 $\frac{1}{4}$ | 1 14 $\frac{1}{4}$ | 1 14               | 1 13 $\frac{1}{4}$ | 1 13 $\frac{1}{4}$ | 1 14 $\frac{1}{2}$ | 1 14 $\frac{1}{4}$ | 1 14 $\frac{1}{4}$ | 1 15               | 1 13 $\frac{1}{4}$ | 18 13 $\frac{1}{4}$ | 1 15               | 1 13 $\frac{1}{4}$ | 1 $\frac{1}{4}$ | + 5 2 |

\* No report, on account of irregularity between cups.  
 ‡ No report, on account of great differences.

† Recommended for regular discharge of contents in all positions.  
 § Recommended for regularity of delivery under all conditions.

Corn-planters, *i.e.*, machines for planting Indian corn, were both numerous and of ingenious construction. The original inventor was Mr. George Brown, of Galesburg, Illinois, whose planter still holds its place as a well-made and efficient machine. The importance of the corn crop, especially in the Western States, is so great that it is natural that much attention should be devoted to these implements. The object of the farmer is to plant the corn in lines about four feet apart each way, putting three or four grains into each spot, not huddled together but somewhat scattered. Accuracy of work, so that the lines intersect at right angles, is very important, as allowing of more perfect cultivation during growth, on which, and the previous preparation of the land, the result greatly depends. When the surface is made ready for the seed, that is, reduced to a fine condition, the ground is marked out by running the planter across the field empty; a marker consisting of a lever-arm with a shifting pointer indicates the line for the wheel-track on the return journey. Great care is exercised to commence planting at exactly right angles to the cross-lines. The machines which are commonly used consist of a jointed frame supported on broad wheels; across the frame and immediately in front of the wheels are the two seed-boxes. The driver's seat is in the centre, between and somewhat behind the wheels, his weight acting as a balance. Immediately in front of him and between the seed-boxes is the seat for the boy, who sits crossways, so as to work the lever-handle in connection with the dropper, which regulates the discharge of seed at the proper intervals. In front of the runner is a coulter, which opens the ground for the reception of the seed, and in the case of the Keystone corn-planter, manufactured at Sterling, Illinois, this shoe is adjustable. The corn is dropped from the rear of the runner in view of the driver, who can thus see that the action is complete. In the best machines the corn is first deposited in a lower chamber; the distance from this to the ground is small, and the action of the valve causes the corn to be ejected with a side and backward motion, which insures it being scattered in the hill. More or less seed can be sown as required. The frame carrying the seed-boxes, etc., can be raised clear of the ground by foot-leverage, for turning at the land's end and for traveling. In some machines the surface of the wheels is concave, which causes a slight elevation to be made by their track. In this way the grain can be planted with great accuracy, and the crop has a very symmetrical appearance and can be dealt with to great advantage in the subsequent tillage operations. An attempt has been made to make the action automatic, and so save the work of the boy as well as the marking out.



HAWORTH PLANTER COMPANY, *London, Ohio.*

An invention whereby the desired result is obtained by means of a rope made fast at both ends of the field; this rope, which has knots at the requisite intervals, passes over and around pulleys on the planter; the action of the knots causes the grain-dropping apparatus to come into operation. We believe this invention, which we did not see at work, is thought highly of. The price, \$30, which includes a quarter of a mile of rope, does not appear extravagant.

JOSEPH ROTHSCHILD, *Shelbyville, Ky.*

An invention which admits of much improvement in detail, but is sufficiently ingenious to merit a short notice. The dimensions of the traveling-wheels set out beyond the seed-boxes are such that each half revolution causes the cam to actuate the dropper at suitable intervals. Two spring disks on each wheel mark the spot where the corn is deposited, and act as track-markers. The wheels have a series of spikes on their surfaces. If the wheel-disks on the return journey are not in a line with the holes made before, and consequently the seeding is out of line, then the attendant, by lowering or raising the wheel, for which suitable machinery is provided, causes ground to be gained or lost, as required; of course a marker is used to indicate the line to be traversed. This is a highly ingenious arrangement, and likely to become, when perfect, of great use.

Several single-horse planters, taking one row at a time, were shown, the dropping apparatus identical with those already described, variable as to the quantity of seed and the distance between the drills. Such machines are suitable for small occupations, being more expeditious and cheaper than the ordinary system of planting by hand, which hitherto has been principally followed in the Eastern States. It should be stated that the dropping apparatus is so excellent in the best corn-planters that the variation in delivery seldom exceeds one grain; three or four are generally deposited.

## CLASS 672.—HARVESTING.

There is no description of manufacturing enterprise in connection with agricultural machines that has been more successful, or made more gigantic strides in a comparatively short period, than that of reaping and mowing machinery. In the history of many of our most valuable inventions the originators have had neither credit nor commercial advantage from their inventions. Jethro Tull, the father of drill-husbandry, was an object of ridicule to his neighbors, and it was

left for a more enlightened posterity to do honor to the man who raised agriculture from a rude art into a scientific process. The earlier thrashing-machines in England were smashed by an ignorant peasantry, who imagined that because the business was expedited they would be thrown out of employment. How different has been the fortune of the man, still among us, who first produced a practical reaping-machine, and whose exhibits at the Centennial proved that he has not been idle since 1851, when he first astonished the agricultural mind by his exhibits at the Exhibition in London! It is still, we believe, a disputed question whether McCormick, of Chicago, or the Rev. Mr. Bell, of Scotland, was the original inventor. We are inclined to divide the honors. The fact that to Mr. Bell was awarded a medal by the Highland Agricultural Society of Scotland, in 1823, seems to show that he was in reality the first inventor, but to McCormick belongs the equal honor of first producing a machine that could be practically made use of. Our Chairman remembers contemplating the frail-looking and somewhat cumbrous machine in the Exhibition. In order to obtain a just idea of the progress that has been made, a walk through Agricultural Hall, and a visit to the trial-fields at Ed-dington and Schenck's, would convince the most skeptical as to present proficiency and the large interests now involved in the trade. We are almost afraid to quote figures, they appear so marvelous, but McCormick, of Chicago, Illinois, alone turns out 12,000 machines per annum. The three firms engaged in the manufacture of the Champion reaping- and mowing-machines are stated to produce 30,000 a year. The Buckeye is also made in large quantities. F. L. Osborne's manufactory is one of the largest in the States. Mr. Walter A. Wood produces largely at Hoosac Falls, and numbers of smaller houses are doing a good business. Considering that a great proportion are made for the home trade only, it is a matter of surprise that the market has not been long since glutted. We have no doubt that, as in trade generally, production has overtaken demand, and it is to be hoped that one effect of the Centennial Exhibition will be an increased foreign trade. With the exception of Canada, and one exhibit from Australia and Russia, the vast array of harvesting machinery was of American manufacture.

The Judges take this opportunity of expressing their satisfaction at the alteration of the programme, which substituted comparative for competitive trials, a modification which they believe was equally approved by a large majority of the exhibitors. The value of competitive trials depends upon their being thoroughly exhaustive, to which end a crop difficult to cut, machinery of a special character for test-

ing, a large area of land, and plenty of time to apply the tests, are indispensable requisites. At Eddington the crop was light and open, affording no criterion as to the behavior of the machine under difficulties. It is true that by rolling down the grass the cutting was rendered more difficult, but this did not exactly represent natural difficulties. Through the courtesy of an exhibitor we were able to apply a test as to draft, particulars of which are given below. In the wheat-field again a light, upstanding, and very unripe crop did not show the capabilities of the reaping-machines for picking up a laid, tangled, and heavy crop. Moreover, with so much merit, it would have been a very responsible and difficult business to select the best machine, and it would have been hard upon others, whose machines differed only in some trifling and unimportant detail, to be left out without recognition or report. As it was, the trials were of use to the Judges, in enabling them to frame their reports; interesting to the public, as proved by the large attendance; and satisfactory to the exhibitors, who had an opportunity of displaying their goods to the best advantage.

The trial of mowing-machines, hay-tedders, horse-rakes, hay-loaders and unloaders, took place at Eddington, June 27, 28, and 29, under the direction of Captain Landreth and Mr. Geddes, to whom we desire to express our acknowledgments for their courtesy and attention on this and all other occasions.

Twenty-two machines were exhibited, all but two being tested on the dynamometer. This important business was undertaken by Messrs. Oldendorff and Bruce, the following valuable table being the result of their labors:

| No. | EXHIBITOR.                     | DISTANCE RUN. | REAR OR FRONT CUT. | HEIGHT OF CUT. | WIDTH OF CUT. | TOTAL DRAFT. | DRAFT PER SQUARE FOOT OF GRASS CUT. |
|-----|--------------------------------|---------------|--------------------|----------------|---------------|--------------|-------------------------------------|
|     |                                | Feet.         |                    | Inches.        | Ft. Ins.      | Pounds.      |                                     |
| 1   | Warder, Mitchell, & Co.....    | 100           | Rear.              | 1½             | 3 9¼          | 131          | .343                                |
| 2   | Russell & Co. (Peerless).....  | "             | "                  | 1½             | 4 4           | 157          | .388                                |
| 3   | Rochester Agricultural Works.. | "             | "                  | 1½             | 4 6¾          | 206          | .392                                |
| 4   | C. W. Otis (Haymaker).....     | "             | Front.             | 1½             | 4 3           | 165          | .388                                |
| 5   | Eureka Company.....            | "             | "                  | 1¾             | 5 11½         | 172          | .288                                |
| 6   | Adriance, Platt, & Co.....     | "             | "                  | 1½             | 4 3           | 200          | .470                                |
| 7   | C. Aultman & Co.....           | "             | "                  | 1½             | 4 4½          | 178          | .406                                |
| 8   | W. A. Wood.....                | "             | "                  | 1½             | 4 4           | 222½         | .513                                |
| 9   | Bradley Manufacturing Comp'y.  | "             | "                  | 1½             | 4 3           | 182½         | .429                                |
| 10  | Johnston & Co.....             | "             | Rear.              | 1½             | 4 2½          | 204          | .484                                |
| 11  | W. Farr Goodwin.....           | "             | Front.             | 1½             | 4 3           | 186          | .437                                |
| 12  | Osborne & Co.....              | "             | Rear.              | 1½             | 4 7¼          | 260          | .564                                |
| 13  | The Screw Mower Company....    | "             | Front.             | 1½             | 4 2¾          | 235          | .555                                |
| 14  | Keystone Mower Company.....    | "             | Rear.              | 1½             | 4 5¾          | 228          | .509                                |
| 15  | McCormick.....                 | "             | "                  | 1½             | 4 0¾          | 190          | .467                                |
| 16  | Grigg & Co.....                | "             | Front.             | 1¾             | 4 7           | 205          | .446                                |
| 17  | Osborne & Co.....              | "             | "                  | 1½             | 4 3¾          | 220          | .510                                |
| 18  | Osborne & Co.....              | "             | "                  | 1½             | 4 11¾         | 238          | .471                                |
| 19  | Hubbard (Meadow Lock).....     | "             | Rear.              | 1½             | 4 0           | 140          | .350                                |
| 20  | Aultman, Miller, & Co.....     | "             | "                  | 1½             | 4 0           | 171          | .427                                |

It will be seen from the above that the draft per square foot of grass cut varied from .288, in the case of the Eureka machine (direct draft), to .564 in one of Osborne's machines, or nearly 100 per cent. In reality the difference was not quite so great, inasmuch as the Eureka cut a quarter of an inch higher; but, allowing for this, we still have the fact that this machine was the lightest of all that were tried, and, as it is on a totally different principle from the original models, a short reference to its leading features may not be out of place.

The Eureka is a direct-draft mower,—that is to say, the knife works in front of and between the wheels, and the horses are attached to the centre of the machine, equidistant between the wheels, and are so placed, by means of a long neck-yoke, that while one walks on the uncut grass, clear of the knife, the other walks where the track-board has cleared the cut grass, thus the mowed grass is not interfered with, an important point as regards curing. The wheels are much larger than in ordinary machines. The cutter-bar, which in the machine tested was six feet long, is placed in front of the wheels. The pitman works at right angles with the knife, the connection between the two being a bell-crank lever. It might be thought that the horses treading down the grass would prevent even cutting, but this is not so; did the machine follow the tracks instead of meeting them, we cannot say how it would be, but one great advantage of this form of machine is that it returns along the same line, and therefore meets the grass that has been trodden down. Every crop can be dealt with according to its particular form; thus, supposing the grass beaten down in any direction, the machine can be driven at right angles to the lie, and thus good cutting is secured. By a peculiar method of attaching the knife-bar to the frame flexibility is acquired, and we could not see that any machine cut the standing grass more evenly; at any rate, the cutting was sufficiently good. One great merit in this machine is that, owing to having a clearer track on both sides, the cut grass is laid up in a beautifully light, open swathe, very favorable for curing. Indeed, in fair weather very little after-work is required. Two horses worked a six-foot cutter with ease. The gearing is simple, no bevel-wheels are used, and we do not see why such a machine should not wear well, and there can be no question that as a mower it is a highly valuable implement. The Eureka is made by the Towanda Eureka Mower Company, Towanda, Pennsylvania. Another departure from the ordinary form is seen in the Haymaker mower, made by Otis Brothers & Co., of New York, in which the motion is transmitted from the traveling-wheels to the knife by a single pair of bevel-

wheels, thereby effecting a saving of power by a considerable reduction of friction. Though simple enough in reality, the mechanism by which this is effected is somewhat difficult to describe. We find a small bevel-wheel, with forty-six teeth, fixed to the axle, and a similar wheel in all respects, only having two more teeth, gearing into it, but being hung in a gimbal-joint like a ship's compass, it does not revolve, but makes a succession of rapid serpentine vibrations around the face of the other wheel, and an arm extended from the vibrating disk down to the knife gives it the required reciprocating motion. The motion is remarkably pretty; and as six or eight teeth are always engaged at once, instead of two or three, as in ordinary gearing, the wear is more evenly distributed. There is only one rotating bearing besides the axle, viz., that of a simple fly-wheel, which tends to give regularity and steadiness of motion. The only point that is likely to wear is the gimbal-joint, and this we may safely put against the boxes and bearings of ordinary machines. It is noiseless in running, and the work done on upstanding grass is excellent. Because there was no flexible cutting-bar—which could be easily applied—the rolled grass was not cut well. The knife has plenty of speed, viz., 23 revolutions, or 46 cuts for each revolution of the wheel. We venture to express our opinion highly favorable to the merits of this machine, which, it will be seen, stood well for lightness of draft. The simplicity of the machine, and consequent lightness, must not be overlooked in points of merit. There were two other novelties exhibited, both, we believe, the invention of Mr. W. Farr Goodwin, of Stelton, New Jersey; the older machine, shown by the Screw Mower Company, of Philipsburg, New Jersey, has the ordinary gearing replaced by a large gun-metal screw-wheel on the axle, working into a worm on the crank-shaft. The screw-wheel works in oil, the cover being a receptacle. This is sufficient to condemn the principle. Farmers and their servants are too careless for such details; either the machine would be put away without the oil being removed, or it would be omitted when at work, and then great damage would be done in a short time. Moreover, this machine, though it cut the grass well, was heavy in draft. Mr. Wm. Farr Goodwin's more recent invention is certainly ingenious. In the reciprocating screw mowing-machine there is neither gear nor cog-wheel, crank-wheel nor revolving journal, save the main axle, on which is arranged the peculiar mechanical contrivance for converting rotary into reciprocating motion, which is by means of a reciprocating screw on the nut-and-bolt principle. The power is thus applied very directly, but the friction on the surfaces of the screw-wheels must be considerable, since the record is not good, and a pair

of strong horses did not appear to like their job. We do not think, moreover, that the knife travels with sufficient velocity to effect all kinds of cutting. Of the ordinarily constructed machines, the Peerless, made by C. Russell & Co., of Canton, Ohio, and the Champion machines, made by the Champion Machine Company, of Springfield, Ohio, by Warder, Mitchell, & Co., of Springfield, Ohio, and by Whiteley, Fassler, & Kelley, of Springfield, Ohio, made the cleanest and best work, and appear well-made, serviceable machines. We also approve of the mower shown by the Rochester Agricultural Works, of Rochester, New York, and by James L. Spink & Co., of Minneapolis, Minnesota, its manufacturers, as simple in construction and light in draft. The heavier draft machines—those of the Johnston Harvester Company, of Brockport, New York, the different forms of the Buckeye machine, shown by Adriance, Platt, & Co., of New York, N. Y., and by Aultman, Miller, & Co., of Akron, Ohio—made a creditable performance, and the same may be said of McCormick's mower. The W. A. Wood, of Hoosac Falls, New York, cut well when the crop was upright, but owing to its not having a flexible cutter-bar, was useless in the rolled grass. Our conclusion was that the mowing-machine and combined machine business has reached a high state of perfection in the United States, and that farmers may well be puzzled to know which to select where many are so good. Too much stress must not be laid upon draft alone. It is quite true that it is of great importance. If, as in the Eureka, a six-foot cut can be made as easily as a four-foot cut, we have at once a saving of one-third of our horse-power; but all the ordinary machines are well within the compass of two horses, and, after all, the difference in the better machines is not very great. Although not brought to trial, we cannot pass over without special commendation the mowing-machine and combined mower and reaper shown by L. D. Sawyer & Co., of Hamilton, Ontario, Canada, which appears to have much merit. The inside driving-wheel is made larger by one inch diameter than the outside, in order to obviate side draft. The ordinary clutch-gear, for throwing in and out, is replaced by an eccentric. The knife-bar is suspended on the drag-bar in such a manner that the position of the knife-bar is secured. The ratchet-gear on both driving-wheels is without springs. The combined machine shown by the same firm is also a very practical machine, with an ingenious arrangement for hinging back the platform so as to reduce the width of the machine for passing through farm gateways.

Hay-tedders and horse-rakes do not call for any special notice. Certain awards were made, but the Judges were not impressed with

the merit of these machines, and in some instances the construction appeared defective. There was only one hay-loader exhibited, that of Messrs. Stratton & Cullum, of Meadsville, Pennsylvania (known as Faust's hay-loader), but so successful in its operation and so saving of labor that a short reference is indispensable. This is a thoroughly practical machine, readily attached to any ordinary farm-wagon, and capable of taking the hay out of windrow quite as closely and as rapidly as could be done by four men; the proof of this is the fact that it requires two men in the wagon to load the hay as delivered. The machine comprises a revolving spindle (on high wheels) and forked tines, somewhat resembling an English tedder, which picks up the hay and delivers it to an elevator of simple construction with a wind-quad. The action is continuous and perfect, all that is necessary is that the windrow be carefully made; but this can be made by a horse-rake, so that manual labor is reduced to a minimum. Equally effective are the unloading forks and conveyers, by which the hay is elevated from the wagon by horse-power, and conveyed to any portion of the barn or mow desired. In this way two men on the wagon, one attending to the fork, and two hands in the barn, are capable of stacking as much hay as could be pitched by four able-bodied men. We notice and record great progress in this department of farm economy. Until the horse is accustomed to work the fork, a boy in attendance is necessary, but after a little education the intelligence of the animal enables it to perform the operations by word of mouth from the man working the fork. There are several forms of this implement: thus we have the single- and double-shaft harpoon, and the expanding forks, differing in utility but all having commendable efficiency. We see no reason why the loader should not be used for hoisting loose grain, although such operations are necessarily wasteful, and only to be resorted to when it is impossible to tie up the grain.

The great feature of the Exhibition, as regards reaping machinery, was the practical realization of a long-wanted and much-desired combination of a cutting- and automatic binding-machine. It would be premature and injudicious to say that the present will be the ultimate form, or that the arrangements are perfect. Much improvement is desirable, so as to simplify the mechanism; but just as the first Exhibition was memorable for the introduction of a reaping-machine, will this be remembered as the first public occasion upon which automatic binders were successfully worked. There were four separate inventions shown, and all were practically tested at Schenck's, three of them successfully, while the ingenious invention of Mr. McPherson

failed more from bad workmanship than from defective construction; indeed, it appears to us to possess elements of great merit, and we trust to see it eventually successful. The other exhibitors were F. D. Osborne, to whom must be awarded special commendation, since his machine never once stopped, nor failed to deliver a well-bound sheaf, McCormick, and W. A. Wood. In all the material used for tying is iron wire, and the *modus operandi*, though arrived at by different mechanical means, is identical. To the ordinary harvester, which cuts the grain and carries it, by means of a revolving table and elevator, to the tying platform, is applied the tying apparatus, which consists of a revolving lever that places the wire around the grain, while an ingenious arrangement of toothed wheels working in a rack twists and cuts the wire, which receives the requisite amount of tension in the process. The sheaf thus made is either allowed to fall from the table by the pressure of freshly-formed sheaves behind or is ejected by a spring action. As a rule, the wire was well tied, and sufficiently tight for ripe grain; how far wire will answer when the grain is cut before fully ripe we had no means of testing, as, unfortunately, the crop at Schenck's was quite ten days over-ripe, and considering the tangled condition of the heads in consequence, it was creditable that such a good separation was made. To the unfavorable condition of the crop must to some degree be attributed the failure of the South Australian reaping- and thrashing-machine, which is thus spoken of in Mr. William Harcus' work on that colony: "The greatest invention ever produced for the agriculturists of South Australia is Ridley's reaping-machine, which reaps and thrashes the wheat by one simple process." We were very anxious to see this novelty at work, and Mr. Davenport, the energetic Commissioner, took the greatest possible trouble in the matter. Unfortunately, whether from the over-ripe condition of the crop, or the way in which the heads hung down, the comb-like collectors clogged up, only a portion of the ears were removed, and at every few yards the machine had to be stopped. The idea is to take off the heads at the junction with the straw, pass them into a box, and act upon them with a drum with four beaters, driven at a very high speed. This separates the grain from the chaff, and blows the products into the receptacle behind. At the land's end it is emptied into sheets and winnowed at once for market. It is clear that either this machine is capable of much improvement or it should be abandoned in favor of a simpler arrangement.

The varying requirements of different districts were well illustrated by the exhibition at Schenck's, which embraced all sorts except the



heading-machine, which we believe is principally confined to California, Oregon, and such districts. 1st, we had specimens of the harvester reapers, which we believe have commanded a large sale in some of the Western States. With one exception, to be alluded to, the old plan of a revolving platform, which travels at right angles to the forward motion, is adopted. This is either of cloth furnished with half-round wooden laths at intervals, or is made of wooden shakers with iron pins. The grain is thus led to the elevators, and either carried up between two traveling-cloths, as in McCormick's machine, or on the outside, its falling back being prevented by a guard; two men occupy the tying platform, in some instances standing or sitting close together, when they get in each other's way, in others being separated as widely as the nature of the work allows. As fast as the sheaves are made they are either thrown off or placed on a tipped platform actuated by a leverage from the driver's foot, who drops ten sheaves at a time.

A novel and, as it appears to us, advantageous divergence from this type was shown by Messrs. George Esterly & Son, of White-water, Wisconsin, and known as the Esterly harvester. Unfortunately, this machine was not taken to Schenck's, but we think there can be no question as to its being capable of successful working. The knife is driven in the same way as sweep-rake reapers, and not by an attachment in the centre of the blade with connecting-rod passing under the platform,—a clumsy arrangement, liable to become impeded by dirt, etc., but rendered necessary in the ordinary form. The platform is fixed, comprising first a level surface, and then a slightly-concave elevation, up which the grain is swept at required intervals by a balanced rake, which works quite independently and in a different orbit from the reel, which, however, derives its motion by chain-gearing from it, and can be regulated up or down, backward or forward, to suit the requirements of the crop. The advantage is in the quieter movement of the grain, which is liable, if ripe, to be knocked out by the revolving platform. But the especially meritorious feature of the Esterly machine is in the traveler on the binding platform, which is so arranged as to collect the grain brought by the rake and convey it first to one binder and then to the other, the binders being seated at opposite sides of the platform. Not only are they out of each other's way and able to employ their labor efficiently, but the traveler does some of the work by compressing the grain into the form of a sheaf. We think it possible for two men, thus assisted, to tie up a light crop of moderate length, and to do quite as much work as five or even six men could with the gavels, as made by the

ordinary sweep-rake reaper. We see no reason why the traveler might not be replaced by an automatic binder.

2d. The table-rake reapers were exhibited by Mr. W. A. Wood, of Hoosac Falls, New York, and C. Aultman & Co., of Canton, Ohio. The first machine, in which the rake is attached to a chain-gear which travels around the outside of a nearly square platform, was not a success, as the grain was laid too much to the rear of the machine, and not clear of the horses' track during the next journey. Messrs. Aultman's apparatus, in which the jointed rake is driven by universal joint- and bevel-gearing, being directed in its orbit by a common table screened from the grain by a shield, made excellent work, and offers some advantages over ordinary sweep-rakes, especially in the superior form of the gavel for binding. The rake can be worked continuously or stopped at any portion of its course by leverage from the driver's foot, thereby allowing of regulating the size of the gavels according to the crop. The disadvantages of the table-rake appear to be that as the rake compresses the grain at the corner of the table there would be some risk of the grain shedding when over-ripe, while the closeness of the gavel interferes with the drying influence of sun and wind when the corn is cut green. The practical farmer alone can decide in which direction the balance lies according to his requirements.

3d. By far the largest number of machines exhibited at the Exhibition and worked at Schenck's were on the sweep-rake principle, with improved turn-table adjustment, which we believe was first patented by the Johnston Harvester Company, of Brockport, New York, and which enables the operator to convert rakes into collectors and collectors into rakes to suit the varying conditions of the crop; in other words, any or all of the arms can be made to rake off the grain, so that for every revolution of the rakes one, two, three, or four sheaves can be made, and this action in nearly all of the machines can be made automatic or controllable. Without going into details we may state that most of these machines cut and laid well, and represent a very decided advance on their originals.

#### CLASS 673.—MACHINES PREPARATORY TO MARKETING.

THRASHERS.—As was to be expected, this was a large entry, confined, however, almost entirely to the American section; Canada exhibiting three or four machines and Russia one. The latter, a powerful but cumbrous-looking implement, was built somewhat on the English plan, while the Canadian exhibits were on the American model. In the few remarks that are called for we shall therefore confine our attention to the home production. Though steam- and horse-power

thrashers were invented and brought into use long before harvesting implements, similar progress is not visible. The thrashing-machine of to-day is undoubtedly much improved and combines more operations than the original, which was merely a revolving drum or cylinder and an inclined open platform. The produce, after being acted upon by the drum, fell into this open platform, when it was shaken up by manual labor, the chaff and the grain passing through the openings of the platform with much short-straw cavings, etc., while the longer straw was carried away from the lower end of the platform, being first well shaken by men with forks. At the present day we find the American machines of two distinct types. In the older form, the produce, after passing the cylinder, is carried by an inclined revolving cloth, furnished with cross sections or cups of wood, a distance of about ten feet. Then the thrashed corn, chaff, and such ears as have passed the cylinder entire or only partially thrashed, fall upon the shaker, which has a reciprocating motion. The grain and chaff passing through the openings of the shaker-screen, meet the blast from the winnower, the chaff is blown right out of the machine, while the grain passes to the sack by means of a spout, assisted in some cases by a revolving screw. The unthrashed heads, etc., which for distinction may be called *cavings*, passing over the end of the screen, are conducted by a spout to the hopper of the elevator, carried back to the drum, and rethrashed. The straw is passed from the carrier on the straw-belt, being aided thereto by the picker, a revolving triangular piece of wood. The straw-belt is agitated so as to carry the straw a distance of five or six feet by a series of jerks; any loose grain carried over with the straw is thus shaken free, and, falling through the open spaces of the belt, is conducted back to the screen. In most of these machines both the cylinder and concave are close,—*i.e.*, their surfaces are covered with sheet-iron.

In more modern forms the cloth-carrier is replaced by shaker-frames and reciprocating forks. The cylinder and concave are both open, so that a large proportion of the chaff and grain falls at once on to an inclined plane, by which it reaches the screen of the winnower. Any grain passed forward with the straw is shaken out during its forward passage, and finds its way by another inclined board back to the winnower. We think this is a step in the right direction, reducing the work which the machine has to do, and bringing the grain more rapidly to the winnower. It must be bad economy to carry all the grain a distance of ten feet when it might be got rid of at once. The special merit claimed for the American cylinder is the rapidity with which it thrashes; its weakness, that it cannot thrash clean at one

operation, and hence a portion of the produce is always on its way back to the cylinder to be thrashed over again. Depending entirely for cleaning operations upon one fan, which, as a rule, is driven from the cylinder-shaft, it stands to reason that with all due care the wind must be irregular, owing to the fact that the speed of the cylinder is checked whenever an extra quantity of feed is presented. We ought to state that in one machine, made by the Geiser Company, an attempt is made to obviate this defect by providing self-adjusting shuttles, which are regulated by the force of wind striking on and actuating a counter-balance; whether this action is quick enough to be effective we cannot say. The cylinder, which is a modification of the old Scotch peg drum, breaks the straw very much, which we believe is not considered a disadvantage for litter purposes, but rather the reverse; it certainly increases the difficulty of handling. Considering the additional labor that is necessary to produce No. 1 grain for the market, it is a question whether, on the whole, machines similar to the improved English model would not prove the more economical; certainly their use is attended with less scattering and loss of grain. It is probable that less grain would be thrashed, but the great bulk of the grain would be ready for market, and worth more from the polishing up to which it is twice subjected by at least twenty-five cents a quarter. It is probable that short and headed grain would thrash fastest by an American cylinder, but given a good, fair crop, we do not think the difference would be sufficient to make up for these manifest deficiencies.

The straw-elevators to convey from the machine to the wagon are simple and inexpensive, answer well in still weather, but are useless in a cross wind, as the sides are low and there is no sort of cover or guard. Field-trials were organized at Schenck's Station, the forty-six acres of wheat cut by the reaping-machines being reserved for this purpose. These trials were in progress from the 17th to the 22d of July inclusive, but, owing probably to their not being competitive, only a portion of the exhibits were presented, and of the nine machines which were tried only three were adapted for steam-power; the remainder were two-horse and one-horse machines, to be driven by railway-power. An attempt (which occupied two days) was made to test the power consumed by running each machine through a friction dynamometer, but, owing to the pulleys being too small, no reliable results could be obtained, and this part of the programme was abandoned with much regret, as it is an important point to determine the relative draft of each machine. The following table represents the results obtained:

| NAME.   | PRICE. | WEIGHT OF GRAIN. POUNDS. | TIME OCCUPIED. MINUTES. | WEIGHT OF GRAIN THRASHED. POUNDS. | SEC'D. | WASTE UNDER MACHINE. | REMARKS.   |
|---|--------|--------------------------|-------------------------|-----------------------------------|--------|----------------------|--|
| G. Westinghouse & Co. }<br>10 horse-power.                                      | .....  | 2000                     | 15½                     | 638                               | .....  | 30                   | { Tail taken with waste. This machine made good work, and appears thoroughly well made and useful.   |
| Geiser & Co.....  | .....  | 2000                     | 16                      | 630½                              | .....  | 15½                  | { This machine took a large amount of power, owing to complication of gearing, without adequate results. Self-adjusting wind-space.  |
| Pennsylvania Agricultural Works. }<br>(A. B. Farquhar.) }<br>Cylinder, 30 × 18. | .....  | 2000                     | 14½                     | 598                               | .....  | 22½                  | { Great vibration. Thrashing not clean.  |
| G. Westinghouse & Co. }<br>2 horse-power. }<br>Cylinder, 30 × 14.               | .....  | 1000                     | 19½                     | 297½                              | .....  | 14½                  | { Thrashes fairly clean, and makes good work. A useful machine.  |
| Doylestown Fr. }<br>2 horse-power. }<br>Cylinder, 30 × 14.                      | \$485  | 1000                     | 14.58                   | 305                               | .....  | 35½                  | { Did not thrash clean. Horse-power noisy. Price, complete, \$485.<br>Machine.....\$225<br>Horse-power..... 150<br>Wheels & carriage... 110<br>\$485   |
| Wheeler & Mellick }<br>Company. }<br>2 horse-power.                             | 515    | 1000                     | 19                      | 327½                              | .....  | 22½                  | { Ran steady, and made fair work.<br>Machine.....\$235<br>Power..... 180<br>Wheels & carriages. 100<br>\$515   |
| Minard Harder. }<br>2 horse-power.  | 540    | 1000                     | 18½                     | 320                               | 8½     | 15½                  | { Good machine, and fair horse-power. Change of gearing to either side of machine. Good winnowing apparatus.<br>Machine.....\$235<br>Horse-power..... 190<br>Wheels, etc..... 115<br>\$540   |
| Ellis, Hoffman, & Co. (Champion). }<br>1 horse-power. }<br>Cylinder, 18 × 17.   | 250    | 1000                     | 34                      | 319½                              | .....  | 7                    | { Peculiar arrangement of double fan on shaft of cylinder. Winnows by double spouts to air-chamber. Fans make a good duster. No elevator to bring back cavings which collected from under machine and rethashed. Six men employed. Power too small to be economical.<br>Machine.....\$150<br>Horse-power..... 100<br>\$250 |
| Heebner & Sons. }<br>Cylinder, 20½ × 16.  | 315    | 1000                     | 15.15                   | 305                               | .....  | 30                   | { Overshot concave, and no duster. Very trying for feeder. Tread-power has some good features. Large level track for horses. Governor on fly-wheel. Large pulley-wheels. Made fair work.<br>Machine.....\$140<br>Power..... 175<br>\$315<br>No wheels supplied.  |

We cannot speak very favorably of these small power-machines; they are probably suited to small occupations when the opportunity does not occur to hire steam-thrashers, and it may be that having the machinery at hand and always ready allows of the filling up of odd time which might otherwise be wasted. It is evident that much consideration has been bestowed on the improvement of railway-powers, and much as we dislike to see horses employed on a treadmill, there can be no question that considerably more duty is obtained than through horizontal horse-gears, when the driving-wheel is sufficiently large and the bearings are also large. The pace of tread not exceeding one and a half miles per hour, and if the elevation of the horse-track does not exceed fourteen or fifteen degrees, then such powers are valuable for various kinds of work, and are not necessarily horse-killers, as they have been called.

We have recommended for award such as appear to fulfill the above conditions. We must notice John A. Hafner's patent Eureka coil spring, for thrashing-machines driven by gear. In the Western States eight or ten horses are frequently employed, the power being communicated from the horse-wheel to the thrasher by tumbling-shaft and cog-wheels. It stands to reason that in starting the horses, or whenever the cylinder is choked down from over-feeding and the velocity suddenly checked, a great shock will be experienced both in the running parts and the horses' shoulders, destructive to the machinery and injurious to the animal-power. Again, the shaft of the horse-power is necessarily irregular, and its full force, less friction, cannot be conveyed to the thrasher, unless we have some means of storing and accumulating the power, and this we get by this spring. It consists of a cylindrical coil of three plates made of the best cast spring steel. These plates are riveted together at the inner hook end. The strain on the outer plate, which is thickest, is tensile, while the strain on the inner plates is compressive, and the spring is thus self-supporting and durable. It is contained in a box, which is fitted on to the driving-gear of the thrashing-machine. It is stated by the inventor that a spring fitted up for a ten horse-power will stand and vibrate under a concussion of over one hundred horse-pressure, and, having a length of five feet, will vibrate from the slightest pressure. This spring can be used on all machines, whether worked by horses or steam, or driven by gear or belt, but its peculiar value is for horse-power machines driven by gearing. We saw it applied to a horse-gear belonging to the Pennsylvania Agricultural Works Company, to drive a five horse-power thrasher. The relief to the horses and the steadier running of the machine were apparent and considerable. It would have been better if the

spring had been applied to the spar-wheel which drives the cylinder pinion, but this was, under the circumstances, impossible. Mr. Hafner casts his spring-box upon the spar-wheel, the outer end of the spring being connected with the casing while the inner end connects with the centre hub, which is keyed fast to the shaft, the box being allowed to play fully on the hub.

LILPOP, RAU, & LOEVENSTEIN, *Warsaw, Russia.*

This exhibit, which was tried at Schenck's, is a powerfully-built machine, probably requiring a nominal eight horse-power engine to drive it. The construction is on the English model, the drum being open, with a series of smooth beaters. The concave also has open spaces between the bars. The winnowing and cleaning capacity is large. The corn, however, is only winnowed once, and the straw-shakers have not a sufficiently rapid or independent motion to deliver the straw freely. This machine was tried under considerable disadvantages, as the attendants were not qualified to manage it properly. We are of the opinion that it is well adapted for bad roads and districts where repairs would be difficult to execute.

In our examination of machinery for separating cotton from its seed and preparing it for the manufacture, as well as in the case of coffee-hullers, rice-mills, etc., we had the valuable assistance of Colonel Bradford, whose practical knowledge of the subject was of the greatest importance in helping us to form a correct conclusion. We found seven cotton-gins, all in the American section, and which, although required in the Southern States, were all manufactured in the eastern and northern localities. We think that self-feeders are a most desirable addition, and, considering the danger and risk of accidents, they should be more generally applied than is the case at present. Two different forms of self-feeders were exhibited. The original and probably the best is the invention of S. Z. Hall, of New London, Connecticut, which comprises a large hopper, into which the cotton is thrown with a fork. The bottom of this hopper consists of four revolving wooden rollers, slightly inclining towards the front, with spaces between, which allow dirt, etc., to escape; from the hopper the cotton is caught up by a wooden roller with numerous small spiked teeth, and carried between it and a fine-meshed wire frame, which allows of a further separating of dust, etc. The cotton drops from the rollers into the cutters. In Brown's feeder, which is also made at New London, the only difference is that the bottom of the hopper has a series of fixed and movable bars with iron serrated

teeth, which possibly carry forward the cotton with much regularity. We are also satisfied of the value of the condenser attachment, and highly approve of the arrangement as seen in E. Remington & Sons, of Ilion, New York, Needle cotton-gin, in which the condenser consists of a large lower cylinder covered with perforated zinc and a small close roller above. The cotton passing between is properly condensed, and dust, etc., passes through the openings in the cylinder and is collected in a tube below. Another feature of Remington's machine, from which it derives its name, is the substitution of needles for serrated surfaces in the cutters. The ordinary cotton-gins have, according to size, a certain number of finely-serrated saws on a shaft, revolving between ribs either square or flanged. These ribs support the cotton while it is being torn to pieces by the cutters; the seed passing away, while the cotton finds its way between the saw and the rib into the revolving brush. In Remington's machine the needles are made in sections, of best steel wire, with rounded surfaces, and covered on each side with Babbit metal. The needles neither tear nor saw off the cotton, but pull it out, consequently they preserve the film, and the seed is well cleaned. The ribs are peculiar, having a flange in the centre on the upper surface, which has the effect of keeping the cotton over the needles. The Babbit metal does not heat, so there is not the risk of accidents from that source, which we believe have occurred with the ordinary saw.

DAVID KAHNWEILER, *New York, N. Y.*

The only exhibitor of cotton-seed hullers, showing different sizes of machines, all excellently well made, and suitable for the purpose. One of those to which we particularly wish to draw attention is designed for plantation use, with a view to meet a very desirable improvement, viz., to remove the shell preparatory to the seed being used as cattle-feed. It will be readily conceived that there are conditions under which the sale of the seed for the purpose of oil-manufacture would not answer, owing to expense of transit, etc. Its value as food will be greatly increased if loose cotton and shell can be removed, and not only so, but it will be converted from a highly dangerous into a perfectly safe material for cattle. First of all we have a hopper, with a revolving feed-roller, cast in small sections, which allows the seed to pass into the mill, but keeps out nails or sticks. The mill comprises an under roller, with smooth surface, carrying eight knife sections, placed in different positions, so as to act like a screw. This roller works against a concave with four knives. The shell and seed fall on a fine reciprocating screen, and are kept well distributed thereon



by means of a revolving spindle, furnished with wooden teeth. The seeds pass through the screen, the shell works off. The method of adjusting the knives on the roller is simple and efficient. This machine can be made either for hand or power.

TAPPEY & STEEL, *Petersburg, Va.*

Several cotton-baling presses were shown. Of these, we consider the Beasley power press made by this firm deserving of commendation, both for the pressure brought to bear and for the simplicity of mechanism. The press is put into work by a clutch, and a self-tripping screw throws it out of gear when the pressure has been exerted.

R. WAKEMAN, *Port Deposit, Md.*

A hand-power machine, with admirable leverage, in which the press is raised by ratchet worked by lever, and the pulley lets down by its own weight. A power of fourteen tons can be applied to each lever. In its present form this press is most suitable for hay, but it can be readily altered to suit cotton.

E. J. MORRIS & Co., *Philadelphia, Pa.*

There were very few coffee-hullers on exhibition, and not of great merit. The machinery shown by this house, and especially designed for the large Uraqua berries of Liberia, though doubtlessly accomplishing its object, is at present too diffuse and clumsy a form to justify consideration.

ALBION COFFEE-HULLER COMPANY, *New York, N. Y.*

The more shapely machine of this company, which has elastic pads, did not make at all a good show, and appeared too slow in action.

DANIEL LOMBARD, *New York, N. Y.*

Quite a good hand-machine coffee-huller, which consists of a vertical fluted roller. The coffee passing in at the top is carried round between this and spring-jacketed concave plates, securing the requisite pressure, but allowing of sufficient elasticity to suit the varying size of the berries. The same exhibitor showed a powerful rice mortar and scourer, which can also be used for coffee-hulling. This is a very simple machine, comprising a large oval iron pot, set up on a strong frame, with a revolving spindle through the centre, driven by bevel-gear from below and furnished with a powerful spiral screw. The pot is filled with the seed and the screw driven at 130 revolutions per minute. The shape of the pot insures the seed coming in contact

with the screw. Power machines can scour 30,000 pounds of rice a day.

GEORGE H. PEABODY, *New York, N. Y.*

We were much impressed with the value of a composition of emery attached to wood, which has been discovered and perfected by Mr. Peabody, as an admirable material for the interior surface of rice-shellers. This emery composition is one-eighth of an inch thick, and the attachment to the wood is apparently very durable. Mr. Peabody's inventions with this material include a rice-huller and polisher, for family use; rough-looking machines.

R. H. ALLEN & Co., *New York, N. Y.*

While on this subject, we may notice the only machine in the Exhibition which attempts to economize the labor of corn-husking by substituting mechanical for hand labor. This is the Phillips Spiral corn-husker, shown by R. H. Allen & Co., which appeared an ingenious labor-saving machine, and should come into extensive use. It consists of a frame, across one end and near the top of which are placed two picking-rolls, with spiral grooves, between which the stalks are fed, and in passing through their rolls the stalks are separated from the ears. The stalks drop upon an elevator and are removed. The ears, as they are severed from the stalks, drop upon the husking-rolls, placed lower down in the frame, at right angles to the picking-rolls and in an inclined position. These rollers have grooves corresponding to spikes on the opposite rollers. The spaces are also valuable in allowing the ears to settle down between the rollers, so that the hold upon the husks may be made certain; the spikes are arranged spirally upon the rollers, and hold the husks at one end of the ear and continue the grasp to the opposite end, making the process of stripping the husk from the ear very similar to husking by hand. As the ears slide down the rolls the husks are caught by the steel spikes, drawn in between the rolls, torn off, and dropped upon the elevator, while the ears pass on to the end of the rollers, and are then delivered into a basket. It will be understood that the ears are discharged at the opposite end of the machine from the stalks and husks. A machine costing \$150 is capable of husking twenty-five to fifty bushels per hour.

There were a number of corn-shellers, both for hand and power; the former were principally without feeding apparatus, necessitating the constant attention of the operator; most of them were also with-

out fans, requiring the further operation of separating the chaff from the corn. These appear to us defects which should be remedied.

SANDWICH MANUFACTURING COMPANY, *Sandwich, Ill.*

A large exhibit of power-machines, showing three sizes, viz., four-horse, two-horse, and one-horse shellers, which for efficiency of design and excellence of construction were far superior to any other machines. We have endeavored to describe these in our recommendations for award, but consider them worthy of more detailed notice. In the first place, there is in the large machines an excellent feed-elevator, consisting of four rubber straps with convex projections working between three bars, which insure the corn, however carelessly placed on the elevator, being properly straightened and regularly passed into the mill by means of a force-feed spindle furnished with iron flanges. Next the corn is caught by four vertical disk wheels, 7 inches diameter, covered with small teeth, and revolving 600 times a minute. These are known as little pickers. It is passed from them to two large picker-wheels, also vertical, and having teeth on both faces, which, with the aid of steel springs, hold the corn while the bevel-runners, 12 inches diameter, with coarse ribs radiating from the centre, making 700 revolutions per minute, strip the corn from the cob. The latter is thrown out on to a wire elevator, which is in two parts; the farther, at a lower elevation, allows of any corn that may be carried along with the corn being carried back. The corn falls on a riddle, is winnowed, and is elevated either into sacks or a wagon, as is required. The four horse-power machine, which we have endeavored to describe, shells one hundred and fifty bushels per hour. It is admirably made, the strength of each part being properly proportioned.

WINNERS.—In the French and German sections revolving cylindrical graders were represented, both for grading corn by means of different-sized sections, and also for removing cockles, etc.; the latter being accomplished by an ingenious construction of the internal surface of the cylinder, which is covered with indentations of such size as to hold the cockles, etc., when passing a screen or diaphragm placed across the centre of the cylinder. The cockle-seed falls out of the cells into a central channel, and is conveyed to the outlet by a revolving screw. This makes a very complete separation. The French machines, shown by M. Pernollet, Paris, were separators and graders only. The German, exhibited by Mayer & Co., Kalk, near Cologne, combined a winnower with the separator, but had not the good finish

or completeness of the French machines. The American retains the old form of winnowing-machine, combining in the best specimens very efficient separators. We particularly call attention to W. Cortrites and the Queen of the Harvest, shown by the Queen of the Harvest Company, of West Chazy, Clinton County, New York, as remarkable graders and seed separators.

CLASS 674.—MACHINERY APPLICABLE TO FARM ECONOMY.

PORTABLE AND STATIONARY ENGINES.—A portion of these, being in Machinery Hall, were examined and reported upon by the engineer Judges. One of these only, that of Messrs. Frick & Co., of Waynesborough, Pennsylvania, was sent to Schenck's for trial, and on that only have we reported. We are indebted to Colonel Waring for great assistance in making our examinations, and to his brother, Mr. John B. Waring, aided by Mr. Bryan Danby, Superintendent of Machinery, for conducting the experiments at Schenck's on the 19th, 20th, 21st, and 22d July. These tests were applied with a view to obtain a comparative rather than a positive test, neither time nor opportunity allowing of more than this. One of the Baker blowers, made by T. Wilbraham & Bros., of Philadelphia, was used as the testing power, each engine being employed to drive it having a given quantity of coal and wood. The quantity of water consumed, the time of the experiment, the pressure of the steam, revolutions of the blower, and force exerted, as indicated by a mercury pressure-gauge, were all carefully noted, and formed the elements of comparison. Some description of the more noticeable machines will be appended. The trials were confined to American engines, with one exception,—that of a portable engine with vertical boiler, from Warsaw. Our opinion is that the makers of portable farm engines have principally aimed at the production of a machine that is easy of transportation and reasonable in price, without much regard to the question of duty for fuel consumed,—in other words, the boiler and fire-box capacity are insufficient to produce the most economical results, as the consumption of fuel under such conditions is necessarily wasteful. Doubtless practical experience has led to this arrangement, but it is a question whether more attention should not be paid to the economy of fuel, especially in those districts where fuel is expensive. Inasmuch as most of the work of portable engines takes place during winter, we think it would be desirable that the cylinders and boilers should be felted and lagged; the additional outlay would, in many cases, be well repaid. We suggest for the consideration of makers the question of straw-burning engines for the Western States; we believe that in many districts the

straw, both of grain and corn, is of no value, either as bedding or fodder; it is burnt on the ground as the readiest means of getting rid of a nuisance, and had much better be used as fuel. Portable engines have been made which successfully accomplish this, and in the case of one English firm (Messrs. Ransomes, Sims, & Head, of Ipswich), an arrangement exists for a self-feeder, which delivers the straw into the fire-box in a continuous stream.

Another point worth attention is whether it would not be possible to introduce a light traction engine, sufficiently strong to do the hauling, and possibly the reaping, as such work will assuredly be eventually done by steam-power, and capable of being utilized for steam cultivation, when the time for such work arrives. One great advantage which manufacturers possess here is the superior quality of the best iron, which allows of much less material being used. We believe that such a machine might be made without any really serious increase of weight, and if the same could be bought at not more than fifty per cent. increase over the price of an ordinary portable engine, the advantage in the saving of horse-labor, and expediting operations, would amply repay for the additional outlay. The English machines, admirably well made as they undoubtedly are, are both heavy and costly; equal strength might be obtained with much less weight, especially if steel was used for the fire-box and boiler.

FRICK & Co., *Waynesborough, Pa.*

The Eclipse engine, exhibited by this firm, gave the best results of any that were tested, and is a strong, well-made, and useful machine; the traveling-wheels are large and powerful; the boiler is suspended on springs for traveling, which are let down when at work; it is capacious, having 33 2-in. tubes 6 feet long; there is a good brake on the hind wheels, very useful for staying the engine when at work. The engine is carried on the top of the boiler, resting on a powerful bed-plate, hollowed out to receive and collect waste oil. This can be detached from the brackets and converted into a fixed horizontal engine if desired. The governor has three speeds, and the crank-shaft is counter-balanced; all journals are self-oiling; the engine-saddle has provision for varying expansion; the water-heater is large, of the ordinary diaphragm form; and the pump, with air-chamber, has a double valve, returning excess of water to the supply. The cylinder has balance slide-valves; the safety-valve works by a spring, which is a good arrangement, particularly when the roads are rough; a driving-wheel is provided on each side of the crank-shaft.

BEST STEAM-ENGINE AND BOILER WORKS, *Lancaster, Pa.*

A useful farmer's engine, with some specially commendable features; thus the pillar-blocks are on one saddle, which is bolted on the inside to the bed-plate; the feed-water pipe of the pump passes through the pillar-block journals, and thus tends to prevent heating; the pump-rod is well situated, being very direct; a double valve, while it shuts water from the boiler, opens a vent, which allows the water to pass to the ash-pan. There is a simple arrangement for reversing the eccentric without link; the connecting-rod has solid ends. The boxes are set up by key, adjusted by set-screws; the water-heater consists of a long, narrow tube, with a coil of paper inside; steam passes through the centre. This engine made a good record at the trial.

MANSFIELD MACHINE WORKS, *Mansfield, Ohio.*

These works showed in Agricultural Hall a good serviceable-looking engine, which did not come out for trial, and therefore we have no facts for our guidance, but, as far as can be judged from the size of the boiler, and the general construction, it ought to give a good account of itself on the brake. The pump, of good pattern, is driven by eccentric to the main shaft; the position of the engine at the side of the boiler is convenient for getting at. It is carried on a strong, well-arranged bed-plate, which can be detached from its brackets and serve as a stationary horizontal engine. The cylinder is steam-jacketed, and the steam-pipe is lagged; the joints, scraped or ground, avoid the use of packing; it has an adjustable cut-off sliding and throttle-valve, readily fixed at any desired point, balance steam-valve, steel friction, and flue shut. There is a small water-heater, with return-pipes; the crank axle is furnished with a box-spring.

CHANDLER & TAYLOR, *Indianapolis, Ind.*

A well-made, light-running engine; the boiler space is hardly proportioned to the engine, consequently the record is not so good as in some other cases. A peculiar arrangement exists for the passage of the steam from the dome, by a pipe passing into and through the boiler to the smoke-box, where the pipe coils so that the steam becomes superheated, and enters the chest in a dry condition; this is an ingenious device to overcome a difficulty, from the fact that the engine is reversed from the ordinary position, and has the cylinder close to the smoke-box. The cylinder is jacketed with felt, and the steam-cylinder is placed below, instead of above, or on the level with the cylinder; the advantage is that whatever condensation takes place

is clear of the cylinder. The piston-valve is balanced, the guides having large surfaces. The pumps have a thin way-valve; there is a spring-seat for the driver, who has within reach the lever-rod, acting on a powerful brake on the hind wheels.

BLYMYER MANUFACTURING COMPANY, *Cincinnati, Ohio.*

The only fixed engine which came under our notice was, strictly speaking, hardly agricultural, being designed to drive sugar machinery. This was the engine shown by the Blymyer Manufacturing Company, and is a strong, well-proportioned engine, with steam-chest and cylinder properly covered; the speed is regulated by cut-off from the governor, instead of the ordinary throttle-valve; this is done by means of a valuable eccentric; the bed-plate very solid, and the water-heater capacious.

LILPOP, RAU, & LOEVENSTEIN, *Warsaw, Russia.*

This firm have, we believe, an extensive manufactory of various kinds of machinery. The engine which they exhibited, and which was carefully tested at Schenck's, is very strongly made, and the frame contains a great deal more iron than would be thought necessary in this country. The explanation given for this is, that the machine is designed for a country where the roads are bad and mechanics scarce; it is certainly not conveniently arranged; thus, the boiler, which is vertical, is carried on the frame, immediately over the front wheels. The cylinder of the engine, which is in an inclined position, is put as far as it is possible to be from the fire-box, consequently the engineer has quite a journey to perform between the two. We fail to see why the engine could not have been placed in a vertical position close to the boiler; there was no governor, and the pump was old-fashioned and very defective; on several occasions the engine had to be stopped, and once the fire raked out from this cause. The boiler, which is of considerable diameter, contains fifty-two pipes, ten of which are smaller than the rest; these pipes hang down from a dome, and the whole is so arranged that a large heating surface is secured. On trial, steam was raised in at least one-third less time than in any other engine, and the result was satisfactory, this engine taking second place for duty.

CHAFFERS, HAY- AND FEED-CUTTERS, SLICERS, AND PULPERS.—We were not impressed with the exhibits under the above heads. In the United States, especially in the large corn-growing districts of the West, but little appears to be done in the way of food preparation.

Straw is not at present of much value—rather an incumbrance to be got rid of than otherwise. Of the few chaffing-machines exhibited, we liked those of the Silver & Deming Manufacturing Company of Salem, Ohio, in which is a good safety arrangement in the event of stones or iron getting into the feed. The fly-wheel continues to revolve, but the knives stop, preventing breakage. This is effected by a friction cone on the shaft. The arrangement for altering the size of cut by shifting a cluster of gear-wheels is simple and efficient. The upper feed-roller is held in place by a spring, and rises according to the pressure of the feed by means of toothed gearing and racks. This is attached to both sides, so that the roller is always parallel. The lower roller is smooth, the upper ribbed; this does not give the self-feeding power of double-fluted rollers. Canada took a decided lead in chaff-cutting machinery.

JOHN WATSON, *Ayr, Ontario, Canada.*

Good power-machines, the knives being attached to the fly-wheel; they cut six sizes of chaff. The same firm exhibited a combined pea-cleaner and pneumatic chaff-conveyer (Tolten's patent), a highly ingenious device, by which the peas are separated from the straw and pods; the latter are cut into chaff and winnowed at the same time; the blast being utilized to convey the chaff up a spout, while the peas are delivered into a hopper below.

In the Pneumatic Chaff-Cutter, also shown by Mr. Watson, the fly-wheel, on which are the knives, is boxed off, and carries four wooden blades, which generate sufficient draft to blow the chaff through a tube for a considerable distance; the air enters under the box and below the knives. The defect in this machine is that the gear-clutch is on the outside of the box, on the right-hand side, and quite beyond the reach of the feeder in case of accident. There is also no reverse action and no protection. The first-described machine is in most respects superior.

DAVID MAXWELL, *Paris, Ontario, Canada.*

A power chaff-cutter with patent gearing, which can reverse, stop, and change the length of cut without the use of a clutch-lever or change of wheels; this is effected by an ingenious cluster of wheels on the lever axle.

A. ANDERSON, *London, Ontario, Canada.*

A capital hand-cutter, without wheel or gearing; the blade is diagonal with ragged edges; the length of cut is regulated by a feed-



board working in a slot, a rubber tension-spring steadies the cut. For simplicity, efficiency, and reasonable cost, this invention is worthy of high praise. Mr. Anderson also showed a hay-knife and bread-cutter with similar edge.

The only exhibits of slicers and pulpers for preparing turnips and mangolds for animal food were shown by John Watson, of Ayr, Ontario, Canada, who deserves great credit for the large and thoroughly useful assortment of machinery which he displayed.

The Triple-action Pulper, Ribbon Cutter, and Slicer, is a valuable adjustment, comprising two disks revolving on the same shaft, one furnished with pulping-blades, the other with slicing- and ribbon-knives. The hopper is in two parts, with a hinged plate to cover over either portion as desired. The pulping-knives can be brought forward or back so as to regulate the size of the pulp.

The Gardener's Slicer and Cutter is an improvement on an old English patent; it has a sliding division-plate or hopper, which insures the roots being continuously presented to the cutting surface.

CORN-MILLS.—There was a considerable collection of stone and metal mills, the latter generally very meritorious, on account of the material used and the efficiency of operation. The most common forms were vertical disks, but there were several instances of conical mills.

SEdgebeer & Miller, *Painesville, Ohio.*

The Farmer's feed-mill, shown by this house, is a thoroughly useful mill. It consists of vertical disks covered with Y-shaped projections in alternate circles, ground down with emery to a fine surface. First of all is a small breaker and crusher, consisting of sections on the shaft; next a series of large teeth on the inner section. The mill works equally well in either direction.

W. L. Boyer & Brother, *Philadelphia, Pa.*

Good metal mills of conical form. The surfaces both of the mill and the concave are fluted. The edges sharpen themselves by contact; in one machine a bolting-screen is attached. By a clever arrangement the same jigger from the wheel acts on the hopper above and the screen under. The mill is easily adjusted at the ends by set-screws. The feeder's shaft has a cob-breaker, so that corn-meal can be produced without the necessity of shelling the corn. Mr. Watson

also showed a corn-mill with vertical plates with the striations on the grinding surface. The feed is delivered at the centre by a screw. This is a small mill, capable of producing ten bushels an hour when driven by four horses. In a grain-crusher, by the same firm, comprising two revolving fluted rollers, a steel spring between the boxes prevents contact of the rollers when the mill is empty.

JOACKS & BEHRENS, *Lubeck, Germany.*

A model of a millstone with their patent aspirator; a highly valuable invention for securing a current of air between the stones and removing all moisture. The air enters from above, passes through the centre and is exhausted; the flour is forced out on the opposite side by an endless screw with a valve-mouth, so that no air may enter save by the aspirator. The flour is prevented from passing the exhauster by a number of triangular-shaped surfaces of flannel, which hang down all around and present surfaces for the flour to fall against. The case or cover in which the mill is placed consists of wood, felt, and tin inside, and being non-conducting, prevents moisture condensing, a point of great importance. Automatically the flour-catcher is vibrated, and the accumulations of flour fall down and are conveyed to the screw.

DU VIVIER & Co.

In the Aubien bolting mill-stones of this firm, the lower stone has spaces from the circumference to the centre, occupied with metal bolting-sieves, which are agitated by knockers. Bran passes through the opening between the stones, and flour is collected below. In the French department there were several exhibits of burr-stones of fine quality.

INCUBATORS.—Two exhibits of these deserve mention.

S. A. DAY & Co., *Baltimore, Md.*

This incubator is automatic and highly ingenious; the heat, which is supplied from a coal-oil lamp, passes into a hot-air chamber; the cold air enters by holes. Above the hot-air chamber is a supply of water, so as to secure by its evaporation the necessary moisture. The eggs are placed in boxes on sawdust, and the hot air circulates over them. The automatic arrangements are effected by the unequal expansion of a bar composed of rubber and tin. The machine is set for a temperature of 103°, which is found by experience to be most

favorable for incubation; as temperature rises the bar moves by expansion of the rubber, and acts on a leverage, which is fixed so as to connect with the lamp and shut off a portion of the flame. By another adjustment the expansion or contraction of the bar is made to act on a watch-spring, which rings a bell. Thus, if the lamp goes out in the night, or gives out too much heat, in either case the bell is rung and the attendant aroused; this is remarkably clever, and we see no reason why with proper management it should not prove successful.

A simpler scheme was that shown by

A. CORBETT, *Hicksville, Long Island, N. Y.*

The inventor makes use of horse manure as his heating material, both for his incubator and artificial mother; he uses a circular box, in which the eggs are placed in sieves, ventilation being supplied at the top; these boxes are surrounded by stable manure, and a temperature varying from  $103^{\circ}$  to  $110^{\circ}$  is thus maintained. In the second box for rearing, the artificial mother consists of a round board, fitting the box, covered on the under side with long wool. The board is attached to a vertical rod fitted with a screw, so as to allow of its being brought nearer to or farther from the bottom according to the size of the chickens.

DAIRY FITTINGS AND APPLIANCES, CHURNS, BUTTER-WORKERS, ETC.—Considering the important interests which have of late years been developed in connection with the manufacture of dairy produce, we were surprised and disappointed not to find a more complete exemplification of the factory system, by which the progress in this direction could be traced. Still, enough exists to show that skill and capital have been largely and profitably developed, and there can, we think, be no question that the change of practice with regard to the manufacture, both of cheese and butter, from the individual producer to the co-operative association, has, under favorable conditions as to supply, proven both economical and convenient,—economical on account of the introduction of labor-saving apparatus, greatly reducing the cost, and convenient as relieving the female portion of the farmer's household of an irksome drudgery. To the United States belongs the credit of first introducing the factory system, as regards cheese-making; while Sweden took the lead in the same method of dealing with butter. England has recently been endeavoring to follow in the footsteps of American enterprise, and the Derby cheese-factories have achieved an encouraging success.

It would have been satisfactory to the Judges if they could have seen the machinery exhibited in actual operation.

H. H. ROE & Co., *Madison, Ohio.*

This was the only complete exhibit of cheese-making apparatus, and comprised a small steam-engine and horizontal boiler, of suitable capacity for factory use. As far as we could judge from examination the latter is of economical construction, and the former of sufficient power for running the largest churn. Next we have two large cheese-vats, of parallelogram form. The vats, made of strong block-tin, rest in wooden cases, with sufficient space under and on all sides for the necessary supply of water, which is heated by means of steam-pipes, with numerous outlets, so distributed over the bottoms of the case as to insure uniform temperature rapidly acquired. This appears a good arrangement, which we believe is generally adopted in the factories. The whey is removed by a siphon. The same firm also exhibited two cheese-vats, with heating apparatus attached; a less costly arrangement, but of very inferior utility, for two reasons: first, the fire raises the temperature of the cheese-room more than is desirable; and, secondly, the fire-space being in the centre only, the water is not so evenly heated as by the introduction of steam.

CARL ATTERLING, *Orebro, Sweden.*

The only other exhibitor of cheese-making apparatus, his design being very similar to that employed in England for the Cheddar system; in this steam is used as the heating medium. It comprises a steam generator, of economical construction, which can be placed in an adjoining room if desired; a small steam-pipe conducts to the steam-jacket of a circular cheese-vat, of large dimensions, composed of copper tinned over; the whey is removed by a stop-cock at the bottom of the vat. In Sweden we found a series of well-executed designs of cheese- and butter-factories, from the well-known dairy engineer, William Rehnstrom. It would have been interesting and instructive if models or plans of some of the leading American factories had been exhibited.

W. O. CAMPBELL & Co., *Richford, Vt.*

In regard to the butter business, we found some excellent arrangement of milk-pans, especially the exhibits of this company in the Dairy Building; a series of large block-tin pans, of rectangular form and divided into unequal compartments, to suit the requirements of the dairy at different seasons. These are contained in zinc or

galvanized troughs, with water-space all round; an adjustable vent regulates the height of the water, an ingenious and useful appliance.

GEO. PLUMB, *North Bangor, N. Y.*

A series of milk-pans on a smaller scale, but similar in construction, without the compartments, and with a tap and two waste-water pipes, for regulating the circulation of water. The depth of the pan in both cases does not exceed a few inches. It is as yet an open question as to the depth of milk which yields the highest percentage of cream. It is reasonable to suppose that cream rises most rapidly in shallow vessels. There is an equally-divided opinion as to the material best adapted for making the pans.

The exhibition of churns was very large, and the principle varied greatly. We are glad to notice that exhibitors have abandoned the attempt to make *time* the principal object in their inventions; very rapid is not, as a rule, economical churning. Another point is that the cream may be subjected both to too rapid and too violent action, whereby the fatty globules are broken and the quality and keeping properties of the butter injured. In at least two churns, viz., the rectangular and the oscillating, the agitation is secured by the motion of the box itself, without the aid of fans, dashers, etc. And we believe that the old form of barrel churn, with fixed dashers, is still the most common and reliable form of power churn. Great progress has been made in the improvement of butter-working machines.

P. SHAW, *Scituate, Mass.*

The power-worker of this exhibitor is noteworthy, both for its simplicity of mechanism and efficiency of action. The apparatus comprises a vertical screw-press, to which is communicated an up-and-down motion by a crank underneath, and a revolving circular table, adjustable as to position in reference to the press. This table revolves upon and forms the top of the buttermilk receptacle, which is also an ice-box when required. The operator revolves the table as required, so as to bring every portion of the butter under the action of the worker. The latter is made of perforated iron, tinned over, covered with a cloth, and having on the upper side a small box containing a sponge. Any buttermilk squeezed out upwards passes through the perforations, and is absorbed by the sponge. The table is also covered with a cloth, in which the butter, when the operation is complete, is removed to the packing department.

P. EMBREE & SON, *West Chester, Pa.*

This hand-machine is equally meritorious. It comprises a revolving cedar-wood table, with a convex surface, on which the butter is placed and pressed by a revolving conical, fluted roller, with cleaner attachment, actuated by lever-handle. At the opposite end of the roller-shaft is a small pinion, working into toothed gear in the centre of the table, causing the latter to revolve, thus insuring the thorough working of the butter. All liquid expressed finds its way by a channel to an opening in the edge of the table. The roller is easily detached, and both it and the table are readily cleaned. The efficiency of this machine renders it applicable to all but the largest factories.

UNIVERSAL STRAINER COMPANY, *Rutland, Vt.*

An excellent tin strainer and cover, which should be universally employed. It consists of a funnel, with a conical strainer of fine wire gauze in the centre of the bottom, which again is covered by a movable cap, also furnished with gauze. Thus the milk is twice strained, and the gauzes are so arranged that the weight of the milk cannot force the sediment through.

JOHN MATHEWS, *Pleasant Grove, Pa*

A highly ingenious device, in which the box is raised after the butter has been pressed, for the removal of the butter, and can be easily detached for cleaning purposes. The press is worked by a sun-and-planet gear.

SPEAKMAN, MILES, & Co., *West Chester, Pa.*

A clever arrangement for the same purpose, viz., a hinged box, working down on a movable mould; the press is worked by a spring and lever.

IRON-CLAD CAN COMPANY, *New York, N. Y.*H. H. ROE & Co., *Madison, Ohio.*

Of displays of milk-cans, for transporting milk from the producer to the factory, or for town trade, these were the principal exhibitors, and both showed highly-finished apparatus suitable for the purpose.

J. G. KOEHLER, *Philadelphia, Pa.*

The butter-tubs shown by this manufacturer are intended to convey the butter after it has been prepared for the retailer. They are made of cedar-wood, with convenient shelves for the packing of the butter, and two ice receptacles.

ORANGE COUNTY PAIL COMPANY, *New York, N. Y.*

A large exhibit of well-made oak pails, with convenient fastenings, for conveying the butter in bulk.

## CLASS 680.—LAYING OUT AND IMPROVING FARMS.

This class included some highly-interesting exhibits, a few of which may be noted.

S. W. HALL, *Elmira, N. Y.*

His universal fencing-machine is a most valuable invention, not only rendering the operation of fence-making more rapid and economical, but resulting in a more perfect fence than could be made by hand. The machine comprises a circular saw, a reducing and tenoning arrangement, by which the rails are prepared for insertion into the posts, and a series of augers by which the holes are bored and countersunk. After one set of holes are bored the position of the post is changed, and a second set of holes, occupying intermediate spaces on the opposite side, are made, which completes the operation, and all that remains is to set the posts and drive home the rails. The counter-sinking of the holes, allowing of a tight water-proof joint, insures durability. The cost of the machine is \$300, and Mr. Hall states that two men and a boy can prepare from fifty to eighty rods of fence per day, and that the saving of material much more than pays for dressing. If desired, wire can be introduced to replace all but the top and bottom rails.

THEODORE F. RANDOLPH, *Morristown, N. J.*

Of the ditching and excavating machines shown, this exhibit denoted most progress, and greatly expedites drainage-work. It comprises a beam supported on four wheels, the centre of which is the cutter-wheel, so arranged as to take out a given depth at each revolution, bring the soil up with it, and distribute it on either side of the cutting. The implement is made of different sizes, according to the nature of the work and the power to be employed; that shown in Agricultural Hall was for two or three horses, and was calculated to dig drains thirty inches deep, doing the work of twenty men.

A. C. BETTS, *Troy, N. Y.*

A very admirable wood and wire fencing-machine for making light, temporary fences for sheep, etc. The wire is placed between the machine in coils, a boy feeds the wooden uprights in the machines;

the staples, which are suspended on inclined rods, come to their place over the wire, and are driven into the wood by hammers regulated by cam-gearing. The distance between the wooden uprights is either six or twelve inches, according to the purpose for which the fence is intended. The uprights are made  $1\frac{1}{4}$  by  $1\frac{1}{2}$  inches, and 4 feet long. As fast as the fence is made it is rolled up for transportation. Two men and one boy can make two hundred rods of fencing a day.

P. J. STRYKER'S SELF-LOADING EXCAVATOR, *New Brunswick, N. J.*

A very efficient machine; the elevator is between the front wheels, and can be raised or lowered as required. Behind the excavator is an elevator connecting with the cart, worked by chain-gear from the hind wheel; the driver's seat is immediately over the elevator, and the cart or receptacle has a hinged bottom, in three divisions. A leverage, of which the handle is within reach of the driver, allows of the load being discharged by opening the hinged bottom.

HUBER MANUFACTURING COMPANY, *Marion, Ohio.*

Of the road-scrapers shown, that manufactured by this company, on the same principle as the revolving horse-rake, appeared the most practical and complete. The workman, by releasing the connection of the handles with the box, allows the draft of the horse to pull over the latter, which is returned to its place by pressing on the handles. It is both cheap and efficient.

RHODES & WATERS, *Elyria, Ohio.*

A clever post-hole digger, which we subjected to a severe test, viz., digging a hole on the grove road outside Agricultural Hall. It consists of a pointed digger, steel blades attached to double handles. When the hole is being made the handles are kept close; when the soil is to be removed the handles are expanded, which brings the blades together, their concave interiors forming the receptacle for the soil. By the use of this tool a great saving may be effected in putting down fence-posts.

A. C. COTTON, *Vineland, N. J.*

A stump- and rock-extractor, which combines the ratchet-wheel and lever, thereby insuring safety, and gaining great power with a slow motion. The chain is secured on a sprockle-wheel, which is on the same axle as the ratchet-wheel; slipping is impossible, and the



machine can be worked by one man. The object can be raised sufficiently high to put a sledge under.

BOWEN & RIDER, *Vineland, N. J.*

This extractor operates by a double leverage, with dogs. The fulcrum is one and a half inches, and each lever can raise fifteen tons. This is also an efficient machine. There is a great opening for such machines in many parts of the country where fresh land has been recently broken. The stumps are not only an eye-sore, but a serious impediment to good cultivation.

CLASS 683.—MISCELLANEOUS.

Under this head were included a great variety of exhibits, more or less agricultural in their objects, but generally displaying that ingenuity of construction and adaptability of purpose for which American inventors are so justly celebrated. The section of wind-engines contained several exhibits. These powers are found of great use for pumping purposes; they vary considerably in construction, but adopt the Rosette principle, with several modifications.

UNITED STATES WIND-ENGINE & PUMP COMPANY, *Batavia, Ill.*

This engine, which probably obtains more power, according to diameter, than any other, has sections on transverse axles; these are held straight to the wind by means of a balanced lever-weight, where the centrifugal force overcomes the weight. The sections open so as to adopt the same direction as the wind, and consequently the mill is checked. But as soon as the velocity decreases the balance-weight comes into play again. The sections catch the wind, and the result is that the mill runs steadily in a high wind, when some others have to be stopped. This is a very ingenious arrangement, and great improvements have recently been made by the use of small counter-balance weights on the sections themselves, giving the mill a greatly increased power. The disadvantage of this mill is the complication of parts, requiring more attention in oiling, and the extra cost.

ECLIPSE WIND-MILL COMPANY, *Beloit, Wis.*

A form of the solid Rosette wheel, which, though less powerful, has some advantages. Here an adjustable side vane, which is a patent, acts as an over-balance, and draws the sail away from the wind, but does not interfere with the efficiency in a light wind, because it must first overcome the leverage of a weighted arm, which is also adjustable. The

engine can be quickly stopped by pulling down the lever, which brings the wheel-edge to wind. The turn-table travels on four friction-balls, running on a grooved surface. The table casting is in one piece with the cap or bed-plate, and has flanges on the under side to receive the head of the post. This mill is very well made, and appears a cheap and valuable invention.

E. STOVER & BROTHERS, *Freeport, Ill.*

These makers also use the solid Rosette. The wheel is dished inwards, and strongly braced by the felloes, which are round. Here a balance-weight is employed to keep the mill face to wind. When the force of the wind overcomes the weight, the mill is brought edge to wind. The frame is made of four pieces of timber, bolted together like a camp-stool. The turn-table sets on an anti-friction table, with sixteen cast-iron balls. This makes the mill very sensitive, and allows of a comparatively short vane being used. The vane-beam has a spring clutch acting on the crank, and stops the machine entirely if required. The shaft-casting is in two parts, with india-rubber between to compensate for wear. This is a strong mill, suitable for a farmer's purpose.

GAMMON & DEERING, *Chicago, Ill.*

In this engine the Rosette is in six sections, actuated by spring and leverage, which causes the fans to open. The stroke is variable, according to the force of the wind. This is effected by having the crank-shaft bent, and acted upon by the spring on the Rosette standard. When the wind is strong, the crank is forced back, and the stroke is lengthened. The connecting-rod is attached to the crank by a ball-and-socket adjustment. This is an ingenious arrangement, but, as the machine was shown in Agricultural Hall, we had no opportunity of judging of its behavior in a strong wind, and therefore refrain from any opinion as to its practical utility.

O. F. TIFFANY, *San Francisco, Cal.*

Fruit-drying is an important interest, and we found several exhibits of machines for this purpose. One of the most complete arrangements was Mr. Tiffany's, which has a hot air-chamber in the basement, with two dampers for the admission of cold air,—one into the chamber and one above, the draught-stack forming a natural draught. The roof of the apparatus is so constructed inside as to form a vapor conductor. The moisture thus collected empties into a conductor, with siphon-spout filled with water, thus the escape of heat is pre-

vented; the sieves are arranged on a frame, which runs on wheels, and can be readily removed when the process is completed; all the trays can be shifted from story to story by an elevator.

JONES BROTHERS, *Sturgis, Mich.*

In this apparatus, for the same purpose, the principal feature is a double-action fan worked by horse-power, the degree of heat being regulated by a shutter. The screens are in ten sections, and the fruit is passed forward according to condition. The merit claimed for the machine is that, owing to the action of the fan, the fruit can be dried more rapidly, and at less cost than in any other machine.

GEO. A. DEITZ, *Chico, Cal.*

This is the largest machine of all, having 420 feet of drying surface; the arrangements for regulating temperature and securing perfect circulation of hot air are excellent. The screens of galvanized iron run upon rollers, and are easily removed.

H. BURDEN & SONS, *Troy, N. Y.*

A model of a machine for making horse-shoes was shown by this house, who have a large and important manufacture. Specimens of the hematite and magnetic ore used, together with the pig-iron, large and small bars, were shown. The latter, when rolled out to the proper dimensions, are passed at once to the mill, into which they are fed by two fluted rollers. First the iron is cut off at the proper length, then the shoe is formed; next it is stamped by passing between an upper and lower die. The holes are not punched, but a crescent die marks the place where the holes are to be made; lastly, the shoe is straightened by a press; sixty shoes per minute can be made. The machine has only four gear-wheels, is simple in construction, and very strong. The works are very extensive; 1400 hands are employed, and the factory has an annual capacity of 600,000 kegs, of 100 pounds each, equal to 60,000,000 pounds.

GEORGE NEIGHBOUR & SONS, *London, England.*

The apiaries shown by this firm deserve recognition as cheap, economical, and well adapted for securing the honey without destroying the bees.

R. R. MURPHY, *Fulton, Ill.*

A machine excellently adapted for extracting the honey without destroying the comb. This machine comprises a copper cylinder,

tinned on the inside, with a revolving rectangular frame or box, the sides of which are covered with fine wire-gauze. The comb, taken from the hive before the last process of sealing up the cells has taken place, is placed in the frame or box, which is revolved by a handle and bevel-gear; the centrifugal force causes the honey to discharge into the cylinder, from which it is drawn off without injuring the comb, which is replaced in the hives and refilled. This is a very ingenious device for securing the maximum produce.

JONA BIGELOW & Co., *Boston, Mass.*

An extremely ingenious device for labeling cans or bottles, comprising an inclined plane, composed of copper plates covered with flannel. The can is set in motion down the incline; first passes over a paste-roller, which is covered with flannel, and takes up a supply of paste from a receptacle below; next the label is attached, being taken up by the can in its passage over the label reservoir or chamber, which is so adjusted as always to present a label to the surface of the can; farther on an upright lever is passed over and compressed; this, by a clever cam-gear, raises a gum-brush, which gums the edges of the uppermost label ready for the passage of the next can; this is particularly clever, as the gummed edge is required to insure a perfect adhesion. The can, with label duly attached, is discharged from the bottom of the machine. This work was formerly done by children, and a great saving both in time and cost is effected.

BOOMER & BOSCHERT PRESS COMPANY, *Syracuse, N. Y.*

In cider-mills this establishment takes the lead, exhibiting an apple-mill, the cylinder of which is furnished with a number of knives, its sections being adjustable by two screws. The fruit is held to the cylinder by means of a spring-jaw, which is adjustable. The fruit, after passing through the mill, falls into an open box, divided into two compartments by a movable door, so that the material can be delivered from either end to the press. The latter is of extremely powerful construction, consisting of a cross-screw with a double-leverage thread. The motion downwards is slow, so as to insure the full action of the press; the screw stops itself, and rises five times as rapidly as it falls. A similar press was also shown for hand-power.

KEYSTONE MANUFACTURING COMPANY, *Sterling, Ill.*

P. P. MAST & Co., *Springfield, Ohio.*

THOMAS, LUDLOW, & RODGERS, *Springfield, Ohio.*

In the hand-power mill of the Keystone Manufacturing Company,

the hopper is provided with an adjustable jaw and small roller to regulate the feed. The mill consists of two horizontal rollers with conical sections fitted into each other, and covered with numerous small projections on the surface, which greatly increase pressing surface and efficiency. The rollers are differently speeded,—one revolving three times as rapidly as the other secures great efficiency; all the bearings are adjustable, to compensate for wear. The press is worked by a powerful screw, to which the follower is attached, which, however, can be readily removed if desired. The other machines are very similar in principle, but differ in details.

Included under miscellaneous exhibits were a large collection of meat- and sausage-choppers, fruit- and potato-peelers, etc.,—designed for domestic economy,—ice-freezers, refrigerators, bird-cages, etc., of which, speaking generally, we may say that the exhibits were highly creditable to the makers.

In the above report, which has been necessarily hastily compiled from notes taken during our examinations, we have endeavored to convey a general, rather than a particular, description of the more prominent exhibits.



The progress is provided with an adjustable jaw and small roller to regulate the feed. The mill consists of two horizontal rollers with conical sections fitted into each other and covered with numerous small projections on the surface, which greatly increase grinding surface and efficiency. The rollers are differently speeded, one revolving three times as rapidly as the other, securing great efficiency; all the bearings are adjustable to compensate for wear. The gear is worked by a powerful screw, to which the follower is attached, which however can be readily removed if desired. The other machines are very similar in principle, but differ in details.

Included under miscellaneous exhibits were a large collection of great and small choppers, fruit and potato peelers, etc.—designed for domestic economy;—ice-machines, refrigerators, fruit-cages, etc., of which speaking generally we may say that the exhibits were highly creditable to the makers.

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# REPORTS ON AWARDS.

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## GROUP XXIII.

### 1. Israel L. Landis, Lancaster, Pa., U. S.

#### DURABLE SAFETY SWINGLE-TREE.

*Report.*—Commended for the very ingenious arrangement by which the traces can be instantly detached from the swingle-tree of a buggy or any single-horse carriage, and which answers admirably, provided the adjustment of the remainder of the harness allows of the animal getting clear. There must be no breeching straps attached to the shafts, and the tugs must be large and kept in front of the stop. The device consists of a sliding fork at each end of the swingle-tree, acted on by a strap leverage from driver's seat. By pulling the straps the forks slide forward and throw the traces off.

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### 2. Chicago Scraper & Ditcher Co., Chicago, Ill., U. S.

#### ROAD SCRAPER.

*Report.*—A strong, useful machine, shod with steel, with adaptable pitch by a chain, and facilities for emptying.

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### 3. Munsell & Dexter, New York, N. Y., U. S.

#### LEVER JACK.

*Report.*—Commended for its utility as a farm implement, strong and durable, easily applied, and very powerful as a press and jack for lifting; very simple in construction; operated by means of a lever with two ratchets on the end that works in notched upright; the fulcrum being short gives the operator great power.

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### 4. Huber Manufacturing Co., Marion, Ohio, U. S.

#### ROAD SCRAPER.

*Report.*—It revolves on the same plan as their horse-rake; a catch spring holds the box in place; when loaded the spring is released, and by raising the handles the draft of the horse carries over and upsets the box. The bottom of the box is of steel strongly riveted to iron sides. This is a strong, handy machine, reasonable in price.

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### 5. Milburn Wagon Co., Toledo, Ohio, U. S.

#### FARM, PLANTATION, AND FREIGHT WAGONS.

*Report.*—Commended as being well made, of the best timber, and thoroughly ironed; the bolster plate particularly large, level, and strong; wheels strong and substantial, the wooden axles having powerful and well-adjusted skeins.

## 6. Kansas Manufacturing Co., Leavenworth, Kan., U. S.

## FARM WAGONS.

*Report.*—Commended for excellence of material, thoroughness of construction, and beauty and perfection in finish.

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## 7. A. B. Farquhar, York, Pa., U. S.

## HORSE GEAR FOR COTTON GIN.

*Report.*—Commended for the power of adjusting both vertically and horizontally, which is very important, as, owing to faulty constructions, the floors of the gin room frequently sway in consequence of too long bearings, and but for this arrangement the gear would inevitably get out of order.

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## 8. Heebner &amp; Sons, Lansdale, Pa., U. S.

## RAILWAY HORSE POWER.

*Report.*—Commended for level position secured to plank upon which the horse steps, dispensing with expense of sharp shoe calks and continual wear of plank; and for security obtained to man and horse by means of a governor placed on shaft inside of belt wheel, acting independent of brake; and for cheapness and durability.

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## 9. W. L. Boyer &amp; Brother, Philadelphia, Pa., U. S.

## UNION HORSE POWER (BURT'S PATENT) AND COMBINED METAL MILL AND BOLTING SCREEN.

*Report.*—The Union horse power is commended for strength, durability, and efficiency, due to the use of good materials and the peculiar arrangement of the running gear. The driving gear wheel is placed directly under the motive power, and is large enough to cog into the chain links both above and below: thus is secured a double leverage with direct action, and so the connecting pivots of the chain are relieved from all strain and friction whilst passing the end track. Power can be applied at a less acute angle, consequently wear and tear of the horse is reduced. Multiplying gearing is employed to get up speed.

The combined metal mill and bolting screen is commended for strength and durability of wearing parts, for efficient operation, and suitability either for grain or Indian corn. This is a conical mill, working horizontally, with fluted sections; concave has also raised surfaces. Edges sharpened by contact; material cast steel; for clever jigger from wheel, which agitates hopper and screen. The mill is adjustable at the end by set-screws. A separate opening in the box allows of the cobs coming in contact with a breaker, a cast bush with convex teeth keyed on to the shaft. Bolting cloth can be applied or not, as required.

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## 10. Henry S. Vanderbilt, Washington, D. C., U. S.

## WAGON JACK.

*Report.*—Commended as consisting of an upright ratchet that works in a frame and is raised and lowered by small cog wheel, operated by a lever and drop catch on short fulcrum, giving great leverage power; the load is securely held by a separate drop catch that is hinged on the frame of the upright. It is very durable, and easily operated.

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## 11. Lehigh Car Manufacturing Co., Stemton, Pa., U. S.

## FARM AND EXPRESS WAGONS.

*Report.*—This wagon, besides being well made and thoroughly ironed, has a novel, peculiar, and useful feature. The "fifth wheel," instead of being made of a flat ring of iron attached to the axle, with another corresponding one on the body, consists of a single ring resting in a frame on springs which are attached to the axle, and made with its front and



rear portions gradually raised. The body of the wagon rests partly on supports touching the raised points of the wheel and jointly on rollers resting on its depressed portions. As the forward wheels are turned, the circular movement of the fifth wheel brings the rollers supporting the body up the raised portion till at the highest the fore wheel may run under the wagon body. This is effected in the easiest possible manner and with very little friction. The king-bolt passes down through a hollow cylinder or tube of iron, which is bolted to the body of the wagon, and it is screwed underneath the platform; around the king-bolt is coiled a spring pressing against the head of the king-bolt and forcing it up as the body rises by the action of the fifth wheel on the rollers. The whole arrangement permits a wagon to be turned in a very narrow compass and with great ease, and permits large forward wheels.

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12. S. W. Hall, Elmira, N. Y., U. S.

UNIVERSAL FENCING MACHINE.

*Report.*—Commended for the ingenious combination of a circular saw, a large auger or tenoning machine, a reducing machine for preparing the rails for the tenoning process, a gang of five augers with countersink attachment behind, so that the post can be bored and the holes countersunk to the exact size required for a tight joint; for the ease with which the position of the post can be altered so as to allow of a second set of holes being bored at the proper position; and for the excellent, well-stayed, and durable fence which results from the operation described. Such a machine has a high value when large works are in hand and manual labor is scarce.

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13. S. N. Gustin, Mexico, Oswego County, N. Y., U. S.

ANIMAL POKE.

*Report.*—Commended for peculiar adaptability for the purpose designed, consisting of a wooden bow, adjustable as to size, hung on malleable iron cross head of the poke, held by spring-seated ratchet; on the upper side of the breast-block is a spring gear. When the poke comes in contact with a fence, the pressure of the bar on the spring causes the animal to be pricked by two sharp pins. Also for cheapness and durability.

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14. A. C. Cotton, Vineland, N. J., U. S.

STUMP AND STONE EXTRACTOR.

*Report.*—Commended for ingenious construction, efficiency, simplicity, and durability. A long lever, whose fulcrum may be changed according to convenience, works on a ratchet and sprocket wheel of sixteen inches diameter, giving great power to the workman. The whole apparatus is attached to a tripod, which may be easily changed from one locality to another.

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15. P. I. Stryker, New Brunswick, N. J., U. S.

SELF-LOADING EXCAVATOR.

*Report.*—Commended for the efficient manner in which the load is discharged from the cart by tipping hinged bottom in three divisions, an arrangement that might be usefully applied in other directions. We notice the simple gearing on the front wheels by which the plow or scoop can be elevated for traveling, and the efficient elevating arrangement by which the soil is conveyed from the scoop to the cart.

## 16. Bowen &amp; Rider, Vineland, N. J., U. S.

## STUMP AND ROCK EXTRACTOR.

*Report.*—Commended for strength, simplicity of design, great power, and quick action. The machine, having two levers, can be worked by one or two men as desired. The load is held by dogs, the action is direct and immediate; when the load is raised, it can be easily unloaded.

## 17. J. A. Treat, Cleveland, Ohio, U. S.

## SELF-OPENING CARRIAGE GATE.

*Report.*—Commended as a highly ingenious combination of levers, by which a wheel or horse pressure on a plate or upright bar causes the gate to swing open and shut by corresponding action on the opposite side. The gate is made adjustable so that it can be raised to a certain extent in the event of obstructions, snow, etc., being in the way. This adjustment is also important to overcome sagging or variation in position of the post. This is very necessary, as the jar of the swing is likely to cause displacement. The question is how long the various levers would continue in working order.

## 18. Albert C. Betts, Troy, N. Y., U. S.

## MACHINE FOR MAKING WIRE FENCES AND READY-MADE WIRE FENCING.

*Report.*—Commended for ingenious construction and valuable products. This machine is capable of making from two hundred to three hundred rods of fencing per day, requiring only one horse-power, and the attendance of two men and a boy.

The machine is provided with a set of reels containing wire of which the fence is made, also a set of staples, drivers, and two sets of hammers, all operating automatically, driving the staples over all the wires firmly into the pickets, which are fed in the machine as fast as a boy can handle them, and carried through by means of an endless chain. The number of pickets may be changed from fifteen to thirty to the rod, and the numbers of wire from three to six. The bundles are made to contain from six to ten rods rolled up in barrel-shape,—easy for transportation. The fence is not only strong enough to protect crops, but entirely safe for cattle or horses, and is undoubtedly of great value in any country where wood for fencing purposes is scarce.

## 19. Theodore F. Randolph, Morristown, N. J., U. S.

## DITCHING AND DRAINING MACHINE.

*Report.*—Commended as an ingenious and efficient machine for draining or ditching purposes. The two-horse-power machine is well suited for drainage operations, cutting out the ditches five inches wide and thirty inches deep, thereby effecting a great saving over manual labor. The large machines have still greater labor-saving power. A machine drawn by six horses will cut ditches from twelve to thirty inches in width and from thirty to forty inches deep. A cut six inches deep and twelve inches wide can be made as fast as horses can walk. The machine can also be worked by a traction engine or by stationary steam power.

## 20. W. Anson Wood, Albany, N. Y., U. S.

## REAPING MACHINE.

*Report.*—Commended as a strong, serviceable machine, simple in construction and efficient in operation.

The cam head of malleable iron is fixed low and is protected by a shield; switch trip automatic, and controllable; rake orbit secures good collection, and leaves clean gavels; large driving wheel, moderate draft, and reasonable price.

## 21. Otis Brothers &amp; Co., New York, N. Y., U. S.

(HAYMAKER) MOWING MACHINE.

*Report.*—Commended for a novel and beautiful motion, by which the power is conveyed from the traveling wheels to the knife by means of one pair of bevel wheels only. This is effected by means of a gimbal joint carrying the driven wheel instead of revolving, to make a succession of serpentine vibrations around the face of the driver, and an arm extended from this vibrating disk gives the necessary movement to the knife. In this peculiar motion, which is partly dependent upon the fact that the gears are differential (the driver having forty-one teeth and the gimbal wheel forty-eight), at least eight teeth are always engaged at once, thereby distributing the strain more evenly than in ordinary gearing.

## 22. The Towanda Eureka Mower Co., Towanda, Pa., U. S.

DIRECT-DRAFT EUREKA MOWING MACHINE.

*Report.*—Commended for the introduction of an entirely new principle by that of direct draft. The horses are attached to the centre of the machine, one horse walking on the standing grass; but the cut grass is not trodden at all, and, owing to the presence of double clearers which are composed of light iron rods, the grass is left raised up, and so light upon the ground that curing follows without aid of tedders, etc. For the great advantage of being able to work the land in any direction, up or down the hill, and thus attack difficult crops in the best way. For the excellent arrangement by which flexibility of the knife is secured. The latter is placed in front, and is drawn by means or through a rock shaft. For lightness of drag, and owing to large driving wheels and great capacity for rapid work on level land.

## 23. Adriance, Platt, &amp; Co., Poughkeepsie, N. Y., U. S.

MOWING MACHINE (BUCKEYE MODEL).

*Report.*—Commended for strength and simplicity of construction, and for attention to details. The pitman is of malleable iron; brass bushes are used which can be cheaply replaced; large oiling space. The drag bar of tubular cast iron strongly braced. The gearing being principally outside the machine counteracts the draft of the cutter bar. The bar for traveling folds over the frame, which is a convenient arrangement. The shoe is removable, and its position can be altered to secure different heights of cut. No arrangement for adjusting the pitch of the fingers during work: this we consider a drawback,—not, however, sufficiently so to exclude this machine from favorable consideration.

## 24. Whitman &amp; Miles Manufacturing Co., Akron, Ohio, U. S.

MOWING AND REAPING MACHINE KNIVES, SICKLES, AND SECTIONS.

*Report.*—Commended as fine in quality, of high finish, and all approved forms required by manufacturers of reaping and mowing machines. As a collection of great variety and marked merit, they give evidence of a well-established and carefully-conducted manufacture. Special attention is drawn to the new sickle-edge reaping sections, which present a finely serrated surface without face bevels, thereby insuring increased wearing surface, with a self-sharpening edge. All sections are made of the best English steel.

## 25. J. F. Seiberling, Akron, Ohio, U. S.

MOWER.

*Report.*—Commended for a novel application of gearing. The driving pinion placed on the main shaft is cast with two alternating rows of teeth, which secure a continuous and

regular motion, and in the event of a tooth breaking, the regularity of the same is not interrupted. This arrangement is described by the inventor as alternate and intermitting gear.

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26. **Warder, Mitchell, & Co., Springfield, Ohio, U. S.**

MOWING MACHINES (CHAMPION PATTERN).

*Report.*—Commended for strong durable construction on similar patterns as the Champion Machine Company; rear cut; the knife-bar on a parallel drag bar can be set to any angle while at work.

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27. **The Johnston Harvester Co., Brockport, N. Y., U. S.**

MOWER, REAPERS, AND COMBINED MACHINES.

*Report.*—A large exhibit of machines. Commended for excellent material, strength, durability, finish, and attention to details, as evidenced by the following facts. Solid wrought-iron frame. Table attachment very strong, and easily adjustable by lever and outside wheel that runs in a crank shaft. Pitman rod attached to knife by ball and socket, giving great elasticity. Patent key nuts easily adjustable to compensate for wear. Motion communicated to rake shaft by square-linked chain-gear, with spring tension rollers. Cam gear for traverse of rake; original, automatic, and controllable. Speed of knife can be changed by reversible pinions. Driver's seat balances the pole. The machine works with little noise, indicating little friction. Prices reasonable.

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28. **Rochester Agricultural Works, Rochester, N. Y., U. S.**

REAPING MACHINE (TWO WHEELS).

*Report.*—Commended for the special features in this machine which appear worthy of commendation: first, the rakes are driven by slack chain-gearing through sprocket wheels; secondly, the driving gear is balanced by the use of two pinions on either side of the driving wheel, which is placed on the main shaft. The raking mechanism is on the improved Dorsey principle; a movable latch, worked by foot leverage, makes the rakes controllable.

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29. **C. H. McCormick & Co., Chicago, Ill., U. S.**

MOWING MACHINES.

*Report.*—Commended for being simply made, and for making capital work both on up-standing and laid crop; partly due to the high speed at which the knives are driven. For the excellent connection of knife-bar to frame, by means of a two-and-a-half-inch wrought bar well braced by a bar behind. The knife works behind the centre, and the draft is certainly not so light as some others. The fingers, which are steel-faced, are firmly attached to the bar by three bolts to each.

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30. **Bradley Manufacturing Co., Syracuse, N. Y., U. S.**

MOWING MACHINE.

*Report.*—Commended for being well made, having change of speed pinions. The connecting-rod attachment allows of the knife-bar working at any angle without strain or undue friction. The gearing is well covered. The driver's position balances the pole. The frames are raised or lowered without affecting the draft.

## 31. D. M. Osborne &amp; Co., Auburn, N. Y., U. S.

## BURDICK REAPER.

*Report.*—Commended as a well-made, light-running machine, with excellent raking apparatus. The cam table is placed low, and the rakes pass the knife in a nearly parallel line, securing even laying of grain on table. The cam table is unusually large, and the traverse of the rakes consequently steady. The rake-heads are provided with large gathering surface, valuable in the case of laid grain. The knife and rakes are driven from the same shaft by bevel gearing.

## 32. George Esterly &amp; Son, Whitewater, Wis., U. S.

## HARVESTER REAPING MACHINE.

*Report.*—Commended as a decided improvement upon the ordinary form of harvesters. The traveling platform and elevator being replaced by a fixed platform, the grain (as fast as it is laid on the platform by an ordinary adjustable reel) is swept up an inclined plane by means of a collecting rake which is balanced by a weighted arm. This works quite independently of the reel, pursuing a different orbit. The grain is thus landed on the tying-table. The workmen are seated on either side, and the grain is brought to them in bundles suitable for tying, by means of a traveler. This traveler is worked by a cam on the second gearing wheel, which actuates a sun-and-planet gear. The advantages are diminished gearing and reduced friction. The grain is not so liable to be knocked out, and the traveler greatly facilitates the binding operations. In a light crop and with moderately short straw, two men thus assisted could tie the grain as fast as presented.

## 33. Hillborn, Buckman, &amp; Co., Newtown, Pa., U. S.

## HALLENBECK REAPER.

*Report.*—Commended as a strong, well-made machine, with good cutting and clearing mechanism. The peculiar arrangement of the crank shaft gear allows of the knife-bar being placed nearly in line with the axle of the wheel. The crank rod is bent, and has a bearing at either end. The connecting rod connects with it in the centre; a balance wheel being placed at the opposite end of the crank rod secures steadiness of motion. The primary motion is through bevel gearing.

## 34. Whiteley, Fassler, &amp; Kelley, Springfield, Ohio, U. S.

## SWEEP RAKE REAPER (SIX-FEET CUT).

*Report.*—Commended as a well-made, serviceable machine, of the Champion pattern, with rake head set very low, which insures the grain being laid straight on the table. The form of cam gear allows of the collectors rising somewhat obliquely, thereby inclining the grain in the right direction and allowing of successful operation when the crop is laid. The cam gear (Dodge's patent) is of malleable iron, driven by universal telescope joint from main axle, which allows of the elevation or depression of the table without increase of strain; knife gear outside the traveling wheel; main frame in one piece of wrought iron, three-quarters by two and a half inches; platform connected with main frame by strong brace with two bearings securing liberty and strength; gavels uniform and well laid; machine commendable for strength and simplicity.

## 35. Rochester Agricultural Works, Rochester, N. Y., U. S.

## COMBINED MOWER AND REAPER (HUBBARD).

*Report.*—Commended as an efficient machine for either purpose. As a reaper the method of altering the rakes is simple and ingenious. This is effected by means of three

small gearing wheels. The driving pinion has fifteen cogs; the intermediate wheel twenty-eight cogs; and the third has twelve cogs, three cogs to represent each rake arm, either wheel made to act by a clutch stop. The action is either automatic or controllable. The knife can be driven at two speeds by change of pinion, which can be effected while in work. The rake shaft is driven by pitch chain from axle of inside wheel. In many respects this is a useful combination.

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36. Bradley Manufacturing Co., Syracuse, N. Y., U. S.

HORSE RAKE, REAPING MACHINE (HARVESTER REAPER).

*Report.*—The horse rake is commended for the method of dumping, which is effected by a double lever acting on clutch gearing on both wheels. The clutches are distinct from the wheel, being bolted on, and are easily replaced. The frame is independent of axle. The teeth, which are set too far behind the centre, admit of some adjustment by lengthening or shortening the leverage. Action easy.

The reaping machine is commended for balance of working parts, great facilities of adjustment to suit varying crops, snug arrangement of gearing, which allows of the knife-bar being placed in a line with the axle of the main wheel; for good cutting and well-made gavels, lightness of draft, and general excellence.

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37. C. Aultman & Co., Canton, Ohio, U. S.

MOWING MACHINE (BUCKEYE).

*Report.*—Commended for a well-made, strong, serviceable machine with the following special features. The knife-bar is attached to the frame in front of the driving wheels. This has some advantages. The side strain is reduced, because the weight of the cutting is balanced by the frame and the driver. The guards are rolled out of wrought iron, the under surfaces on which the knife plays are faced with one-eighth inch steel, and the points are also steeled. The under sides of the guards are beveled, so that the minimum of metal shall be on the surface of the ground. The wrist of the pitman works in a box on a crank. This prevents shaking. The crank-rod guard or box is adjustable to meet the wearing of the rod. The frame is cast in two pieces. The gearing is strong and well protected. The first motion is contrary to usual custom, that of bevel wheel running on to spur gearing. The reason assigned for the change is that the wheels most liable to wear should do the slower work. The knife makes forty-two vibrations for each revolution of the wheel, the diameter of which is twenty-nine and one-quarter inches. The frame is so hung upon and rolls over the axle that alteration of the angle of the knife-bar does not cause more friction. The gearing is well balanced, so that there is no undue pressure on the horses' necks. This machine works quietly. The pitch of the finger-bar is adjustable by means of a lever which is attached to the front of the shoe and can be actuated while the machine is in work. This is a desirable feature, enabling the workman to cut out a dead furrow, or to alter his machine for a laid and twisted crop. Nothing is more objectionable than to find a field otherwise well cut disfigured by patches of long, tough grass.

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38. C. Aultman & Co., Canton, Ohio, U. S.

IMPROVED BUCKEYE MOWER AND TABLE-RAKE REAPER.

*Report.*—Commended as being practically the same machine as was shown by Aultman, Miller, & Co., to which our report equally applies. Some description of the *modus operandi* may be given. The knife is placed in front of the driving wheels, a ratchet wheel on axle of inside driving wheel communicates motion to a pinion by means of chain gearing with spring tension pulleys. Then motion is communicated to table by universal joint, terminating in a bevel pinion, well shielded, which drives bevel wheel, to which the rake is

attached. Orbit of rake shaft determined by cam gear protected by a shield, part of which is hinged. The workman, by throwing it out of gear, can stop the rake at any point of its traverse.

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39. Aultman, Miller, & Co., Akron, Ohio, U. S.

THE NEW BUCKEYE COMBINED TABLE-RAKE REAPER.

*Report.*—Commended for the superior form in which the gavels are left for facilitating the binding, over sweep-rake machines. The grain is laid straight on the platform by the reel, because the latter is parallel with the cutter-bar, and its motion uniform along its whole length. The table-rake compresses the grain and delivers it in a closer form and with the straw more parallel than the sweep-rake, which, entering and leaving the crop more or less obliquely, has a tendency to fan out the butts of the gavel, which, while of great advantage when the crop is green and requires field room, adds to the labor of binding, and is of no merit in a ripe crop. The reel, being capable of more adjustment to suit uneven and laid crops, may be expected to work well under difficulties. The workman having control of the revolutions of the table-rake can make the gavels of any size, or the action can be continuous; on the other hand, it is evident that the pressure of the rake-head on the grain at the front corner of the table must have a tendency to knock out ripe grain more than a steady sweep motion.

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40. Sweet, Faulkner, & Co., Dansville, Livingston County, N. Y., U. S.

REAPING MACHINE.

*Report.*—Commended for very light draft, the machine weighing only four hundred and thirty-five pounds, for quality of material and workmanship, and for efficient operation. The cam gear is placed just above and clear of the platform. The rake-shafts are hung upon the standards, and, by means of an adjustable trip and spring, feather over the grain when acting as collectors, thus securing a pretty and effective action; a traveling wheel without spokes, periphery attached by solid external casting, allows of compact gearing and direct draft, the knife-bar being in a line with the axle. The rake-standard is driven by universal joint. The guards are reduced in number, with spaces between. This is a comparatively new machine, and without further experience it is impossible to express a positive opinion as to its durability and ability to deal with a weedy crop.

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41. The Champion Machine Co., Springfield, Ohio, U. S.

COMBINED REAPER AND MOWER (AS A MOWER).

*Report.*—Commended for strong durable construction. The frame is of wrought iron bolted together. The height of cut regulated by good leverage and pitch of knife-bar can be altered while at work. The advantage of this adaptability was evident when the machine followed the roller and cut the laid grass extremely close and even. The knife is driven from both wheels, by means of ratchet wheels on the spur pinion axle. The main axle is stationary and of cold rolled iron. The wheel axle has short bearings. The crank-shaft is of cast steel, has a bearing the whole length with an oil chamber in the centre. The nut of pitman holder is furnished with a ratchet and spring catch. The pitman has a ball-and-socket attachment. The bearings are large, and the wear is taken up by a screw. The finger guards are forged solid, the slot being cut out by a circular saw. No steel plates are used, but the guards are sharpened and case-hardened. The knives are made from four to six feet in length. The knife-bar is fixed fifteen inches behind the axle. The knife makes ninety-eight vibrations for each revolution of driving wheels, which are thirty-two inches in diameter.

## 42. G. H. Peabody, New York, N. Y., U. S.

## ATTACHMENT OF SOLID EMERY TO WOOD IN A RICE-HULLER.

*Report.*—Commended as producing a surface admirably adapted to effect the shelling of rice, which appears to be extremely durable. Mr. Peabody shows this material as applied to a small rice-huller for family use. We recommend the material and the method of attachment to wooden surfaces.

## 43. S. L. Allen &amp; Co., Philadelphia, Pa., U. S.

## HAND SEED-DRILL AND WHEEL HOE.

*Report.*—Commended as a valuable implement for garden culture. The drill consists of a revolving barrel with openings two and a quarter inches from centre to centre, with a regulating slide; each opening is covered by a cap or shield, which secures regularity of seed whatever quantity is in the box. The frame can be used as a hoe also. This firm also exhibits a strong, well-made horse hoe, with triangular frame; the hoe standards being fixed in slots allowing of variation.

## 44. George Barnes &amp; Co., Syracuse, N. Y., U. S.

## KNIVES AND SICKLES.

*Report.*—Commended for excellence of material and good workmanship.

## 45. Ball's Scythe Works, Saratoga, N. Y., U. S.

## GRAIN SCYTHE AND CRADLE.

*Report.*—Commended for excellence of material and workmanship, and improved style of adjustment of the fingers; of great utility and convenience to the moderate farmer.

## 46. Myers &amp; Erwin, Philadelphia, Pa., U. S.

## ASSORTMENT OF FORKS.

*Report.*—Commended for quality of material and good workmanship. A thoroughly useful assortment of straw and manure forks—ferrules well riveted.

## 47. Pittsburg Plow and Crucible Steel Casting Works (J. C. Bidwell), Pittsburg, Pa., U. S.

## STEEL CASTINGS FOR AGRICULTURAL IMPLEMENTS AND FOR OTHER PURPOSES.

*Report.*—Commended for the extent, variety, and general good quality of the castings presented,—affording evidence of the ability of the exhibitor to produce castings of cast steel of any desirable pattern and reasonable size, having great strength and durability, and tempered as required; also for collection of implements suitable for the cultivation of sugar plantations.

## 48. Baugh &amp; Sons, Philadelphia, Pa., U. S.

## SECTIONAL MILLS.

*Report.*—Commended for strength of construction and varying utility, being capable of grinding bones, phosphates, rock guanos, minerals, and ores. The specially commendable feature is that all the grinding surfaces, both in the cylinder and in the cones, are in sections which can be replaced without renewing the whole, or can be substituted for other surfaces to suit different kinds of work.



## 49. C. B. Rogers, Philadelphia, Pa., U. S.

## IRON CULTIVATORS.

*Report.*—Commended for easy adjustment from twelve to twenty-four inches, for arrangement of draft line by regulating screw, for good material and finish, and reasonable price.

## 50. Lewis Lamborn, Hamorton, Pa., U. S.

## HOE HARROW.

*Report.*—Commended for the method in which the hoe standards are secured to the frame, which is ingenious and efficient. The standards are drawn out U-shaped. On the under side of the frame is fitted an iron box. The hoe standard fits into this box, being secured by a wedge with a pin through the beam and nut screw. This hoe is designed principally for potato culture. A small front wheel carries on its axle a perforated dredger, which is intended to distribute Paris green when potatoes are affected by the beetle.

## 51. Graham, Emlen, &amp; Passmore, Philadelphia, Pa., U. S.

## LAWN MOWERS.

*Report.*—Commended for good material, strong and durable mechanism, adjustable speed, considerable variety as to size and form. Horse machine with driver's seat, so arranged that the knife can be raised by lever handle clear of the ground. The fore and hind parts of machine jointed. Shaft of one and five-eighths steel. Cylinder rings malleable iron. Knives attached by screws, and readily adjusted by set-screw. Shaft held in place by two caps with pieces of leather between, which allows of adjustment for wear. Self-oiling journals. Horse attachment jointed and not rigid; an important arrangement, as workman can guide the machine independently of the horse.

## 52. Maxwell, Rowland, &amp; Co., Holmesburg, Philadelphia, Pa., U. S.

## SHOVELS AND SPADES.

*Report.*—Commended as a large, well-assorted collection of shovels and spades, particularly for plain back shovels of cast steel, with straps welded to the blades, a strong attachment being secured without rivets, and for reasonable price.

## 53. B. Rowland &amp; Co., Philadelphia, Pa., U. S.

## SHOVELS, SPADES, AND SCOOPS.

*Report.*—Commended as a large and varied assortment of exceedingly strong, well-made implements; for a recently patented shovel, all made by machinery, with long ferrule and close joint at the socket, made of two pieces of cast steel; and for very reasonable prices.

## 54. Alexander Speer &amp; Sons, Pittsburg, Pa., U. S.

## REVOLVING HILLSIDE AND LEVEL LAND PLOWS.

*Report.*—Commended for the novel and ingenious arrangement by which the stilts and beam revolve on the standard frame. This movement is extremely simple. The workman actuates a lever in connection with a stop clip, thus setting free the beam, etc., and the horses in turning carry it round. The share and fore part of the mould board are in duplicate, with a revolving wing common to both; the first pressure of the turning furrows reverses the wing; price reasonable. Also, for a hillside sub-soil plow of similar principle; and for the general excellence of their large assortment of general purpose plows.

## 55. Auburn Manufacturing Co., Auburn, N. Y., U. S.

## MANUAL IMPLEMENTS OF TILLAGE.

*Report.*—Commended for excellence of manufacture, quality of material, and general utility of the tools, consisting of steel forks, steel hoes, steel rakes, and potato hooks, all finished with best quality white ash handles; grain, grass, and bush scythes; hay, straw, and corn knives; and grass hooks. We also draw attention to the "Denio patent" rounded double-end ferrules, and braced back spading forks and manure forks, as combining great strength and durability.

## 56. Tubular Barrow and Truck Manufacturing Co., New York, N. Y., U. S.

## TUBULAR FRAME IRON WHEELBARROW.

*Report.*—Commended for strength, lightness, and durability, iron being the only material used in its construction,—tubular for the frame, and sheet iron for the tray; also for good workmanship and cheapness.

## 57. Remington Agricultural Co., Ilion, Herkimer County, N. Y., U. S.

## NEEDLE COTTON GIN.

*Report.*—Commended as one of the best machines yet invented for ginning cotton, due to the peculiar form of the cylinder, which, instead of saws, consists of a series of needles with rounded ends, which tear rather than saw off the fibre. These needles are made in small sections, easily renewed, covered with Babbitt metal, which projects slightly beyond the teeth, insuring more intimate contact with the teeth. The Babbitt does not heat, which is a point of considerable importance. The ribs between which the needle circles revolve are slightly chilled at the working parts. The revolving brush, which removes the cotton from the needles, is well made and convenient for repairs. The condenser has also much merit. It comprises a large cylinder covered with perforated zinc, and a small press-roller above. The cotton in passing between these is not condensed and compressed so as to hold together, but weeds, dirt, and dust, etc., find their way through the perforations of the cylinder, and are collected in a spout. The machine can be driven from either side, and all the parts are interchangeable.

## 58. Chadborn &amp; Coldwell Manufacturing Co., Newburgh, N. Y., U. S.

## LAWN MOWERS.

*Report.*—Commended for mechanism, material, and finish, great simplicity, and considerable variety. Hand machines made with either two or three blades, to suit the home and English market. Open balance wipers. Merit claimed that as most of the weight is on the periphery, power is accumulated as in a fly-wheel. All bearings bushed with common metal. Bushes can be screwed up to compensate for wear, and are easily replaced at a small cost; handles either rigid or free, castor wheels in front can be taken off if desired. In the horse-power machine four blades are fixed on to flanges, which are so formed as to secure strong attachment and support for the blades. The shaft-bearing is strong. The knife is supported by a strong spring, and adjusted by a set-screw above. Gearings well covered, impossible to clog; driver can throw in or out of gear, but cannot raise the knife.

## 59. Peru City Plow Works, Peru, La Salle County, Ill., U. S.

## CORN CULTIVATOR (WITH WROUGHT-IRON FRAME).

*Report.*—Commended for being excellently made, with plenty of crop space under the frame; for the method of adjusting the width of cut by sliding the hoe-frame carriage on the main axles; for the connection of the handles by tie-rods and adjustable screw, so that

they can be made rigid at varying widths or worked separately; for the attachment of the corn-shields by springs to the frame, which allows of their giving in case of serious obstructions; and for reasonable price.

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60. Deere & Co., Moline, Ill., U. S.

SINGLE IRON AND WOOD BEAM PLOWS, IRON BEAM GANG AND SULKY PLOWS, AND IRON BEAM-WALKING CULTIVATOR.

*Report.*—Commended for substantial construction, approved models, and forms for different requirements of service; excellence of material employed, fine workmanship, durability, and uniform high quality of products; reasonable cost to consumers.

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61. S. Z. Hall, New London, Conn., U. S.

SELF-FEEDER TO COTTON GIN.

*Report.*—Commended as an efficient substitute for hand labor, thereby replacing one man; for the peculiar arrangement of the hopper bottom, which contains four revolving wooden rollers, with spaces between, through which dirt, etc., can pass. The cotton is next passed over and round a wooden roller with numerous bars carrying spiked teeth. The frame covering this roller, being of strong wire, allows of dust, etc., blowing away. The cotton is dropped from the roller on to the teeth of the gin.

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62. Collins & Co., Hartford, Conn., U. S.

DOUBLE GANG PLOW.

*Report.*—Commended as a strong, well-made implement, designed for three horses working abreast, one on the right and two on the left side of pole; draft equalized by compensating leverage whipple-trees; draft direct from centre of machine; for strong frame carried on a crank axle; the different angles of the wheel-arms; further alterations by leverage from driver's seat.

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63. Skinner & Brother, Des Moines, Iowa, U. S.

PLOWS.

*Report.*—Commended for excellence of material, good workmanship, and beauty of form.

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64. P. K. Dederick & Co., Albany, N. Y., U. S.

PERPETUAL BALING PRESS.

*Report.*—It is the invention of the exhibitor, and quite original in construction.

It is simple and efficient, forming a very compact bale, of good shape, without undue expenditure of power or severe labor by the operator, and its action is continuous.

The hay is formed into trusses as deposited by the fork, and the bale is thus composed of a series of distinct layers of hay, so that when opened at the end it is easily separated for feeding. No injury is done to the hay by the pressing.

It is portable, and may be readily adjusted to the application of any kind of power.

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65. New York Cotton Gin Co., New York, N. Y., U. S.

HAND-POWER COTTON GIN.

*Report.*—Commended for suitability for the Brazilian market. The machine being compact, easily packed for traveling, can be transported on the back of a mule; important feature for this trade.

## 66. George W. Brown, Galesburg, Ill., U. S.

CORN PLANTER.

*Report*.—Commended for superior workmanship and durability; the ingenuity displayed in its construction, possessing the desired qualities of lightness of draft, ease, and accuracy in performing the work very cheaply for which it was designed.

## 67. Moline Plow Co., Moline, Ill., U. S.

IRON AND WOOD BEAM SINGLE PLOWS, AND WALKING IRON BEAM CULTIVATORS.

*Report*.—Commended for adaptation to special work, good quality of material employed, solidity of construction, durability, and fine workmanship; reasonable cost to consumers.

## 68. C. R. Sargent, Newburyport, Mass., U. S.

HAND SEED PLANTER FOR GARDEN PURPOSES.

*Report*.—A simple and efficient tool, with good arrangement of change rollers perforated with various-sized holes, according to the nature of the seed to be sown; adjustable row marker, by wheel sliding on axle.

## 69. Beardsly Scythe Co., West Winsted, Conn., U. S.

SCYTHES, AND GRASS AND BRIER HOOKS.

*Report*.—Commended for excellence of workmanship and material, and for general utility.

## 70. A. C. Cotton, Vineland, N. J., U. S.

ADJUSTABLE SCUFFLE HOE FOR HAND POWER.

*Report*.—Commended for varying utility. Can be used as a hoe or scuffle; also for preparing and covering a seed furrow; a good implement for a small farm or garden; made of good material, and well finished; price very reasonable.

## 71. Queen of the Harvest Manufacturing Co., West Chazy, Clinton County, N. Y.

GRAIN AND SEED SEPARATOR AND GRADER.

*Report*.—Commended for the efficient and rapid manner in which the separation of different forms of grain and weed seeds is effected, due to the excellent construction of the hand-made wire sieves, and the varying forms of screens and separators used. The feeder or hopper is detachable, and can be removed when ordinary fanning only is required. This feeder has two screens, one above the other; the one with coarse round openings lets the wheat through and grades larger material; both it and the screen frame have a lateral smooth or trembling motion, according as they vibrate upon smooth or cogged rollers. This is a patented arrangement of considerable merit.

## 72. The Hills "Archimedean" Lawn Mower Co., Hartford, Conn., U. S.

LAWN MOWERS.

*Report*.—A large assortment of well-made machinery of two distinct types:

No. 1, Roller, Archimedean Machine, with large roller behind, securing speed to the knives; noiseless ratchets; adjustable handle, which can be made rigid if desired.

No. 2, Charter Oak Machines. The roller is replaced by two driving wheels, each loose on shaft, and each has a silent ratchet. The advantage of this arrangement is light draft

and ease of turning; cutter-bar and screw shod with steel; cutter-bar easily adjustable by one screw at each end; axle cap can be filed down to take up wear of axle; good bearing and journals; gearing well covered.

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73. J. E. Wisner, Friendship, N. Y., U. S.

HORSE RAKE.

*Report.*—Commended for the ingenious arrangement for self-action, which is effected by a revolving axle with a toothed wheel in the centre. The boy by lifting a chain with his foot places a lug in gear with the toothed wheel, and the tooth-head rises until the load is discharged, when, coming in contact with a stop-bolt, the teeth return to the ground. The rake frame is connected with the shaft frame by an adjustable lever; pressure on this lever keeps the teeth rigid to the ground. This lever can be used for raising the teeth if required. This rake appears to run very easily.

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74. Richmond Plow Works, Richmond, Ind., U. S.

PLOWS.

*Report.*—Commended for symmetry of form, durability, and strength, and as being well adapted to plowing in different soils.

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75. The Dunn Edge Tool Co., West Waterville, Maine, U. S.

SCYTHE BLADES, AX HEADS, GRASS HOOKS, AND CORN KNIVES.

*Report.*—Commended for quality of material, and good workmanship. A new form of corn knife with double edges appears a decided improvement.

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76. Bickford & Huffman, Macedon, N. Y., U. S.

GRAIN AND SEED DRILL (COMBINED).

*Report.*—Commended for excellence of workmanship, accuracy of delivery, facilities for change of seed from large to small grain, its change of quantity by gear wheels, and regularity of discharge under different conditions. This machine is the same as the "Superior, No. 1," manufactured and exhibited by Thomas, Ludlow, & Rodgers, of Springfield, Ohio, which machine was not tested, one test being regarded as sufficient for both drills, as they differ only in name.

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77. Walter A. Wood, Hoosick Falls, N. Y., U. S.

HARVESTER WITH S. D. LOCKE'S SELF-BINDER ATTACHED.

*Report.*—Commended for a meritorious accomplishment of a much-needed operation, viz., to apply a self-binding apparatus to a harvesting machine. The reel by which the grain is directed on the traveling apron is very efficient, being adjustable both on its height and forward or backward position to suit the nature of the crops. The tying apparatus is controllable by lock leverage so that the size of the sheaf can be regulated. The wire by which the sheaves are bound is securely twisted, and fastened in one place only. The tension can be altered so as to adapt itself to grain in any condition. Every sheaf is tightly compressed, and when bound is thrown off by one of the compressing arms acting automatically. It is evident that further improvements in details, probably including some simplifying of gearing, is required; but great credit is due to those who have experimented at a large outlay of time and capital.

78. **Champion Machine Co., Springfield, Ohio, U. S.**

## COMBINED SELF-RAKING REAPER (AS A REAPER).

*Report.*—Commended as a strong, well-built machine, capable of doing good work in both capacities. As a sweep-rake, the gavels were laid with regularity, and the butts of the sheaves well exposed to wind and sun. This is due partly to the table being slightly turned up at the edge. The cam-table and switch-gear are horizontal, automatic, or controllable as desired, being a modification of Johnstone's patent. The platform and knife-bar can be lowered, raised, or tilted by easy adjustment.

79. **Johnson & Gere, Ahwaga Foundry and Agricultural Works, Oswego, Tioga County, N. Y., U. S.**

## GRAIN DRILL (COMBINED).

*Report.*—Commended as a strong well-made machine, with attachable manure distributor, strong connection of hoe from standards for shifting, one set moving forwards, while the other goes backwards, securing considerable space for trash. For a good cone-shaped serrated force feed-wheel, which occupies the whole width of the seed-cup, the variation of sowing being secured by change wheels, which our experiments prove to be on the whole more reliable and positive than either an alteration of the force feed-wheel when the latter slides on the shaft, or regulation by opening or closing the outlet of the seed-boxes.

80. **Thomas' Smoothing Harrow Co., Geneva, N. Y., U. S.**

## HARROWS.

*Report.*—Commended as a remarkably solid, efficient, and cheap implement, made of excellent material. The main feature of this harrow is that the teeth are put in a slanting position, producing a diagonal cut which facilitates labor and prevents clogging. The harrow may also be used as a weeder with great success.

81. **Sheble & Fisher (Fairmount Fork Works), Philadelphia, Pa., U. S.**

## HAY AND OTHER FORKS AND STEEL RAKES.

*Report.*—This is a very large and superior display of hay, spading, and manure forks, dung and potato hooks, made of excellent material, good shapes, and highly finished. The shanks of the steel rakes are particularly well joined to the heads. The forks are strongly made; and in the spading and manure forks special attention has been given to securing strength in the handle by inclosing the lower end holding the shank of the fork with a stout ferrule, having a slotted end, which comes down on and over the top of the blade or head of the fork.

82. **C. Pierpont & Co., New Haven, Conn., U. S.**

## FODDER CUTTER.

*Report.*—Commended for direct application of power, the feed-rollers being driven by gearing from the knife-shaft. By altering the size of the pinions four different lengths can be cut. The shaft carries two knives revolving nearly parallel to the face of the box, which is lined with steel, the feed rollers being shielded by a cover which extends back ten inches, and so protects the feeder from risk of accident, which is very important, as there is no means of throwing the rollers out of gear.

## 83. The Farmer's Friend Manufacturing Co., Dayton, Ohio, U. S.

## GRAIN AND SEED DRILL.

*Report.*—Commended for excellence of manufacture and material; for ingenious arrangement of change wheel clustered on a cone so that change of quantity is effected with the greatest ease even while the work is in progress; for force feed-wheel which is slightly concave, having eight zigzag ribs on its surface, filling the seed-box and elevating the grain in a manner highly satisfactory on the level and hillside, but capable of further improvement as regards delivery up and down hill. The bottom of the seed-cup, being hinged, can be opened by removing a pin, and cleaned out. The conductors from the seed-cup to the coulters are removable, and can be replaced by broadcast mouths, thus securing varying utility. The india-rubber springs in connection with the jointed hoe-frames, intended to bring back the hoe into position if thrown back by an obstacle, are well arranged so that during ordinary work no pressure on the rubber is possible.

## 84. Withington, Cooley, &amp; Co., Jackson, Mich., U. S.

## HOES, FORKS, RAKES, POTATO HOOKS, AND CORN AND HAY KNIVES.

*Report.*—Commended for variety of manufacture, beauty of form, uniform excellence of material employed, fine workmanship and finish, together with reasonable strength and solidity of the several parts.

## 85. Rhodes &amp; Waters, Elyria, Ohio, U. S.

## EUREKA POST-HOLE DIGGER.

*Report.*—Commended as a strong, efficient implement, well adapted for holing in strong as well as light soils. The judges saw it worked on a hard road. The ease with which the disturbed soil is removed by spreading the handles renders it a valuable labor-saving implement well deserving recognition.

## 86. John H. Thomas &amp; Sons, Springfield, Ohio, U. S.

## HORSE RAKE.

*Report.*—Commended for simplicity of construction, the weight of the driver being so utilized that the additional pressure of the load upon the rakes overcomes the balance and elevates the teeth. The wheel axles are broken, passing through eyes bolted to the under side of the frame, thus securing a perfectly independent action to the frame. The teeth are firmly secured, and easily taken out in case of breakage, by the removal of one nut; over the head of each tooth is a brass spring which insures clean raking. The teeth have large capacity, the cleaner-bar being placed outside the teeth when the latter are down. Price reasonable.

## 87. George W. Rue, Hamilton, Ohio, U. S.

## POTATO DIGGER, HAND CULTIVATOR, AND COMBINATION HAND HOE.

*Report.*—The potato digger is effective and reasonable in price, and is provided with a rolling fender on the beam, lessening the liability to choke.

The hand cultivator is light, adjustable, easily managed, and efficient.

The combination hand hoe is a convenient tool, with the shank and blades so constructed that any shaped blade may be easily attached.

## 88. I. Sedgebeer &amp; Miller, Painesville, Ohio, U. S.

## NONPAREIL FARMERS' FEED AND CORN MILL.

*Report.*—Commended for the peculiar construction of the metal grinding surfaces, which consist of a series of Y-shaped projections, flat and smooth on the face, so that contact does not injure the mill. The mill comprises first a small breaking machine, which reduces the grain and prepares it for the vertical disk wheels, which are made of gray iron and covered with Y-shaped projections in alternate sections, which can be ground down by emery to a fine surface. These plates can be cheaply renewed. The mill is run at about eight hundred to two thousand revolutions a minute, and works equally well reversed.

## 89. Samuel Fisher, Philadelphia, Pa., U. S.

## WHEEL GANG PLOW WITH CULTIVATOR.

*Report.*—Commended for utility as a wheel gang plow and cultivator, simple in construction. The four iron beams between the wheels are ingeniously arranged for the attachment of shovel or turning plow, as required, by means of a bolt. The beams work on hinges independently of each other, enabling the plows to follow the uneven surface. The plows are elevated and lowered by two levers, one on either side of the driver's seat.

## 90. A. J. Nellis, Pittsburg, Pa., U. S.

## HARPOON HORSE HAY FORK AND GRAPPLES.

*Report.*—Commended for the rapidity with which hay can be unloaded and carried up by the draft of the horse acting through pulley-blocks. The fork comprises a single standard with double harpoons, which are actuated by a lever, and effectually hold up the load while it is being elevated. Also for ingenious mechanism of grappling blocks, which are so constructed that they can be elevated on a pole to the required position, fixed to the beam by claws, and held fast, and removed with equal facility.

## 91. The Hall Husking Glove Co., Chicago, Ill., U. S.

## HUSKING GLOVES AND PINS.

*Report.*—Commended for strength of material and durability of wear. The material is strong tanned calf-skin, protected with steel plates. The right-hand glove is furnished with a strong steel husking pin, or claw, by which the husk is principally removed. Half gloves are made on the same plan, and present certain advantages by half the cost. The hands are kept cooler and have more freedom.

The husking pins are also sold separately with straps to fasten to the hand.

## 92. Gale Manufacturing Co., Albion, Mich., U. S.

## HORSE HAY RAKE.

*Report.*—Commended for a well-constructed rake, simple in design, having an improved clearing-bar and means of adjustment for changing the position of the lever and the position of the rake-head.

## 93. P. P. Mast &amp; Co., Springfield, Ohio, U. S.

## CORN CULTIVATORS.

*Report.*—Commended for varying utility, being equally adapted for riding or walking. Having high wheels and a light, though strong, well-braced wooden frame, the draft is reasonable. The wheel-axles, which are cranked, are strongly attached to the frame; frame raised out of work by foot lever, treadle, and chain. Corn guards consist of rotating



toothed wheels, which are very efficient. Standard arm jointed to frames, braced by iron band, to which wooden pin is attached, so that in the event of an obstruction breaking the pin, the whole arm, and not the hoe only, flies back, rendering breakage impossible.

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94. Bickford & Huffman, Macedon, N. Y., U. S.

FERTILIZING ATTACHMENT TO GRAIN DRILL.

*Report.*—Commended for a successful distribution of artificial fertilizers, due to the peculiar form and action of the stirrers, which consist of revolving star-shaped disks, which run on the bottom of the hopper and bring the manure over diagonal openings, which are regulated by a slide attachment, giving great variability.

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95. Furst & Bradley Manufacturing Co., Chicago, Ill., U. S.

SINGLE GANG AND SULKY PLOWS, CULTIVATOR, AND HORSE RAKE.

*Report.*—Commended for extent and variety of manufacture, uniform good quality of products in material, workmanship, and adaptation to the special service required of each, reasonable simplicity of construction, and lightness consistent with durability, facility of handling, and thorough work; moderate prices to consumers.

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96. Vandiver Corn Planter Co., Quincy, Ill., U. S.

VANDIVER CORN PLANTER.

*Report.*—Commended as well constructed, of good material, reasonably light, and durable; delivers the grain accurately in sight of the driver, and covers it well in all properly prepared soils to secure uniform germination.

It is simple in construction, easily adjusted, and may be readily converted into a drill by drill attachment, for which the frame is prepared by the manufacturers.

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97. South Bend Iron Works, South Bend, Ind., U. S.

CHILLED PLOWS AND ATTACHMENTS.

*Report.*—Commended for the highly-tempered metal used in its construction, and the ingenuity displayed in giving it shape and finish to suit it to different soils; for making it cheap and very durable, and overcoming the heavy friction against the land side by placing the beam over the centre of the plow.

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98. Smith Harper, Philadelphia, Pa., U. S.

GARDEN AND FIELD HAND HOES, AND GARDEN, LAWN, AND FIELD HAND RAKES.

*Report.*—Commended as embracing a large and varied assortment of the manual implements named; of uniform good quality, fine finish, and substantial workmanship; light and durable in construction and material, and well adapted to their several uses.

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99. B. F. Avery & Son, Louisville, Ky., U. S.

PLOWS, WALKING CULTIVATORS, AND SULKY PLOWS.

*Report.*—Commended as of the best material, of the most approved patterns, and thoroughly finished.

The walking cultivator is commendable for the same reasons, and for the form and strength of the frame.

The sulky plow has a novel arrangement in the plow being placed forward of the axle and driver's seat.

## 100. James Selby &amp; Co., Peoria, Ill., U. S.

## CORN PLANTER.

*Report.*—Commended as a strong, well-made machine, with foot leverage for raising the seed-boxes, and an arrangement to regulate the depth of planting, and for rigidity of coulters; seed slide-bar travels on friction rollers, secures great freedom of motion; boy's seat adjustable so that weight can be brought right on to the shoes or runners. A small stirrer in the seed-hopper keeps the grain well up to the openings; good foot leverage for wheel scrapers.

## 101. D. E. McSherry &amp; Co., Dayton, Ohio, U. S.

## RICE DRILL AND GRAIN AND SMALL SEED DRILL.

*Report.*—The rice drill is commended for the admirable action of the force-feed, which is on the same plan as that used in the grain drills of this firm, insuring very even discharge both in the level and the hillside.

This drill has four hoes, fifteen or sixteen inches apart, which have wide mouths, in order that the rice may be sown in a broad channel. The patent lift-bar is used.

The grain and small seed drill is commended for the excellence of manufacture and material for the nature of the force-feed arrangement, which comprises a spiral ribbed wheel with a spring washer attachment, which prevents the grain being crushed. This wheel and washer occupy the whole transverse span in the seed-cup, which insures regularity of delivery on hillsides. Some farther adjustant appears desirable to enable this drill to deliver with equal equality of delivery up and down hill. For the way in which the alternate hoe frames are hung on an iron rod which slides forward or backward in strong grooves. For a patent lift-bar.

## 102. A. B. Farquhar, York, Pa., U. S.

## COTTON CULTIVATOR.

*Report.*—Commended for its simple and strong construction. It does the work economically and facilitates subsequent operations. The improvement of this machine consists of two S-shaped knives which revolve horizontally, chopping everything in their way, leaving at distances diamond-shaped groups.

## 103. A. B. Farquhar, York, Pa., U. S.

## PLOW.

*Report.*—Commended for the strong combination standard; for its attachment to the beam by one bolt behind and adjustable clip in front; for the arrangement by which the land side and sole can be adjusted to compensate for the wearing away of the share, and for the facility with which the implement can be converted into a cultivator, hoe, or double-earthing plow; a number of different points being supplied for these objects, and included in the price, which is reasonable. The importance of a good convertible implement as tending to utility, especially for small occupations, commends this implement.

## 104. A. B. Farquhar, York, Pa., U. S.

## MACHINE FOR SEPARATING RICE FROM ITS STRAW.

*Report.*—Commended for great strength, simplicity of construction, efficiency, and for the following specialties: peculiar form of drum and concave teeth, which have rounded backs and beveled edges, in order to avoid breaking the grain; for vibrating carrier, composed of ribbed sheet iron, with three projecting notched wood pieces with open spaces for the passage of the rice to the screen of the winnower; for three cross bars, with agi-

tating teeth adjustable, which help to retard the passage of the straw and shake out the grain; for adjustable riddle to regulate the discharge of any unthrashed ears; and for a measuring hopper and simple counter.

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105. S. R. Nye, Winchendon, Mass., U. S.

HORSE HAY RAKE (BAY STATE RAKE).

*Report.*—Commended for the facility with which the rakes rise and discharge the load. This is effected by replaceable ratchets on both wheels; the frame is connected at will with these ratchets by means of a trip worked by foot levers. The teeth increase in spread to the centre, and so form the parabola of a circle. We could not see that this peculiarity was advantageous, as it reduces the capacity of the rake, the hay taken up at the outside being unduly pressed. The clearers are high, and do not materially interfere with the capacity of the rake. The workmanship and material appear excellent.

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106. George Esterly & Son, Whitewater, Wisconsin, U. S.

BROADCAST DISTRIBUTER AND HOE ATTACHMENT.

*Report.*—It is a useful combination of a broadcast machine of large capacity, with a hoe frame which covers the seed as sown, or can be used as a corn hoe. The frame hangs on a vertical bar having considerable freedom; can be guided with accuracy by means of two handles, which give a powerful leverage. Force-feed comprises a fluted wheel which slides on shaft by lever adjustment. Quantity distributed depends on proportions of fluted wheel in the seed-box. This is probably not a very accurate adjustment. Seed falls upon an inverted cone with projecting rays, which insures spread. The hoe standards are attached to the frame in such a manner as to be adjustable as to pitch.

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107. Silver & Deming Manufacturing Co., Salem, Ohio, U. S.

STRAW AND STALK CUTTER.

*Report.*—Commended for a safety fly-wheel arrangement, the wheel being fixed to the shaft by a friction cone. In the event of iron or other hard substances getting into the feed, the fly-wheel revolves but the knife stops. Also for a simple plan of changing the cut by shifting cluster of gear wheels.

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108. Keystone Manufacturing Co., Sterling, Ill., U. S.

TWO-HORSE CORN PLANTER.

*Report.*—Commended for the two following merits: 1, for regularity of the cut-off; 2, for the adjustable shoe under side of coulter, which regulates depth at which seeds are deposited.

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109. George Griffiths, Philadelphia, Pa., U. S.

SPADES AND SHOVELS.

*Report.*—Commended for variety of useful forms, for strength and quality of material and workmanship, and for reasonable prices.

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110. T. Rowland & Sons, Philadelphia, Pa., U. S.

SHOVELS AND SPADES.

*Report.*—Commended for excellence of material and superior workmanship, and for their adaptation to the work for which they were designed.

## 111. Pennock Manufacturing Co., Kennett Square, Chester County, Pa., U. S.

## DOUBLE HARPOON HORSE HAY FORK.

*Report.*—Commended for great capacity, and special adaptation for dealing with short hay, and for cleaning up the last portions of the load.

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## 112. S. Hanck &amp; Brother, Lebanon, Pa., U. S.

## CABBAGE CUTTER.

*Report.*—Commended for simplicity of construction, efficiency of work, and adjustability.

1. Lightning cutter; comprises a stationery hopper and vibrating table, with double-edged knife cutting both ways. The power is applied through a heavy fly-wheel; a smaller wheel on same axis actuates the table by means of a pin on its periphery working in an upright slot, to which the table is attached. We thus have a remarkably easy motion. The cabbage or other vegetable is pressed down by a follower, which can also be used as a divider for the hopper. Useful for small vegetables.

2. Centennial. This is a much cheaper machine, but less efficient. The cutter-bar is fixed. The hopper-box, on friction wheels, is worked backwards and forwards by hand, running on tracks of galvanized iron. Gun stocks at either end arrest the traverse of the box beyond the requisite limits. These machines are principally valuable in the preparation of sourkrout.

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## 113. Clegg, Wood, &amp; Co., Dayton, Ohio, U. S.

## ARCHER HORSE RAKE.

*Report.*—Commended as a well-made and efficient horse rake, which can be raised or lowered vertically. Driver's seat adjustable according to size of attendant. Teeth set well under the machine. The teeth frame is hinged at top of axle; gives considerable space for load.

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## 114. A. J. Nellis &amp; Co., Pittsburg, Pa., U. S.

## IRON TIE FOR BALING COTTON.

*Report.*—Commended for simplicity, strength, ease of adjustment, and impossibility of loosing the buckle or tie in transporting. The exhibitors have two kinds of tie, of equal merit.

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## 115. Oliver Ames &amp; Sons Corporation, North Easton, Mass., U. S.

## SHOVELS AND SPADES.

*Report.*—The shovels and spades are made from the best materials, and of a very superior finish.

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## 116. Haworth Planter Co., London, Ohio, U. S.

## CHECK ROWER FOR PLANTING CORN.

*Report.*—Commended for an ingenious arrangement, applicable to any corn planter, by which the seed-slide can be made to work at the required intervals, and the boy usually employed to work the slide is dispensed with. The action is secured by means of a rope fixed at either end of the field, which passes over and around pulleys fixed to the planter. The rope is knotted at proper intervals; as the machine passes these knots the required action of the seed-slide takes place.

## 117. B. D. Buford &amp; Co., Rock Island, Ill., U. S.

GANG PLOWS, WALKING CULTIVATORS, SULKY PLOWS, AND IRON AND WOOD BEAM SINGLE PLOWS.

*Report.*—Commended for variety of manufacture; good quality of products; adaptation of the several implements to special work required of each; material, workmanship, durability; and for reasonable cost to consumers.

## 118. O'Brien Brothers Manufacturing Co., Kewanee, Henry County, Ill., U. S.

VIBRATING HARROW.

*Report.*—Commended for ingenious construction and light draft. The harrow is made in three sections, which are attached in such a manner as to secure a perfectly independent action and allow of adaptation to uneven ground.

## 119. Wheeler &amp; Melick Co., Albany, N. Y., U. S.

HORSE HAY RAKE.

*Report.*—Commended for simple and effective method of raising the teeth and discharging the load. Revolving axle, connected with the wheel by linch-pins, is divided in the centre. Friction bands, tightened by a lever and chain, effect the required motion. This rake has considerable capacity, owing to the fact that the cleaners are placed tolerably high and do not interfere with the accumulation of the hay in the rake.

A second machine shown by this firm is commendable for the mode of attaching the draft. The horse draws by traces from a bodkin which is attached to the lever; consequently, when the lever is set free to act by pressure of the workman's foot, the horse greatly assists in the operation of dumping. The rakes are hung upon a bar by collars. They have considerable freedom of motion, and the machine is well made, simple in construction, and fairly efficient.

## 120. D. Root, Son, &amp; Co., Mount Joy, Pa., U. S.

CULTIVATORS.

*Report.*—The cultivators are well made, of a desirable pattern, iron frames, expanding sides, and with a wheel in front, adjustable to regulate the depth of work.

## 121. Joseph Rothchild, Shelbyville, Ky., U. S.

CHECK ROW CORN PLANTER.

*Report.*—Commended for ingenious arrangement by which the grain can be dropped automatically at the requisite distances. Each half revolution of the wheel causes a cam to actuate the dropper; two disks standing out from the periphery of the wheel mark the places in a line with which corn drops, and thus act as track markers. The wheel axle can be raised or lowered by lever handle. The wheels have a series of spokes on the surface. If the wheel disk does not return in the holes made by the previous run, and consequently the seeding is out of line, then by raising or lowering the wheel ground is gained or lost as required. A heavy marker carried on a spring at the end of frame acts as an assistant guide; frame easily raised by a foot lever.

## 122. Russell, Burdsall, &amp; Ward, Port Chester, N. Y., U. S.

BOLTS AND NUTS FOR USE IN CONSTRUCTION OF AGRICULTURAL IMPLEMENTS AND MACHINERY.

*Report.*—Commended for the uniform good quality and reasonable cost of the products.

## 123. Gregg &amp; Co., Trumansburg, N. Y., U. S.

## SULKY PLOW.

*Report.*—Commended for solid, simple, and ingenious construction, and comparatively low price. Any right-hand plow may be attached to the frame, giving the advantage to use this plow in any class of soil. The axle is adjustable, so that the plow may be handled very easily, and the contrivance for varying the depth is so complete that the driver may do it instantaneously.

## 124. A. B. Travis, Brandon, Oakland County, Mich., U. S.

## WHEAT HOE AND BROADCAST SOWING MACHINE.

*Report.*—Commended for a combination which effects two important operations, viz., to sow grain broadcast and cover the seed by means of a series of hoes attached to a pivoted frame with handle. The same implement is an efficient hoe for drilled grain, the workman being able to steer the frame with great nicety. The seed distribution is effected by means of reciprocating slides with holes of different sizes driven by cam gearing on inside of driving wheels; different-shaped hoes can be attached.

## 125. Brown, Hinman, &amp; Co., Columbus, Ohio, U. S.

## HOES AND FORKS.

*Report.*—Commended for good material and workmanship, for variety of utility, for a capital collection of socket and shank hoes of various forms and for different purposes. Also for scythe cradles with regulating screws, allowing of adjustment to suit workmen.

## 126. P. P. Mast &amp; Co., Springfield, Ohio, U. S.

## BUCKEYE PLOW SULKY.

*Report.*—Commended as a convenient carriage to which any ordinary two- or three-horse plow, wood or iron beam, right- or left-handed, may be readily attached, the whole forming a sulky plow. The devices to secure proper adjustability as to direction and depth are ingenious, novel, and efficient. The frame is strong and durable.

## 127. Nash &amp; Brother, New York, N. Y., U. S.

## POTATO PLANTER.

*Report.*—Commended as an ingenious invention, and, provided it is a fact, as declared by the exhibitor, that potatoes sliced into wedge-shaped sections will grow whether such sections have eyes or not, effective. The hopper consists of a round iron box with revolving bottom, furnished with eight openings four inches in diameter, which can be reduced by bushing rings to two and one-quarter inches, and any of them can be covered by a shield so as to cease acting; over the discharge opening below is a stationary horizontal knife with an opening of three-fourths inch on one side, one-eighth inch on the other, securing a wedge-shaped cut; a second box, which can be removed if desired, sows fertilizers, which can either be dropped at same point as the sets, or at intermediate intervals. The distributing power consists of a horizontal scraper; a ratchet and spring in wheel throws in and out of gear and stops delivery while turning.

## 128. Moses Johnson, Lockport, N. Y., U. S.

## PATENT ROTATING HAND WEEDER AND HAND HOE.

*Report.*—The rotating weeder is commended for the varying operations to which it can be applied. This is due to a revolving spindle which carries four sorts of cuts. The

spindle is turned by the foot and held in place by a ratchet and spring. The cutters can work at any angle and at different depths.

The cultivator or hand hoe is commended for excellence of material and ingenuity displayed in constructing, with little cost, hoe and socket out of same piece of steel without weld or rivet. The front of socket is concaved, imparting greater strength to the very light hoe.

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129. Marsh Harvester Manufacturing Co., Sycamore, Ill., U. S.

WIND VANE PUMPING ENGINE.

*Report.*—Commended for the highly ingenious arrangement by which the length of stroke of the pump is adjustable according to the force of the wind, and for the sensitive action of the fans, which open out to the wind, being actuated by a spring on the shaft and levers. The engine runs equally well with a light or a heavy wind. Price reasonable.

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130. The J. C. Hoadley Co., Lawrence, Mass., U. S.

PORTABLE FARM ENGINE.

*Report.*—Commended for peculiar arrangement of steam jacketed cylinder, the steam being admitted into the jacket direct from the boiler, the jacket acting as a dome; also for the capacity and construction of the boiler. These two points are considered meritorious; but the general construction of the engine is not approved of, considered as a farm engine, and no opinion is offered as to the value of an automatic cut-off on main shaft in place of ordinary governors.

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131. The Eclipse Windmill Co., Beloit, Wis., U. S.

WIND ENGINE.

*Report.*—Commended as a thoroughly efficient, well-made engine, economical in work. We find a strong solid wheel varying in size from ten feet to sixteen feet diameter. The special claim is for a small controllable side vane, which acts as an overbalance and draws the sail away from the wind in a storm. It is prevented from acting unfavorably in a light wind, because it must first overcome the leverage of a weighted arm, which can be made adjustable by moving the weight nearer or farther from the centre. The turn-table travels on four friction balls running on a grooved surface. Table casting is made in one piece with the cap or bed plate, and has flanges on under side to receive the heads of the posts. The end of the piston-rod has a ball attachment which keeps it in place. There is no method for taking up the wear of this ball.

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132. Tappey & Steel, Pellsburg, Va., U. S.

BEASLEY'S POWER BALING PRESS.

*Report.*—Commended for simplicity and rapidity of action, all motions derived from one belt. The motion of the press is arrested automatically at the proper point, and the action of the screw is reversed by a lever. A well-made, strong, and efficient machine.

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133. The Brown Cotton Gin Co., New London, Conn., U. S.

POWER COTTON GIN.

*Report.*—Commended for general excellence of construction and design, comprising a very efficient machine, with all labor-saving appliances. Thus, we find a self-feeder, differing from others principally in the fact that the hopper bottom has a series of fixed and movable bars with iron serrated teeth set about one-eighth of an inch above their surface.

These convey the cotton with considerable regularity on to a revolving spiked feeder, by which it is carried to the saws. This feeder is inclosed in a wire cover. The saws work through flat ribs according to the usual plan, but the peculiar arrangement is that the ribs are adjusted to the saws by means of external screws. The condenser is not so good as it might be; the perforated cylinder being above the press roller, there is not the opportunity for the escape of dust, etc., as if their positions were reversed. Also commended for moderate draft due to simplicity of the gearing.

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134. R. Wakeman, Port Deposit, Md., U. S.

HAY AND COTTON PRESS (BY HAND POWER).

*Report.*—Commended for powerful and rapid leverage, effected by ratchet, lever, and pulley. The chain winds upon a cone cylinder so arranged that the power increases as the presser works home. Each leverage exercises a pressure of fourteen tons. In present form this machine is adapted for hay, but can be made equally suitable for cotton by slight modifications of the press.

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135. Chandler & Taylor, Indianapolis, Ind., U. S.

PORTABLE FARM ENGINE.

*Report.*—Commended as a well-made, light-running engine; boiler space somewhat limited, consequently this is not a specially economical machine. The steam is taken from the dome of the boiler by pipe passing into and through the boiler to the smoke-box, where the pipe coils so that the steam becomes superheated and enters the chest without exposure to the air in a dry condition. This appears a meritorious arrangement. The cylinder is jacketed with felt. The steam-chest is placed below the cylinder, so that all condensation is clear of the cylinder. The piston valve is balanced. The guides have large surfaces. All connecting rods are of steel. The pump has a three-way valve, spring seat for driver, brake on hind wheels acted on by leverage from driver's seat. The boiler is connected with the centre of fore carriage by ball-and-socket joint.

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136. Best Steam Engine and Boiler Works, Lancaster, Pa., U. S.

PORTABLE FARM ENGINE.

*Report.*—Commended as a practical useful engine suitable for agricultural work. The pillar blocks are on one saddle, which is bolted to the bed plate; feed-water pipe of pump passes through pillar block journals, and this keeps them cool. Pump rod very direct. A double valve shuts off water from the boiler, and opens a valve which conducts to ash-pan, an excellent arrangement, preventing accidents to pump. Simple plan for reversing the eccentrics without link. The connecting rod has solid ends, boxes set up by key adjusted by set-screw. Water heater consists of a screw, steam passes right through the centre. The crank axle with iron springs.

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137. C. H. Dana, West Lebanon, N. H., U. S.

LABELING MACHINE.

*Report.*—Commended for highly ingenious mechanism, by which wire labels for cattle, hogs, or sheep are stamped with name or initials, numbered from 0 to 1000, cut and ring-shaped, suitable for insertion in the ear; ease with which the work can be done by a lad, and rapidity of execution; one thousand labels can be made in twenty minutes. Immense saving in labor over hand work.



## 138. Mansfield Machine Works, Mansfield, Ohio, U. S.

## PORTABLE FARM ENGINE.

*Report.*—Commended for comparatively large boiler capacity; good pump with air chamber, driven by eccentric from main shaft. The engine is attached to the side of the boiler in a convenient position for oiling, etc.; carried on a strong well-arranged bed plate, which can be detached from its brackets and used as a stationary engine. Cylinder has a steam jacket, joints scraped or ground, no packing used, adjustable cut-off, sliding throttle valve, readily fixed at any desired point, balance steam valve, steel fire-box and steel flue sheet, small water heater with return pipes. Altogether, a well-balanced, well-arranged, and carefully-finished machine, likely to do good duty.

## 139. E. Stover &amp; Brother, Freeport, Ill., U. S.

## WIND ENGINE.

*Report.*—Commended as a strong durable engine, not liable to get out of order, for the following reasons. The wheel is solid, dished inwards, which allows of the fellies, which are round, acting as braces. The vane beam has a spring clutch which acts on the crank wheel of the pump and instantaneously stops the motion. The turn-table runs on an anti-friction table, comprising sixteen chilled iron balls, making the action sensitive and allowing of a comparatively short vane being used. The shaft castings are long and divided into two parts with india-rubber between, to compensate for wear. In storms the wheel luffs because the wind overcomes a weight on the left side of the machine. The frame is made of four pieces of timber bolted together near the top: this makes a strong connection.

## 140. United States Wind Engine and Pump Co., Batavia, Ill., U. S.

## WIND ENGINES.

*Report.*—Commended for the powerful and efficient wind engines, with sectional sails, turning on a transverse axis and capable of being set with their edges to the wind, in which position the mill stops. These sails are held to the wind by an adjustable weighted lever ingeniously connecting with radiating arms attached by jointed levers to the transverse axis of each section. Each arm is provided at its extremity with a weight: when the centrifugal tendency of these weights is sufficient to overcome the weighted lever already described, their action causes the sections to turn their edges to the wind more or less completely, according to their velocity or the force of the wind, so that in a stiff breeze the position of the section is almost parallel to the direction of the wind, and the least amount of surface is exposed that will keep the mill to its work. The only objection that we know of to these mills relates to complication of parts, requiring the frequent lubricating of many joints, and high original cost.

## 141. Frick &amp; Co., Waynesboro, Pa., U. S.

## PORTABLE FARM ENGINE ("ECLIPSE").

*Report.*—Commended as an engine giving the best results of any that were tested, and may be regarded as a well-made, strong, useful machine. The traveling wheels are large and powerful. The boiler is suspended on springs for traveling, which are let down when at work. The boiler is capacious. There is a powerful brake on the hind wheels, very useful for staying the engine when at work. The engine is carried on the top of the boiler, resting on a powerful bed plate, which is hollowed out to form a receptacle for oil leakage. This can be detached from the brackets and the engine converted into a fixed horizontal engine if required. The governor has three speeds, and the crank shaft is counterbalanced. The engine saddle has provision for varying expansion.

The water heater is large, of the ordinary diaphragm form, and the pump with air cham-

ber is well constructed. The cylinder has balanced slide valves. The safety valve works by a spring, which is a good arrangement, particularly when the roads are rough. Driving wheel on each side of crank shaft.

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142. Jona Bigelow & Co., Boston, Mass., U. S.

PATENT LABELING MACHINE.

*Report.*—Commended as a most ingenious, efficient, and labor-saving invention for attaching labels to cans or bottles. The apparatus comprises an inclined plane, with a paste-roller at the upper end, covered with flannel, and working in a paste-box. The labels are placed in a recess lower down, which is so arranged that the bottom rises as the labels are withdrawn, thus insuring that as the pasted surface of the can passes, the label shall be attached. The most ingenious part of the performance is the way in which the edge of the label is gummed. This is effected by the can, after picking up its label, passing over and pressing down an upright lever, which, by a cam gear, causes a brush to rise and gum the top label ready for the next can. All that is required is to start the can or bottle rolling down the inclined plane. The label is picked up and perfectly fastened. The saving of labor over hand work is very great.

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143. Elias Stangeland, Rockdale, Minn., U. S.

FEED STEAMER.

*Report.*—Commended for its efficiency and simplicity as a very economical farm apparatus, simply consisting of a boiler and tub, in which the feed is cooked by means of steam.

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144. Kenosha Fanning Mill Co., Kenosha, Wis., U. S.

FANNING MILL.

*Report.*—Commended for good workmanship in make and finish. The motion is easily adjusted to any required shake by means of cams with a hook that is shifted to holes in shaker, thus procuring the desired motion to sieves. Also for its utility as a grain separator.

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145. Pittsfield Eureka Fan Mill Manufacturing Co., Pittsfield, Ill., U. S.

FANNING MILL.

*Report.*—Commended for its value as an efficient and rapid grain cleaner and separator, the sieves are easily changed and adjusted to suit the various kinds of seeds, and for cheapness and durability.

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146. Barnard Cortrite, Norwalk, Ohio, U. S.

EUREKA FANNING MILL.

*Report.*—Commended as a well-made, strong, and efficient winnowing machine, a separator capable of separating clover and plantain, timothy and grain, and all sorts of seed weeds, making superior samples, light-running, with adjustable blast, regulating shaker, and a great variety of admirably-made screens for various purposes. Moderate cost.

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147. Russell & Co., Massillon, Ohio, U. S.

EIGHT-HORSE POWER THRASHING MACHINE.

*Report.*—Commended for quality of material and workmanship, capacity for rapid and efficient execution, especially provided for by the presence of the winnowing fans, which improve and simplify the separation of chaff from the grain; for the mode of driving the riddles by pitman from lower fan shaft; for attachment of straw elevator; and for convenient plan of folding up.

## 148. J. I. Case &amp; Co., Racine, Wis., U. S.

## TEN-HORSE POWER THRASHING MACHINE.

*Report.*—Commended as a strong, well-made machine, capable of doing efficient work, and reasonable in price; also for capacity and general satisfactory work.

## 149. Keystone Manufacturing Co., Sterling, Ill., U. S.

## HAND CORN SHELLER.

*Report.*—Commended for being thoroughly well made and efficient; for possessing a feed hopper, which facilitates feeding, allowing a boy to operate as effectively as a man without it; for having a powerful winnowing fan, which removes chaff, etc.; for heavy fly wheel, which gives steadiness to the mill, and reduces the labor of working; and for utility for small occupations.

## 150. Wheeler &amp; Melick Co., Albany, N. Y., U. S.

## STRAW PRESERVING RYE THRASHER.

*Report.*—Commended for special arrangement of concave on springs, allowing of considerable variation in case of a large quantity of straw passing the drum; and for the arrangement of the drum beaters securing desired effect.

## 151. Jos. K. Mount &amp; Co., Hightstown, N. J., U. S.

## CHAMPION HAY CONVEYER.

*Report.*—Commended for simplicity of construction, strength and ease of motion, secured by having four friction rollers. While the load is being made and raised, the conveyer is secured in position by a lock lever; the pulley wheel or ring of the fork striking a rod in connection unlocks the lever, and the strain of the rope, actuated by the power below, immediately causes the conveyer to travel along the rail to any required point, when the load is discharged. This is a most desirable addition to the ordinary unloading fork, which, without such assistance, must discharge the load only at a given point, from whence it must be removed by manual labor. With this, no matter what is the size of the barn, one man, or a man and a lad or girl, can shake up and stack the hay as fast as it can be elevated. The conveyer well braced, and a guide from lower side of the lever prevents the rope getting off the pulley. No injury can be done to the roof by the rail, since the latter is secured to the rafters in such a manner by clips as tends rather to truss the roof than otherwise.

## 152. Warder, Mitchell, &amp; Co., Springfield, Ohio, U. S.

## CHAMPION SELF-RAKING REAPER.

*Report.*—A strong, well-made machine, on the same principle as the Champion machines, differing slightly in some of the minor details; thus, the rake gear cams are placed vertically with flanges. The cam gear is placed nearer the table. The rakes act in a nearly parallel direction above the knife, securing a level deposition of grain on the table, and well-made, tidy gavels.

## 153. Thomas Hazard, Wilmington, Ohio, U. S.

## CHAFF CUTTER (KEYSTONE COMMON SENSE).

*Report.*—Commended for an ingenious arrangement of steel springs in front of mouth which steadies the knife and holds the straw while it is being cut off. The upper edge of spring comes in front of the material that is being cut, and prevents a ragged tearing action. Also for the manner in which the speed of the upper feed roller is regulated, and consequently the change of cut effected, which is done without change of wheels.

## 154. Stuart Perry, Newport, N. Y., U. S.

## HAY TEDDER.

*Report.*—Commended for simplicity of gearing, great power, and the admirable way in which the grass is kicked up and left exposed to sun and wind. The revolution of the tines is effected by a cam gear, so contrived that after the work is effected the tines rise up from the crop, rendering clogging or undue agitation impossible. The tines are made self-adjustable by a spring. The shafts, two in number, are driven from both wheels; they are made of hollow gas-piping, strong and durable.

## 155. John A. Hafner, Pittsburg, Pa., U. S.

## COIL SPRINGS FOR THRASHING MACHINES.

*Report.*—Commended as a valuable addition to thrashing machines driven by gearing from horse or steam power, but especially the former, acting as a reservoir or accumulator of power, preventing the sudden jerks incidental to the starting of the horses or the choking of the cylinder, saving the horses' shoulders from injury, and steadying the motion materially. The spring is so constructed that its durability is secured. The application is easy.

## 156. The Pitts Agricultural Works, Buffalo, N. Y., U. S.

## THRASHING MACHINE (STEAM OR HORSE POWER).

*Report.*—Commended for the method of attaching the draft-poles, which secures strength and allows of considerable play; and for strength of horse gears generally; for the arrangement of the thrashing machine, which is well balanced, strongly braced, and efficient, doing good work, and being of the largest class in point of capacity.

## 157. Stratton &amp; Cullum, Meadville, Pa., U. S.

## HAY LOADER (FOUST'S).

*Report.*—Commended as a most efficient labor-saving machine, picking up and elevating hay or loose grain out of windrows into the wagon as rapidly as could be done by four men; and for simplicity of construction and admirable adaptability for the work. The machine consists of a revolving frame on high wheels with curved tines which pick up the hay and place it on the elevator, composed of traveling chains carrying cross-bars of wood, with a slatted wind guard which materially assists the elevating process. To the revolving frame are hinged hammers, which, striking against fixed surfaces, give the hay a shake and facilitate the delivery from the collector to the elevator. The attachment to the wagon is by a hook, which allows of the junction being made or severed with the greatest ease. The machine can be thrown out of gear for traveling.

## 158. Sandwich Manufacturing Co., Sandwich, Ill., U. S.

## SELF-FEEDING POWER CORN SHELLERS (ADAMS PATENT).

*Report.*—1. Commended for machines representing a large and successful industry in the heart of, and adapted to the wants of, the great corn (maize) producing district of the United States of America.

2. They are substantially constructed, and reasonable in cost to consumers.

3. Being "picker wheel" machines, they separate the grains from the cob with the minimum amount of injury to either cob or grains consistent with clean, thorough, and rapid work.

4. The devices and attachments for self-feeding, insuring regularity and certainty of feeding, as also to supply the necessary pressure without clogging, and to render easy the adjustability to different positions and application of power, are ingenious and effective.

5. They are economical of power compared with the work accomplished.

## 159. Treman, Valentine, &amp; Green, Ithaca, N. Y., U. S.

## HAND CORN SHELLER.

*Report.*—Commended for strength of construction, simplicity, and efficiency, separating the corn from the cob by double feed, and also separating chaff, etc., from the grain and cobs by small winnowing.

## 160. Huber Manufacturing Co., Marion, Ohio, U. S.

## REVOLVING RAKE AND HAY COLLECTOR.

*Report.*—Commended for the improvements over the old collectors, viz., working on iron and being held in position by an iron spring; also for a jointed arrangement which allows of its being folded up and readily transported. The action of the spring, aided by the intelligence of the operator, secures the operating teeth being kept at a proper angle. The handles are kept rigid by a tie rod. They are connected to the frame by a secure bearing. Though hardly a hay rake in the proper sense, as it cannot rake uneven land clean, it is very useful for cutting hay into rows with rapidity, and has one great merit, viz., low price.

## 161. J. R. Fitzhugh, Philadelphia, Pa., U. S.

## HAY ELEVATOR.

*Report.*—Commended on account of its simplicity and its cheapness. This is a traveling pulley running on a bar and intended to be attached to a hay fork for the purpose of unloading hay or straw from a wagon; when the load reaches the desired point it is stripped by a cord and the load is discharged from the fork, and the device and fork are returned over the wagon by a weight.

## 162. D. M. Osborne &amp; Co., Auburn, N. Y., U. S.

## HARVESTER AND AUTOMATIC BINDER.

*Report.*—Commended as a highly successful attempt to introduce a much-wanted labor-saving harvester. The mechanism by which the binding is effected with wire is simple and efficient, as proved by the fact that during a somewhat protracted trial there was no failure or stoppage. The sheaves can be regulated as to size by foot leverage, or the action may be continuous. The tension on the spool is equal whether full or empty, by means of a screw and strap pulley. The binding arm which regulates the direction of the wire is jointed, and has an ingenious and effective swan-neck motion. The binding platform can be made to slide backwards or forwards to regulate the position of the band according to the state of the crop.

## 163. David Kahnweiler, New York, N. Y., U. S.

## COTTON-SEED HULLER FOR PLANTATIONS AND OIL MILLS.

*Report.*—Commended as being well made and thoroughly efficient, supplying an increasing want on cotton plantations, viz., by a means of preparing the cotton seed by the removal of shell and the cotton left by the gin, to be made into a highly valuable food. The mechanism is simple and the result satisfactory. Thus, the feed roller insures regular supply and prevents passage of nails, sticks, and other foreign matter that would injure the mill. The under roller has a smooth surface, carrying eight knife-sections so arranged as to follow each other like a screw; they are easily regulated to compensate for wear. The gin has four knives. The shell and seed fall into a fine reciprocating screen, being disturbed and distributed by a revolving spindle furnished with wooden teeth. The hulls are carried over the screen. The seed falls through the screen, and is received at a box screen, which, being properly agitated, separates the lighter portions of the hulls which have passed the wire screen, getting rid of them over the apron. Larger machines are made for manufacturers.

## 164. C. H. &amp; L. J. McCormick, Chicago, Ill., U. S.

## AUTOMATIC BINDER.

*Report.*—Commended as a highly-ingenious and meritorious attempt to attain a much-desired result, viz., a machine that shall cut and bind the sheaves automatically. As in the other inventions of this kind, an ordinary harvester-frame with revolving web and elevator is employed. The means of adjusting the reel, both up and down, forwards and backwards, to suit the condition of the crop, is simple and effective. The tying apparatus is regulated and governed by a traveling motion, which collects the grain into a convenient bundle, twists and cuts the wire successfully. The action is either automatic or controllable, and, though capable of further improvement, especially as regards the tension of the band, is sufficiently successful to merit recognition.

## 165. Gaar, Scott, &amp; Co., Richmond, Ind., U. S.

## TEN-HORSE-POWER THRASHING MACHINE.

*Report.*—Commended as a well-made, efficient machine, specially for the arrangement by which straw is passed from the carrier by the action of a revolving picker, which insures the final separation of any grain remaining in contact with the straw; also for a lever belt-tightener; also for grain elevator with measuring spout and indicator, which registers the quantity thrashed; also for quality of work and capacity.

## 166. G. Westinghouse &amp; Co., Schenectady, N. Y., U. S.

## THRASHING MACHINE FOR STEAM OR HORSE POWER, AND SMALL THRASHING MACHINE FOR HORSE POWER.

*Report.*—Commended for the action of cylinder concave and straw carriers in separating the grain from the straw; both cylinder and concave being open allow the passage of the larger proportion of the grain direct and at once to the shoe. What grain remains and passes the breaker falls through circular holes in the straw carriers, which are of wood. Also for the large space provided to receive the unthrashed heads from the end of the carrier.

## 167. Nichols, Shepard, &amp; Co., Battle Creek, Mich., U. S.

## THRASHING MACHINE AND STRAW ELEVATOR.

*Report.*—Commended for specialty in the form of the carrier, which consists of a wooden screen suspended by rods and having open spaces, through which the grain drops on to a second carrier, taking it to the winnower at once. The passage of the straw and its proper agitation is effected by six rows of movable fingers. For the manner in which the grain and chaff is sifted on to the winnowing sieves, and thus distributed most favorably for the influence of the blast. The grain when winnowed can be delivered on either side of machine by a worm. Elevator attached to and forming part of machine, light, and folds up for traveling. Prices reasonable; of the largest class; doing excellent work.

## 168. Minard Harder, Cobleskill, N. Y., U. S.

## RAILWAY HORSE-POWER THRASHER AND CLEANER.

*Report.*—Commended for special features in the tread power to secure light running and minimum friction. For the manner in which the objection to an over-shot cylinder is overcome by a dust-blast in the cover, which effectually prevents the dust coming back into the face of the feeder. Also for the ingenious form of the straw shaker, which insures the proper agitation to separate the grain from the straw.

## 169. R. H. Allen &amp; Co., New York, N. Y., U. S.

## SUGAR LAND PLOWS, AND CANE CULTIVATOR.

*Report.*—Commended for strength and good material. The double mould plow for opening furrows for the planting sugar-cane is very proper for this use.

## 170. Wm. L. Boyer &amp; Brother, Philadelphia, Pa., U. S.

## BROOM CORN MACHINES.

*Report.*—Commended for their utility and efficiency as broom manufacturing implements, consisting of lever vise for holding broom while it is being sewed, a broom winder or tyer, a broom corn sizer for regulating lengths for different-sized brooms, a cylinder with knives for removing seed, and the trimmer for shaping and finishing the broom. They are ingeniously arranged for labor-saving, and are strong and durable.

## 171. Parke P. Flourney, Bethesda, Md., U. S.

## PRUNING IMPLEMENT.

*Report.*—Commended as an efficient pruner, to be attached to a long handle without any rope or wire attachment, the leverage being obtained by means of a slot in the knife-standard. The handle made in two parts adds to utility.

## 172. William Earl, Nashua, N. H., U. S.

## MACHINE FOR SHEARING SHEEP.

*Report.*—Commended as a very ingenious and efficient machine and great economizer of labor.

## 173. American Shearer Manufacturing Co., Nashua, N. H., U. S.

## SHEEP-SHEARING MACHINE.

*Report.*—Commended for the flexibility of the attachment of the shears frame to the connecting rod by spherical gearing, which enables the operator to use the machine in any direction; for using different-sized cutter plates according to the nature of the fleece. The cutting apparatus consists of two blades jointed together and worked by a crank, representing a lever of the first kind, which vibrates rapidly over the cutter plate; for the ease with which it is taken to pieces and the cutting edges sharpened. As many as ten sheep an hour can be fairly shorn by one man and a boy.

## 174. John Ashcraft Hubbard, Marion County, Oregon, U. S.

## FRUIT-TREE PRUNING SHEARS.

*Report.*—Commended for simple and efficient construction. The cutting blade of the shear is attached to the handle by a connecting iron rod that runs the whole length of the shaft. The handle itself works by means of a double lever that gives great power to the workman.

## 175. George Plumb, North Bangor, N. Y., U. S.

## GILT-EDGED MILK PAN AND COOLER.

*Report.*—Commended for its even cooling quality, thereby causing the production of more and richer cream. Easily cleaned, which reduces the labor of the dairy.

## 176. W. O. Campbell &amp; Co., Richford, Vt., U. S.

## COMPARTMENT MILK PANS.

*Report.*—Commended for good material, workmanship, and convenient form. Each pan is in two compartments, the lesser being one-third of the size of the whole, rendering the pans suitable for small or large quantities of milk. The pans, which are of sheet tin, are surrounded by a zinc or galvanized reservoir, which holds the water for cooling. The vent pipe is made with a joint at its bow, so that it can be raised or lowered according to the flow of water required.

## 177. H. H. Roe &amp; Co., Madison, Ohio, U. S.

## DAIRY APPLIANCES.

*Report.*—Commended for a large and varied assortment of dairy material, well made and adapted for factory use, comprising a small vertical engine and horizontal tubular boilers to provide steam for the cheese vats; large curd vats with water space around and under, through which circulate steam pipes, which discharge the steam into the water at various points, securing uniform heat; also for milk cans for carrying large quantities of milk.

## 178. Iron-Clad Can Co., New York, N. Y., U. S.

## MILK CANS.

*Report.*—Commended for a large and varied assortment of cans for transporting milk; solid construction, with close-fitting covers. Also for weighing cans for factory purposes, of great capacity; and for cream cans.

## 179. Cortland Jewett Milk Pan Manufacturing Co., Cortland, N. Y., U. S.

## MILK PANS.

*Report.*—Commended as well made and of convenient form; also for special arrangement for heating or cooling the milk by circulating tubes under bottom of pan.

## 180. The Universal Strainer Co., Rutland, Vt., U. S.

## MILK STRAINER.

*Report.*—Commended for ingenuity, efficiency, and simplicity of construction, and moderate price.

The centre of the bottom of the strainer consists of a cone covered with fine wire gauze, which again is covered by a movable cap furnished also with gauze, so that the milk is strained twice. The gauzes are shielded in such a way that the weight of the milk cannot dissolve or drive the sediment through them. The strainer is easily cleaned.

## 181. Keystone Manufacturing Co., Sterling, Ill., U. S.

## CIDER MILL AND PRESS.

*Report.*—Commended for good workmanship, finish, and solid construction, great strength, and ingenious combination, shown as follows:

The hopper is provided with an adjustable jaw to regulate the feed. The rollers, with a feed roller on the top, are conical, giving more surface for mashing the fruit, and are provided with ribs. One of the rollers runs three times quicker than the other, by which great efficiency is acquired. The bearings are adjustable by set-screws to regulate the wear.

In the press the follower is attached to the screw, and may be easily taken off.



## 182. Boomer &amp; Boschert Press Co., Syracuse, N. Y., U. S.

## POWER CIDER PRESS AND APPLE MILL.

*Report.*—Commended for large collection of power and hand machinery for cider making. The power press has a cross screw, with double leverage threads, so adjusted as to descend with a slow motion necessary for the thorough exudation of the juice. When the press has reached the proper point, it stops itself and rises five times as rapidly as it falls.

The apple mill comprises a greater cylinder, with a number of sections of knives adjustable by two screws. The feed is regulated by a spring jaw. The receptacle for the pulp has a movable door in the centre, so that the pulp can be fed at either end as most convenient for the press. Also for powerful hand presses.

## 183. New York Plow Co., New York, N. Y., U. S.

## CIDER MILL AND PRESS.

*Report.*—Commended for ingenious construction and efficiency of operation. The mill comprises a revolving cylinder with projecting ribs, with a reciprocating jaw or crusher furnished with teeth, which is worked from an eccentric on the main shaft. A balance wheel steadies the motion and reduces the labor of grinding, which is remarkably easy.

The press is worked by a strong screw, and the juice is extracted rapidly and efficiently.

## 184. Thomas, Ludlow, &amp; Rodgers, Springfield, Ohio, U. S.

## CIDER MILL AND PRESS.

*Report.*—Commended for efficiency, good make, and reasonable price. This is very similar in construction to that of Mast & Co. Thus, we have a revolving roller in the hopper, with adjustable check. The mill proper is composed of two chilled rollers running at different velocities, the one with straight ribs, the other angular. The press is powerful, the follower being separate from the screw.

## 185. P. P. Mast &amp; Co., Springfield, Ohio, U. S.

## CIDER MILL AND PRESS.

*Report.*—Commended for efficiency, good material and workmanship, and reasonable price. The hopper of the mill has a revolving barrel with four projections, or flanges, also an adjustable toothed back, which can be regulated by a set-screw. Below are the mill rollers, which revolve at different speeds. Merit claimed is that the fruit is crushed and not grated, whereby the juice is more effectually extracted. The screw of the press is powerful.

## 186. W. C. O'Neil &amp; Co., Philadelphia, Pa., U. S.

## KEGS AND BARRELS.

*Report.*—Commended for ingenious formation of barrels out of veneers cut out in large pieces, the excellence of the machinery not shown being evidenced by the quality of the product. The necessary rotundity of the barrel is secured by sections cut out of the veneers.

## 187. David Wimpfheimer, Philadelphia, Pa., U. S.

## AUTOMATIC VINEGAR VAT.

*Report.*—Commended for its value as an automatic vinegar vat, consisting of several compartments with filtering tubes in each, also with air tubes to each compartment. Good vinegar is obtained in a few hours by filtering through non-conductors in different vats to the lower compartment when it is ready for use.

## 188. John M. Smith &amp; Son, Philadelphia, Pa., U. S.

## CEDAR VATS AND TANKS.

*Report.*—Commended for excellence of material and superior workmanship.

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## 189. W. H. Burkhardt &amp; Co., Philadelphia, Pa., U. S.

## CEDAR TANK AND OAK CASKS.

*Report.*—Commended for the very excellent materials used in their construction, and superior workmanship.

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## 190. Daniel Lombard, New York, N. Y., U. S.

## HAND COFFEE HULLER AND STEAM RICE SCOURER.

*Report.*—The coffee huller is commended for excellence of design, which insures a highly satisfactory result, strength of material, and general utility. It comprises a cylinder with spring jackets, in which revolves a vertical fluted roller; the coffee carried round between the two is efficiently hulled.

The rice polisher is also recommended as a powerful, efficient mill, not liable to derangement, and capable of giving large results. It comprises a large iron pot, in which is a spindle furnished with a screw, and projecting arms revolving on the bottom. The pot is filled, and the rubbing goes on until the desired effect is produced. It is not intended to shell, but only to polish rice.

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## 191. D. Caldwell Millett, Holmesburg, Pa., U. S.

## DEBORAH BEE-HIVE.

*Report.*—Commended as an economical hive, in sections, with movable combs, and facilities for inspection. It is easily made, is inexpensive, and well adapted from the protection it affords, for northern climates.

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## 192. R. R. Murphy, Fulton, Ill., U. S.

## HONEY-EXTRACTING MACHINE.

*Report.*—Commended for being well made and efficient. The success of the operation, which is to remove the honey without injuring the comb, depends upon the care exercised to take the comb before the cells are capped. The apparatus comprises a copper cylinder tinned on the inside, with a vat for the honey at the bottom. Inside the cylinder is a rectangular revolving frame, having its longer sides covered with fine sieve-wire. The comb is placed in the box with the frames in which it was made, and the box is rapidly revolved by a handle and bevel gear. The centrifugal force causes the honey to discharge into the cylinder without the comb being injured, so that the latter is replaced in the hives and the bees at once commence the process of refilling.

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## 193. E. Penn Worrall, West Chester, Pa., U. S.

## DOUBLE BEE-HIVE.

*Report.*—Commended for the facilities for observation, due to the inside being glass; for suitability both for winter and summer use. The space between the glass and the external frame allows of the insertion of quilt or cotton, and in summer the temperature is equalized. The iron frame renders its construction simple and durable. Every part is separate, can be readily taken to pieces, and no nails are used save in the cap; and for reasonable price.

## 194. John Matthews, Pleasant Grove, Pa., U. S.

## BUTTER-PRINTING MACHINE.

*Report.*—Commended for ingenious construction and efficient action. The box is raised in order to remove the butter, and can be easily detached for cleaning purposes. The press is worked by a sun-and-planet gear.

## 195. Thos. B. Parke, Philadelphia, Pa., U. S.

## HAND CHURN.

*Report.*—Commended as a double-action rotary churn with a novel arrangement of dashers, viz., four revolving arms furnished with round rods; the arms are of different lengths, consequently the beaters travel in distinct circles; the shaft or axle carries a plate, which, revolving in the opposite direction to the sticks, throws the cream back against the sticks, thus securing a very complete action. The dashers are removed easily, and the churn can be scoured out thoroughly.

## 196. J. Tingley, Philadelphia, Pa., U. S.

## HAND POWER CHURN.

*Report.*—Commended for simplicity and efficiency, also for the manner in which the lid of the barrel is secured by a contracting band. When prepared for work, the churn is fixed upon a standard, being supported at the farther end by an iron stay from the standard; when this is removed, the churn being hinged to the standard can be turned upon end and easily cleaned.

## 197. J. G. Koehler, Philadelphia, Pa., U. S.

## BUTTER TUBS, CHURNS, AND ICE CANS.

*Report.*—Commended as a large collection of cedar wood butter tubs for conveying butter to market, with conveniently-arranged ice receptacles and shelves for packing the butter; also for cedar wood power churns, and cans for packing ice.

## 198. Orange County Pail Co., New York, N. Y., U. S.

## BUTTER PAILS.

*Report.*—Commended for a collection of well-made butter pails, of excellent material, with convenient fastenings. No nails are used, and they are easy to handle and clean.

## 199. P. Embree &amp; Son, West Chester, Pa., U. S.

## REVOLVING BUTTER-WORKER (BY HAND).

*Report.*—Commended for simplicity, efficiency, and ingenuity of construction. The apparatus comprises a revolving table with a convex surface, made of cedar wood, on which the butter is placed. A revolving conical fluted roller with cleaner attachment, with a crank handle and a pinion working into a toothed gear in the centre of the table, causes the latter to revolve, and insures a thorough working of the butter, pressing out all liquids, which escape by an opening in the edge of the table. Also for great facility with which the roller can be detached and table cleaned.

## 200. Speakman, Miles, &amp; Co., West Chester, Pa., U. S.

## BUTTER-PRINTING TABLE.

*Report.*—Commended for ease of adjustment, being a hinged box with movable mould, placed on table with spring and lever press; very simple, and easily cleaned; of great value in preparing butter for table use.

## 201. Evans &amp; Baird, West Chester, Pa., U. S.

## POWER CHURN.

*Report.*—Commended for simplicity of construction, which allows it easily to be cleaned, and for efficiency of operation.

The churn consists of a large, well-shaped barrel, which revolves on iron axles, with stationary beaters inside. The moving power is supplied by a one-horse gear, and is easily put in and out of gear by a simple lever.

## 202. Philander Shaw, Scituate, Mass., U. S.

## POWER BUTTER-WORKER.

*Report.*—Commended for simplicity of mechanism and efficiency of action. The apparatus consists of a vertical screw press, worked by a crank underneath, and a revolving circular table perforated with holes. This table forms the top of the buttermilk receptacle, which is also a receptacle for ice when required. The worker is made of perforated iron, tinned over, covered with a cloth, and having on the upper side a small box containing a sponge. Any buttermilk squeezed out upwards passes through the perforations and is absorbed by the sponge. So long as due care is observed in thoroughly scouring out the vessels, we think this a useful apparatus.

## 203. John T. Ellsworth, Barre, Mass., U. S.

## OSCILLATING CHURN.

*Report.*—Commended for simplicity of motion, which is secured by means of a revolving crank assisted by two heavy balance wheels. The merit claimed is that butter is rapidly produced by motion of the box without being brought in contact with the paddle or dasher, thus preserving the grain of the butter. The machine is strongly made, easily cleansed, and not liable to get out of order.

## 204. Blymer Manufacturing Co., Cincinnati, Ohio, U. S.

## FIXED HORIZONTAL ENGINE FOR SUGAR MACHINERY.

*Report.*—Commended for a strong, well-proportioned engine, with steam chest and cylinder properly lagged. The speed is regulated by cut-off from the governors instead of the ordinary throttle valve. This is done by means of a variable eccentric. The bed-plate is very solid. The water heater is of large capacity.

## 205. Prof. Adolphe Corbett, Hicksville, Long Island, N. Y., U. S.

## INCUBATOR AND ARTIFICIAL MOTHER.

*Report.*—Commended as simple, and, provided proper attention is paid to keeping up an even temperature, efficient. It comprises two distinct circular boxes, which are surrounded by fresh horse-manure. The degree of heat can be regulated by a ventilator at the top. The second box, where the chickens are reared, contains a circular cap, the under side covered with long wool, adjustable by means of a vertical rod with a screw head, to which it is attached. There is nothing to get out of order.

## 206. S. A. Day &amp; Co., Baltimore, Md., U. S.

## AUTOMATIC INCUBATOR.

*Report.*—Commended for the highly ingenious mechanism by which the contraction or expansion of a bar of rubber and tin acts upon a pulley and weight which regulates the heat, increasing or diminishing the flame of a lamp which is the source of the heat. If

the lamp goes out, or gives out too much heat, the same mechanism acts upon a bell, arousing the attendant. For the simple and efficient manner by which the air is introduced and escapes at the top of the box, and for the arrangement of the egg boxes.

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207. E. & T. Fairbanks & Co., St. Johnsbury, Vt., U. S.

HAY, CATTLE, AND CHEESE-FACTORY SCALES.

*Report.*—Commended for a cheese-factory scale. Owing to the presence of five beams, four separate weighings can be registered on the beam without having to make the deduction for the weight of the can. The first beam shows this, and the others give four distinct weighings of the product. For a useful platform scale for hogs, for butcher's scale for oxen and sheep, for trussed lever scale for hay and cattle, and for general excellence of collection.

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208. The Brandon Manufacturing Co., Brandon, Vt., U. S.

FARMERS' WEIGHING MACHINES.

*Report.*—Commended for the improvements in the Howe scale, principally the protection to the bearings; for strength and simplicity of construction; for the comparative ease with which a large wagon scale can be fixed; and for general collection of scales for various purposes.

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209. Myhan, Schenck, & Co., New York, N. Y., U. S.

SMOKED-BEEF CUTTER.

*Report.*—Commended for ingenious and simple mechanism, securing a fine, accurate, and adjustable cut. This is accomplished by a broad knife driven by a crank and driving wheel, making what is known as a draw cut. A crank-rod from opposite side of wheel works a ratchet and pawl, which actuates a worm working in a rack on under side of table, and so runs a regular self-feed.

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210. H. P. Rankin, Allegheny, Pa., U. S.

MEAT CHOPPER.

*Report.*—Commended for simple, solid, and ingenious construction. The meat is placed in a slowly-revolving tub, and chopped by means of three sets of double cast-steel knives so arranged under different angles as to secure equal action in every portion of the tub. The crank-shaft works in a slotted standard, which allows the knives to rise, avoiding breakage, in case of obstructions, as bones, stones, etc., etc.

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211. Peter Lynch, Mount Holly, N. J., U. S.

HOG-SCALDING TUB.

*Report.*—Commended for strength, good material, large capacity, and facilities for maintaining the temperature of the water, due to the bottom of the tub being occupied with a copper tubular furnace returning to a stove-pipe. Above the furnace is a removable slatted platform, which is readily removed when accumulations of hair, etc., render it necessary. With four men to attend to the pigs, the work goes on rapidly.

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212. Nathan Stockwell, Bainbridge, N. Y., U. S.

FEEDING TROUGH.

*Report.*—Commended for its value and convenience as an economical feed trough. A swinging wall with compartments answers the double purpose of protecting the weaker animals from the strong while eating, while by means of cams with a lever the wall can be swung to inside of the trough, thus keeping it clean when not in actual use.

## 213. James L. Jackson, New York, N. Y., U. S.

## STABLE FITTINGS.

*Report.*—Commended for a large collection of galvanized iron stable fittings, of all kinds, well made, convenient, and safe; all edges are rounded; also for good drainage arrangements.

## 214. C. B. Rogers, Philadelphia, Pa., U. S.

## FRUIT BOXES AND BASKETS.

*Report.*—Commended for great variety of articles, adaptability for designed use, ingenuity of make, and very reasonable cost.

## 215. S. D. Foot, New York, N. Y., U. S.

## FRUIT-COOKING APPARATUS (BY STEAM).

*Report.*—Commended for the employment of steam instead of boiling water, which secures quicker and more perfect action. The apparatus comprises a gas stove or other generator, a tin boiler with a steam-chest attached, from which small tubes convey the steam into the fruit-jars. All descriptions of fruit can be cooked in from ten to fifteen minutes.

## 216. Oscar F. Tiffany, San Francisco, Cal., U. S.

## FRUIT AND VEGETABLE DRYING MACHINE.

*Report.*—Commended for economical method of heating the apparatus by the introduction and mixing of cold air with that which comes direct from the furnace, a natural draft being secured by the draft stack; for the V-shaped roof or ceiling to the drying chambers, combined with gutters beneath them, which collect and remove any moisture that may condense, thus securing a dry air. Sieves holding the articles to be dried run on wheels, and can be easily taken out, or, if required, elevated from one floor to another. It should be mentioned that the gutters for removing the moisture terminate in siphon spouts, so that no heat can escape thereby.

## 217. George A. Deitz, Chico, Cal., U. S.

## FRUIT-DRIER.

*Report.*—Commended for a simple, well-arranged machine, which secures a good circulation of hot air, acting upon an extensive surface. The arrangement for regulating the temperature is very efficacious. The fruit is placed upon trays in frames, which are run upon castors, and easily removed. Temperature can be varied from 70° to 200°.

## 218. Frank A. Parker, Reading, Pa., U. S.

## APPLE-PARING MACHINE.

*Report.*—Commended as well made, of ingenious construction, and thoroughly efficient, paring the whole of the peel, taking out the core, and throwing the apple off the fork. Reasonable in price.

## 219. George Bergner &amp; Co., Washington, Mo., U. S.

## APPLE AND PEACH PARER, CORER, AND SLICER.

*Report.*—Commended for ingenious combination of a parer, corer, and cutter. The operator, after having pared the fruit, winds back the fork, which relieves a catch; the shaft is then forced forward to the corer and cutter. The operations are rapidly and efficiently performed. The angle of the knife adjustable, in order to regulate the thickness of peel. Well made and reasonable.

## 220. Jones Brothers, Sturgis, Mich., U. S.

## FRUIT DRIER.

*Report.*—Commended as a machine capable of rapidly and efficiently drying large quantities of fruit, owing to the operation of a double-action fan-driver by horse or steam power. The heat is regulated by adjustable valves. Large screen surface in ten sections, each carried on rollers, facilitates the process of filling and emptying the fruit. The escape of moisture is provided for by hygrometric openings.

## 221. R. H. Allen &amp; Co., New York, N. Y., U. S.

## ROW CORN DRILL AND HORTICULTURAL IMPLEMENTS.

*Report.*—Commended for being tight, well made, with favorable features of adaptability. Thus, by changing the wooden corn-seed roller it can be made available for sowing small seeds as well as Indian corn. At the base of the seed-hopper is a horizontal feed-roller, with a number of screws at intervals; by sinking these screws, one or each of the openings become corn receptacles: a brush on each side prevents more than the desired quantity of seed being carried round. For small seeds, a false bottom, with varying-sized holes according to the nature of the seed to be sown, is introduced, and the wooden roller is replaced by a revolving brush. The driving wheel is furnished with a series of cog gearing; by altering the position of the pinion, which slides on the spindle, and can be actuated from above by the handles, the quantity of seed is regulated.

The horticultural implements as a collection comprise in simple combination a seed sower, a cultivator, a rake, a scuffle hoe, a shovel plow, etc., all easily changed and adjusted to the one frame and wheel.

## 222. C. Russell &amp; Co., Canton, Ohio, U. S.

## COMBINED REAPING AND MOWING MACHINE (THE PEERLESS).

*Report.*—Commended for a strong, well-made, and carefully considered machine, capable of doing excellent work, especially as a mower. Also for the following points of merit. The driver's seat slides on parallel springs, and thus the pole balance can be accurately secured. For the mode of attaching the connecting rod to the crank by universal joint, so that if the angle of the frame is altered, or the knife-bar is put up or down, there is no friction caused by the alteration. The gearing is simple, strong, and well boxed off. The pitman box cast in two parts, with a piece of leather between, which accommodates it to the wear of the shaft. The fingers are of malleable iron, steel-plated, with hollow spaces under for the accumulation of gum.

## 223. Clement &amp; Dunbar, Philadelphia, Pa., U. S.

## CEDAR WARE CHURNS AND ICE-CREAM FREEZERS.

*Report.*—Commended for beauty, variety, and excellent workmanship and material, as shown by the collection of samples presented. The churns (Spain's patent improved) and the ice-cream freezers (Gooch patent) are well made, and of approved models for the general market.

## 224. White Mountain Freezer Co., Laconia, N. H., U. S.

## FREEZING MACHINES FOR ICE-CREAM.

*Report.*—Commended for very complete action obtained by triple motion. The two sets of dashers work in opposite direction, and the cream can also revolve. The dashers are readily removed, the gearing simple. Price moderate, and the machine decidedly useful.

## 225. Murphy &amp; Broom, Philadelphia, Pa., U. S.

## BIRD CAGES AND WIRE WORK.

*Report.*—Commended for a large collection of wire cages and galvanized flower stands, summer-house, and rustic wood work.

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## 226. Hendryx &amp; Bartholomew, Ansonia, Conn., U. S.

## BIRD CAGES.

*Report.*—Commended for a large and varied collection of bird cages, of ingenious construction.

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## 227. Osborn Manufacturing Co., New York, N. Y., U. S.

## BIRD CAGES.

*Report.*—Commended for a magnificent aviary, and a considerable collection of ingeniously constructed cages of various designs.

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## 228. Blymer Manufacturing Co., Cincinnati, Ohio, U. S.

## SUGAR MACHINERY.

*Report.*—Commended for the large collection of excellently constructed machinery for expressing and evaporating the sugar; also for horizontal engine and intermediate gearing to work the mill. Two forms of evaporators are shown. The smaller one, portable, on rockers, can be adjusted to regulate the flow of syrup.

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## 229. R. H. Allen &amp; Co., New York, N. Y., U. S.

## PHILLIP'S SPIRAL CORN HUSKER.

*Report.*—Commended for strength, durability, and utility as a corn husker and separator. The operations are effected, first, by two revolving transverse rollers, the upper one being fluted. These detach the stalks, which are carried away by an elevator; the detached corn falls into longitudinal rollers with indented spaces, having a number of projecting pins, these detach the husk, which passes through openings, while the corn traverses the rollers and falls out at their end. From twenty-five to fifty bushels an hour can be operated, according to the nature of the crop and power employed.

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## 230. George Neighbour &amp; Sons, London, England.

## BEE-HIVES.

*Report.*—Commended for a large and varied collection of economical bee-hives, so arranged that the honey can be taken without the destruction of the bees. Special attention is directed to the unicomb hive, with venetian blinds, to allow the bees to be exposed to light whilst the sun's rays are excluded; also to a honey extractor by centrifugal force, which removes the honey from the comb without injuring the latter, which can be returned to the hive.

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## 231. William Wilkinson &amp; Sons, Sheffield, England.

## SHEEP AND HEDGE SHEARS.

*Report.*—Commended for thorough good material, and as well made and finished.

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## 232. J. P. Fison, Feversham Works, Cambridge, England.

## SAFETY GUARD FOR DRUM CYLINDER AND SMALL VERTICAL ENGINE.

*Report.*—Commended for securing safety to the feeder of a thrashing machine without in any way interfering with the work. In some measure it assists the passage of the mate-



rial to be thrashed into the cylinder. The invention comprises a revolving cylinder of wood placed above and somewhat in front of the cylinder, leaving ample space for the material to be fed in between it and the feed-board. It is driven by a strap from the crank of the shaker below. Its shaft rests in a slotted bearing of the cover. In the event of any weight, such as the man's body, falling upon or against the drum guard, it is depressed, the strap is loosened, motion ceases, and the cylinder is effectually covered. The construction is simple, very little power is absorbed in working, and the cost is small. Also we recommend for favorable consideration a small vertical two-horse-power portable engine of economical construction, and suitable for light work, such as chaff cutting, grinding, root cutting, etc.

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233. James Fussell, Sons, & Co., Frome, Somerset, England.

SCYTHE BLADES, REAP AND OTHER HOOKS, AND HAY KNIVES.

*Report.*—Commended for a large exhibit of superior scythe blades, grass hooks, and hay knives, from thorough good material, uniformly made, and exhibited in a convenient form.

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234. Arthur Winkler Wills, Park Mills, Birmingham, England.

TOOLS, HOES, AND AXES.

*Report.*—Commended for excellence of material, good and honest workmanship, and varying utility.

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235. Aveling & Porter, Rochester, Kent, England.

STEAM TRACTION ROAD ROLLER.

*Report.*—Commended for strength, durability, efficiency, and reasonable cost. The engine loaded for work weighs ten tons, which is distributed over a wheel surface of six feet. The front rollers, which also form the steering wheels, are forty inches (divided into two sections). The hind wheels are each sixteen inches wide, and these carry the larger portion of the weight. Were it equally divided, the average pressure would be three hundred and eleven pounds per linear inch. The principle of dividing the rolling surfaces as much as possible is of great importance in road making; since the great weight thus distributed penetrates, so as to speak, beneath the surface, finds out the weak spots, and causes an even uniform condition underneath, while the inequalities of the surface can be overcome by the addition of metal in the holes. It should be particularly noted that the formation of the wheels, larger on the inner than the outer side, tends to produce a road with a slight inclination from the centre, which is considered an important feature. The naves of the wheels are two and one-half-inch cast metal. The engine is speeded to travel two miles an hour. In repairing, an old road-spike can be attached to the hind wheels, which, by tearing up the surface, greatly assist the constructor in preparing a binding surface for the new material.

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236. Massey Manufacturing Co., Newcastle, Ontario, Canada.

SHARPE'S PATENT DUMPING HORSE RAKE.

*Report.*—Commended as a reliable, well-made horse rake, with simple and efficient dumping appliance, effected by break bands on the axles of both driving wheels tightened by foot leverage through connecting rods. The rakes or tines are coiled round the wooden axle, which is four inches in diameter. This secures a firm attachment, but is not the most convenient arrangement for removing the teeth.

## 237. Rowland Dennis, London, Ontario, Canada.

## POTATO DIGGER AND RIDGING PLOW COMBINED.

*Report.*—Commended for a combined machine adapted by an easy change to perform three several functions. As a potato digger the plow point and share upturns the potatoes, which are separated from the earth by a series of fingers or prongs projecting back on each side. Attached to the share, this point and share are removable. Another and smaller point is readily attached, behind which are two mould-boards, which can be expanded so as to turn out a furrow if used for making a drill in which to plant potatoes, or as a ridging plow to throw the earth on either side if used for the purpose of earthing up the growing plants.

## 238. L. D. Sawyer &amp; Co., Hamilton, Ontario, Canada.

## MOWING AND REAPING MACHINES.

*Report.*—Commended for excellent material and ingenious arrangement. Clutch gear replaced by eccentric ratchet on driving wheels without springs. Inside driving wheel one inch greater diameter than outside wheel, consequently covers more ground at each revolution, and tends to counteract side draft. Knife-bar suspended on drag-bar, which can be screwed up to frame, so as to secure the position of the bar always at a right angle. As a reaper the platform can be hinged back behind the main frame, so as to facilitate its passage through narrow gateways.

## 239. Joseph E. Stong, Ontario, Canada.

## SWINGING FARM GATE.

*Report.*—Commended for an ordinary gate, not too heavy, sustained between two vertical standards at its rear end, and by two inclined levers, which proceed from the bottom of the rear end to the top rail of the gate, near the middle, and are there confined by sound bolts, which allow them to swing vertically and radially as the gate rises. The gate is raised by an attachment to the short end of a long lever, with its fulcrum on one of the upright standards, the long arm of which stands out at right angles to the rear of the gate far enough to be reached by one on horseback or in a carriage. The gate being so raised is carried up and over the segment of a circle the length of the gate, and set out and down its own length. A pull on the same lever, or on a similar one on the other side of the gate, throws it again over and back to place, and restores it to a closed position, where it is automatically locked.

## 240. Acton Plowing Co., Ontario, Canada.

## GENERAL PURPOSE PLOW.

*Report.*—Commended as a strong, serviceable implement, with adjustable coulter box, which slides on beam; for solid wrought-iron socket, giving great strength. The sole is cast, and can be easily removed; mould-board and land side steel.

## 241. Thomas Yeandle, Stratford, Ontario, Canada.

## SINGLE PLOW.

*Report.*—Commended for useful general purpose plow, well made, saving of undue friction by peculiar construction of under side of share and mould-board; for steel sole with small ground surface; for peculiar form of land side, allowing of considerable wear; adjustable steel mould-board of good form.

## 242. C. Duperrow, Stratford, Ontario, Canada.

## IRON DIAGONAL HARROW.

*Report.*—Commended for construction of teeth, which, being diagonal, can be changed; also for the form of collar, which is diagonal, and fits into similar openings on the lower bars of the frame, thus securing a tight joint and making the connection independent of the screw and nut.

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## 243. Munroe &amp; Agar, Seaforth, Ontario, Canada.

## COMBINED IRON AND WOOD PLOW.

*Report.*—Commended for the mode of attaching the wooden handles, which are riveted into strong wrought-iron standards well stayed, and for general excellence of construction.

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## 244. G. Wilkinson, Aurora, Ontario, Canada.

## DOUBLE PLOW.

*Report.*—Commended as a well-made implement, likely to be useful in light lands; for the method of adjusting the width of furrows, and for the use of a friction-wheel behind the mould-board in place of the ordinary sole and land side; for reversible standard for this hind wheel.

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## 245. Peter Grant, Clinton, Ontario, Canada.

## EXCELSIOR HAY FORK AND CONVEYER.

*Report.*—Commended as a simple, cheap, and efficient labor saver. The conveyer is particularly commendable. The friction rollers travel on an ordinary scantling three by four, which is supported at intervals by simple hooks. The fork is composed of three tines, the centre of which has a double harpoon. The barbs rest on shoulder of standard, which gives great strength. The conveyer frame has friction rollers above and under the rail.

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## 246. John Watson, Ayr, Ontario, Canada.

## GENERAL COLLECTION OF AGRICULTURAL IMPLEMENTS.

*Report.*—Commended for the large and useful collection of machinery, and for general good workmanship, especially directing attention to a two-rowed ridge drill for root crops, and a heavy wooden roller adjustable to hillsides and inequalities of surface; also for metal mills, pulping and slicing machines, and for a pneumatic chaff cutter.

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## 247. Thomas Wilson, Richmond Hill, Ontario, Canada.

## FANNING MILL.

*Report.*—This mill is constructed on the most approved models, and in a thorough manner. It has an unusually large number of screens so arranged as to assort every kind of grain and seed, and chutes to carry off the tailings. The shaker is made in two parts, which move in unequal motions, thus causing a more thorough separation of the contents. The machine was arranged to be run by manual or other power.

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## 248. David Maxwell, Paris, Ontario, Canada.

## POWER CHAFF CUTTER.

*Report.*—Commended for power chaff cutter, with patent gearing by which reverse motion, change of cut, and stop motion are obtained without the use of a clutch or change

of wheels. This is effected by an ingenious cluster of wheels on lever axle; when the lever is in the stop hole, pulling the handle towards the feeder and from the machine reverses the rollers, a fairly safe arrangement.

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249. A. Anderson, London, Ontario, Canada.

HAND BOX CHAFF CUTTERS.

*Report.*—Commended for a diagonal blade with a ragged-edge knife, which is also adapted for a hay cutter and bread knife.

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250. Haggert Brothers, Brampton, Ontario, Canada.

THRASHING MACHINE AND HORSE GEAR.

*Report.*—Commended for efficiency, strength of construction, and good workmanship; for the protection against accidents by the shielding of all shaftings; for the strong attachment of the poles to the horse gear; the drum is driven by gearing, and all the other speeds are multiplied from a comparatively slow motion, which is more economical than the ordinary plan of reducing speed from the drum shaft; for simple arrangement by which straw can be delivered by elevator at any required angle.

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251. John Abell, Woodbridge, Ontario, Canada.

PORTABLE ENGINE AND THRASHING MACHINE.

*Report.*—Commended for economical arrangement of water heater and general excellence of engine, especially good lagging, and complete boiler fittings; for simplicity, strength, and efficiency of the thrashing machine; for adjustable straw elevator, and general compactness of parts.

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252. Jacob Bricker, Waterloo, Canada.

LITTLE CHAMPION THRASHING MACHINE.

*Report.*—Commended as a well-made machine, either driven by gearing or strap, the gearing well protected by a cover; for using Guiser's self-regulating air openings for fan, which tend to insure regularity of blast; for efficient straw-shakers worked by double reacting crank, insuring due progression and agitation of the straw, and complete separation of loose grain, which falls through openings in the shakers. The winnowing shoe, actuated by cams on either end of a revolving cross screen, gives a steady, uniform motion; straw carrier, hooked on to end of machine when working in a straight line, can be detached and set upon trestles, if required, to deliver at an angle; carriage on two wheels with blocks at either end: price reasonable.

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253. Peter Borissovski, Moscow, Russia.

BEE-HIVE.

*Report.*—Commended for ingenious design and good construction.

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254. Nicholas Westberg, Kharkof, Russia.

THRASHING MACHINE.

*Report.*—Commended for excellence of manufacture and material. The machine comprises only the cylinder, with smooth beaters and an adjustable concave, the former driven from both sides by friction rollers.

## 255. Lilpop, Rau, &amp; Loevenstein, Warsaw, Russia.

## PORTABLE ENGINE.

*Report.*—Commended as a very strong machine, suitable for rough roads and for a country where repairs are difficult to execute. The frame is carried on four wheels; the front ones lock right under the frame. The boiler, which is vertical, contains forty-two large and ten small tubes, which are so arranged as to insure great heating surface and quick action. This engine on trial got up steam in little over half the time that some others required. The engine has some defects. In the first place, its position in reference to the fire-box is unhandy, being on the opposite side and at some distance. The pump is defective, having no spring valve; on several occasions it failed to act. The water heater is large and efficient. No governors. The result of the trial was satisfactory.

## 256. Florian Grubinsky, Warsaw, Russia.

## REAPER.

*Report.*—Commended for simplicity and solidity of construction. The whole propelling machinery is capped in the driving wheel, preventing contact with the dirt. A wormed groove gives to the roller of the gimbal joint the necessary and ample motion of the knife, and is not liable to get out of order.

## 257. Eugene Mercier, Epernay, France.

## MACHINERY USED IN THE MANUFACTURING OF SPARKLING WINES.

*Report.*—Commended for various highly ingenious, efficient, and labor-saving machines used in the production of champagne, viz., the bottling apparatus for bottling from the cask without loss of gas; by these machines as many as eighteen thousand bottles a day can be filled, for corking, and applying strong iron clips which secure them, whilst the bottles are racked in an inverted position requisite for the deposit of sediment, and instantly removed without agitation, thus allowing the escape of the lees and the proper clarifying of the wine; for the machine by which the regulated proportion of syrup is added according to the market; and for the facility with which the bottling, tying, and wiring is effected.

## 258. Mabile Brothers, Amboise, France.

## WINE AND OIL PRESSES, AND RAISIN BREAKER.

*Report.*—Commended for strength of construction, excellence of manufacture, and utility; especially for the application of a powerful multiple lever to the press screw, which is admirable on account of simplicity, power, quick action, and good material.

## 259. Joseph Pernollet, Paris, France.

## GRAIN AND WEED SEPARATORS.

*Report.*—Commended for excellent construction and thorough efficiency of the weed and grain separators, and specially for the perfect separation of the cockle seed, which is so prevalent in France. The cockle machine comprises a revolving cylinder set on an incline. The first portion of the cover has long narrow openings, through which small seeds and broken grains and very inferior grain pass. The remainder of the internal surface is occupied with the cockle cups or indentations, into which the seed finds its way, and passing a scraper, which removes any projecting grain, such as wheat, which might otherwise be carried round, the cockles fall into a screw channel and are delivered at the mouth above and distinct from the good grain. The power is conveyed from a fly-wheel turned by hand through gearing wheels. The motion is steady, smooth, and the result thoroughly

effective. In the grain separator the cylinder is covered with netting of different-sized mesh and differently-formed holes, and the section can be readily replaced. Four or five samples can be made. These are most valuable machines.

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260. José Antonio Masquera, Caracas, Venezuela.

COFFEE PULPER.

*Report.*—Commended for simplicity and solidity of construction and efficiency of work. This newly-patented coffee pulper is easily worked by one man at the crank, and instead of having buttoned cylinder has a tooth-fluted one, which prevents the breaking of the berries.

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261. Felipe Perez, Havana, Cuba.

HORSE SUGAR-CANE CULTIVATOR.

*Report.*—Commended for its utility as a sugar plantation implement. It consists of a wooden frame with teeth, and with knives of iron laid with steel. The driver operates it with two handles. The depth is regulated by small wheel in front. Also for strength and durability.

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262. José Antonio Antunes, Rio de Janeiro, Brazil.

APPARATUS FOR MAKING COFFEE.

*Report.*—Commended for its excellence as an economical coffee-kettle. It consists of an upper and lower division. The upper contains filter and tube through centre of bottom, which is inserted through top of lower division into the water. The ground coffee is placed in filter, the water is heated (by means of spirit-lamp in basement of lower division) and forced through tube and filter, the lamp is extinguished, the liquid recedes to lower part without evaporation or loss of aroma, and an excellent clear coffee is ready for use.

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263. Mayer & Co., Kalk-on-the-Rhine, Germany.

WINNOWING AND SORTING MACHINE.

*Report.*—Commended for the combination of a winnowing and weed-separating machine, by means of a circular revolving screen and reciprocating screen placed below the feed hopper. The grain is assisted in its passage from the hopper to the screen by a force-feed spindle furnished with beaters. The internal surface of the cylinder is stamped with indentations of two sizes, separated by a screen in the centre. In these indentations the seeds of the cockle are collected, and, as they fall from the screen, are collected in a trough and forced along to the end of the cylinder by an endless screw. The largest grains are separated by the reciprocating screen; then all small grains and seeds pass through longitudinal openings in the first portion of the revolving screen. Cockles, etc., are removed as described, and the remainder of the grain is carried down to the mouth and delivered below the cockle spout. The motions are communicated by straps, which is certainly not the best arrangement.

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264. Royal Wurtemberg Smelting Works, Friedrichsthal, Germany.

SCYTHES.

*Report.*—Commended for good commercial collection, good workmanship, and excellent material.

265. Austrian Commission for the International Exhibition at Philadelphia,  
Vienna, Austria.

SCYTHE BLADES.

*Report.*—Commended for a large and varied collection of scythe blades, the product of different manufactures; of excellent material.

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266. Carl Atterling, Orebro, Sweden.

CHEESE-MAKING APPARATUS.

*Report.*—Commended as an efficient apparatus for making cheese on the Cheddar system; comprising a steam generator of economical construction, circular cheese vat of large dimensions of copper, tinned over, with steam jacket around and under, provided with water-supply tube and safety valve.

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267. M. Rehnström, Tibble, Köping, Sweden.

PLANS OF CHEESE AND DAIRY FACTORIES.

*Report.*—Commended for designs for cheese and butter factories, well executed, economically and conveniently arranged.

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268. Kalinge Manufactory, Ronneby, Sweden.

DAIRY APPLIANCES AND KITCHEN UTENSILS.

*Report.*—Commended for a large collection of dairy appliances and kitchen utensils of excellent material and workmanship.

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269. S. H. Samuelson, Töskefors, Sweden.

MACHINES FOR MANUFACTURE OF TUBE PEAT.

*Report.*—Commended for the improved form in which the fuel is made. The tubular form insures more rapid and complete drying, so that, without artificial heat, the percentage of water can be reduced to from ten to twelve per cent. The combustion of the peat is also greatly facilitated. Even thickness of the tubes is secured by the use of pistons. The machines exhibited are for foot leverage and power. In the former, a long table receives the peat, pistons at each end are worked by foot leverage, the tubes as made falling out below. In the power machine, the peat is propelled towards and into the mould by a screw working in a trough.

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270. C. E. Petterson, Långö, Elfdalen, Sweden.

COLLECTION OF SCYTHE BLADES.

*Report.*—Commended for quality of material, suitability of form, and excellence of manufacture.

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271. L. P. Eklundh, Hjelmafors, Ulricehamn, Sweden.

COLLECTION OF IRON PLOWS.

*Report.*—Commended for excellence of material, reasonable price, and good form. The plows made for the Russian market, where the soil is dry, have a vertical friction-wheel immediately behind the land side and projecting three-fourths of an inch below the sole; also a small wheel below and behind the mould-board converts sliding into rolling friction, and reduces the draft. Such arrangements are unsuitable for Swedish agriculture, as the soil is strong and moist. The body of these plows is cast in one piece with the land side,

and the side of the sole projects somewhat beyond the land side, reducing wear of the latter; beams either solid or split. The land side is prolonged, and occupies a space between the mould-board and share.

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272. Göteborg Machine Manufacturing Co. (Limited), Göteborg, Sweden.

COLLECTION OF IRON PLOWS.

*Report.*—Commended for excellence of material, form, workmanship, and low price. Most of these plows have split beams, with strong frame and well-braced handles bolted on to beam and frame, and fixed coulter socket with adjusting set-screws.

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273. Walter A. Wood, Hoosick Falls, N. Y., U. S.

SWEEP RAKE REAPER.

*Report.*—Commended for good material and workmanship, and for efficiency as a sweep rake reaper with automatic and controllable delivery, admitting of considerable alteration to suit the varying conditions of crops. Gavels left in fair form for binding and very favorable for curing, the butts laid well up to sun and wind. The rake arms strongly attached to standard. The pole can be raised or depressed. The frame is made in three pieces, well secured with rivets.

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274. Walter A. Wood, Hoosick Falls, N. Y., U. S.

HARVESTER (HEADER).

*Report.*—Commended for its utility as a rapid and economical harvester; it is particularly adapted to the dry harvest seasons of the Pacific coast; it is ingeniously arranged for elevating the headed grain into wagon boxes made for the purpose, that convey it to the thrashing machine. The draper or elevator runs parallel with the sickle, and is driven by belt running pulley on upper end of elevator. The height of cut is regulated by lever easily operated by driver while running. The sickle and reel are raised together or separate, as required. The requisite number of horses are hitched to the pole behind the machine, thus driving it before them, entirely obviating side draft. For its cheapness and durability.



SUPPLEMENT TO GROUP XXIII.  
REPORTS  
SIGNING JUDGES OF GROUP XXIII.  
JUDGES ON ALPHABETS.

The figures annexed to the names of the Judges indicate the reports written by them respectively.

JOHN COLEMAN, 1, 2, 4, 9, 12, 15, 16, 17, 19, 20, 21, 22, 23, 26, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 43, 46, 48, 49, 50, 51, 52, 53, 54, 58, 59, 62, 68, 71, 72, 73, 75, 76, 77, 78, 79, 82, 83, 85, 86, 88, 90, 91, 93, 94, 100, 101, 103, 104, 105, 106, 107, 109, 111, 112, 113, 116, 119, 121, 124, 125, 127, 128, 129, 131, 137, 139, 140, 142, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 159, 160, 162, 164, 165, 166, 167, 168, 171, 173, 176, 177, 178, 179, 182, 183, 184, 185, 186, 191, 192, 193, 194, 195, 196, 198, 202, 205, 206, 207, 208, 209, 211, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 224, 225, 226, 227, 228, 229, 230, 232, 235, 236, 238, 240, 241, 242, 243, 244, 245, 246, 248, 249, 250, 251, 252, 253, 254, 257, 258, 259, 263, 265, 266, 267, 269, 270, 271, 272, 273, 274.

JAMES BRUCE, 3, 8, 10, 13, 44, 45, 56, 63, 66, 69, 74, 89, 97, 110, 144, 145, 170, 187, 188, 189, 200, 203, 212, 234, 261, 262, 264.

JAMES S. GRINNELL, 5, 6, 11, 81, 92, 99, 115, 120, 237, 239, 247.

JOHN BRADFORD, 7, 42, 57, 61, 65, 114, 132, 133, 134, 163, 190.

E. OLDENDORFF, 14, 18, 25, 27, 55, 70, 80, 123, 143, 172, 174, 180, 181, 197, 199, 201, 210, 231, 233, 256, 260, 268.

JOHN P. REYNOLDS, 24, 47, 60, 64, 67, 84, 87, 95, 96, 98, 117, 122, 126, 158, 223.

PEDRO PAES LEME, 102, 161, 175.

FERMIN ROSILLO, 108, 118, 169.

GEO. E. WARING, JR., 130, 135, 136, 138, 141, 204, 255.

# SUPPLEMENT TO GROUP XXIII.

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## REPORTS OF JUDGES ON APPEALS.

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### JUDGES.

JOHN FRITZ, Bethlehem, Pa.  
EDWARD CONLEY, Cincinnati, Ohio.  
CHARLES STAPLES, JR., Portland, Me.  
BENJ. F. BRITTON, New York City.  
H. H. SMITH, Philadelphia, Pa.

COLEMAN SELLERS, Philadelphia, Pa.  
JAMES L. CLAGHORN, Philadelphia, Pa.  
HENRY K. OLIVER, Salem, Mass.  
M. WILKINS, Harrisburg, Oregon.  
S. F. BAIRD, Washington, D. C.

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#### 1. H. N. Prout, Westfield, Mass., U. S.

HORSE HOEING MACHINE.

*Report.*—It is a well-made, serviceable implement, well adapted to the purpose intended.

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#### 2. E. D. & O. B. Reynolds, Brockton, Mass., U. S.

GANG PLOW WITH SULKY AND CULTIVATOR ATTACHMENTS.

*Report.*—Commended for good construction, simplicity, and utility.

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#### 3. William Farr Goodwin, Stelton, N. J., U. S.

MOWING MACHINE (RECIPROCATING SCREW).

*Report.*—Commended for its simplicity and cheapness of construction, lightness of draft, having found it meritorious on a severe trial.

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#### 4. Frank W. Chapman, Morrison, Ill., U. S.

HONEY EXTRACTOR.

*Report.*—Commended for ingenuity and value of improvement, with special fitness for the purpose intended.

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#### 5. Hiram Holt, East Wilton, Me., U. S.

HAY KNIVES.

*Report.*—Superior articles; very meritorious; efficient tools, and cheap in price.

6. D. M. Osborne & Co., Auburn, N. Y., U. S.  
COMBINED REAPER AND MOWER (WHEELER NO. 6).

*Report.*—Commended for simplicity of parts, originality of design, excellence of workmanship, light draft, and durability.

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7. Homer J. Blakeslee, Corry, Pa., U. S.  
IMPROVED SELF-ACTING SWINGS.

*Report.*—Commended for novelty, ingenuity, and fitness for purpose intended.

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8. Higganum Manufacturing Co., Higganum, Conn., U. S.  
AGRICULTURAL IMPLEMENTS.

*Report.*—Good exhibit, and well suited for the purposes intended.

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9. H. H. Wills, Alton, Ga., U. S.  
GRANGE MILL.

*Report.*—Commended for novelty, durability, excellence of work upon all varieties of cereals, and general utility.

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10. Bucher, Gibbs, & Co., Canton, Ohio, U. S.  
COMBINATION PLOW.

*Report.*—It is of great strength, excellent finish, and good shape.

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11. Lewis B. Covert, Jersey City, N. J., U. S.  
ADJUSTABLE LADDER.

*Report.*—It is well made, and of easy adjustment.

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12. B. C. Taylor, Dayton, Ohio, U. S.  
HAY RAKE.

*Report.*—Good in make, and seems to have all the advantages of other hay rakes.

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13. Walter A. Wood, Hoosick Falls, N. Y., U. S.  
MOWING MACHINE.

*Report.*—It is of excellent workmanship; among the most valuable and well adapted to the purpose intended.

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14. A. P. Dickey, Racine, Wis., U. S.  
DICKEY'S FARM AND WAREHOUSE FANNING MILLS.

*Report.*—Commended for good workmanship, and great rapidity of work.

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15. Barrows, Savery, & Co., Philadelphia, Pa., U. S.  
PRINDLE'S STEAMER.

*Report.*—Good machine, and well adapted to the purposes intended.

## 16. A. J. Sweeney &amp; Son, Wheeling, W. Va., U. S.

MOWER AND REAPER.

*Report.*—Commended for simplicity of construction, durability, ease in management, and cheapness.

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## 17. Porter Blanchard's Sons, Concord, N. H., U. S.

BLANCHARD CHURN.

*Report.*—It is a good churn, and well fitted for the purpose intended.

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## 18. Barnard, Bishop, &amp; Barnards, Norwich, England.

GARDEN FURNITURE (IN IRON).

*Report.*—Commended for variety, convenience, good work, and fitness for the purpose intended.

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## 19. A. Douglass Hilton, Grahamstown, Cape of Good Hope.

OSTRICH INCUBATING MACHINE.

*Report.*—Commended as an apparatus for hatching out ostrich eggs in a simple and efficient manner, and for keeping the young during the critical period of their early life.

The invention and use of this apparatus, and the treatment of the eggs and young of the ostrich by Mr. Douglass, have added a most important industry to the world, and, in addition to averting the threatened extermination of this species, have greatly multiplied its numbers and increased the supply of its feathers for commercial purposes. These can now be taken year by year from the same (domesticated) bird, instead of involving its destruction for a single crop.

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## 20. Göteborg Machine Manufacturing Co. (Limited), Göteborg, Sweden.

STEEL PLOWS.

*Report.*—Commended for good workmanship, and fitness for their intended purpose.

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## SIGNING JUDGES OF SUPPLEMENT TO GROUP XXIII.

The figures annexed to the names of the Judge indicate the reports written by them respectively.

H. K. OLIVER, 1, 4, 6, 7, 18.

M. WILKINS, 2, 3, 5, 9, 10, 11, 12, 13, 14, 15, 16, 17.

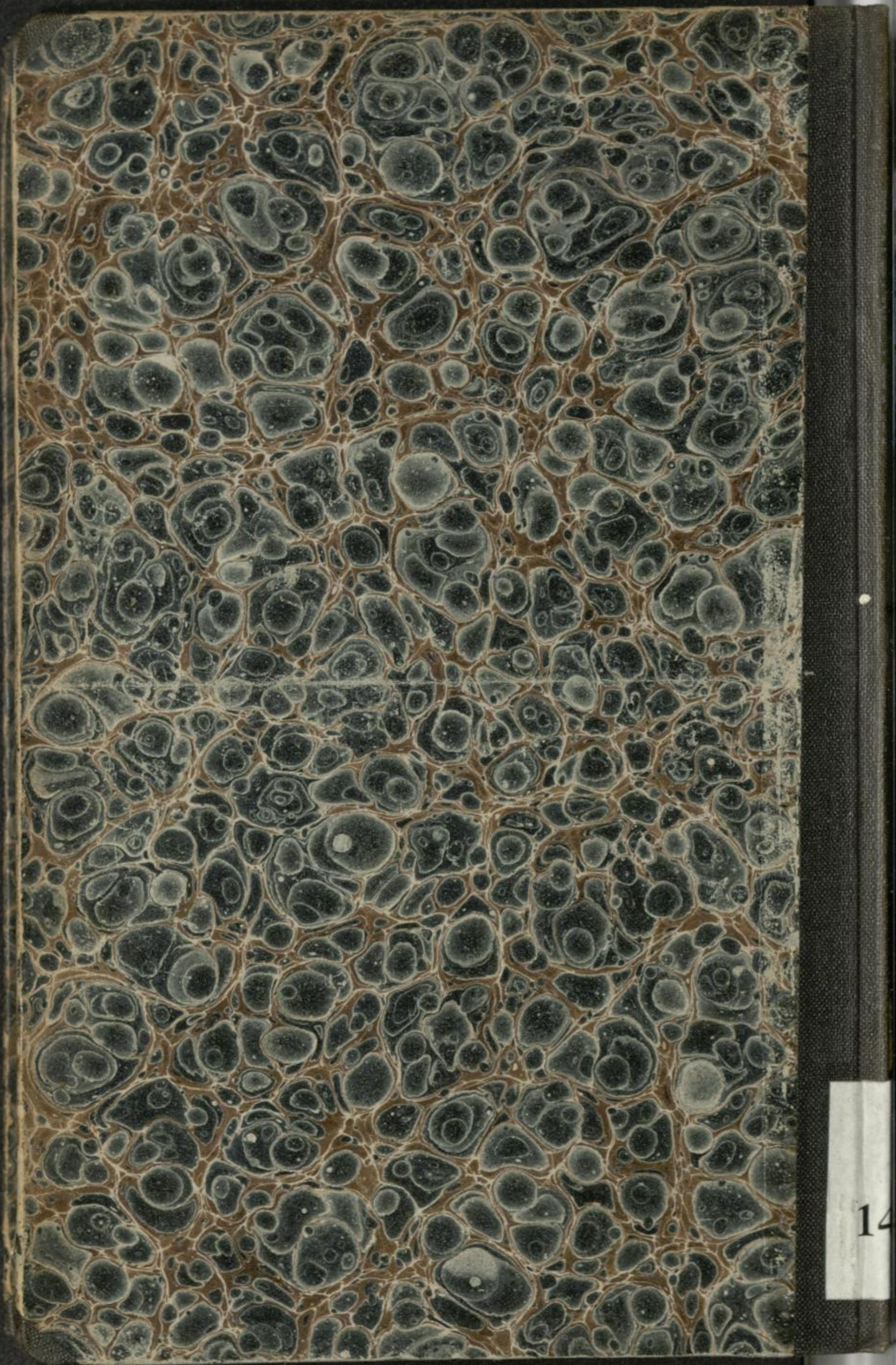
J. FRITZ, 8, 20.

SPENCER F. BALRD, 19.









14