REPORT OF THE JUDGES,

RELATIVE TO THE

HORSE POWER AND COMBINED THRESHER AND CLEANER

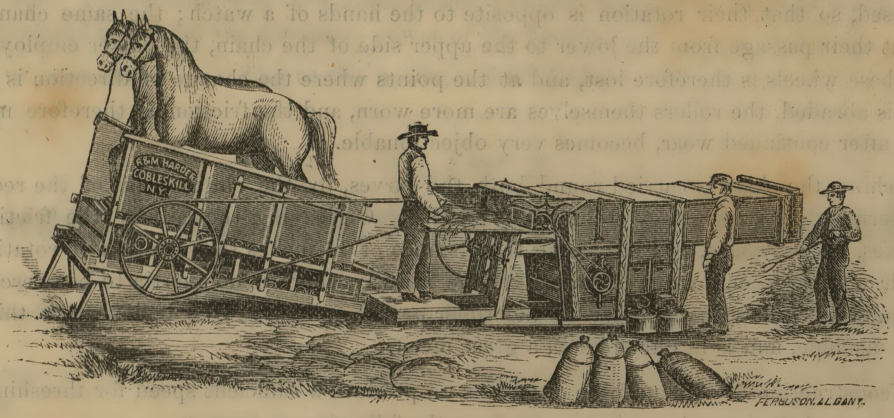
OF

R. & M. HARDER, Cobleskill, N. Y.,

AT THE

GREAT NATIONAL IMPLEMENT TRIAL,

Held at Auburn, N. Y., commencing July 10th and ending July 27th, 1866.



CLASS VII.

HORSE POWERS, INCLINED ENDLESS CHAIN.—R. & M. HARDER, Cobleskill, Schoharie County, N. Y. Entry No. 1.

Messrs. Horace L. Emery & Son, and Wheeler, Melick & Co., both of Albany, entered machines under this class, but finally concluded to withdraw them. The trial was therefore restricted to Entry No. 1, alone.

Weight of the Horse Power, 1850 lbs. Price $190.

As every farmer is acquainted with the general principles of Endless Chain Horse Powers, we will confine our description to points which are peculiar to this machine.

1st. It is somewhat longer than other machines with which we are acquainted; the sides are also somewhat lower, admitting more air to, and under the horses in hot weather. The entire length of the chain is $18\frac{3}{12}$ feet. There are 31 links, each 7 inches long. It is 4 feet 7 inches wide from outside to outside of sills.

2d. The upper and lower parts of the chain are, of course, flat and parallel to each other; the two ends form arcs of a circle; now it is plain that when the chain consists of an even number of links, the center of two of the links must be upon the end of the versed sines of both arcs at the same period of time; the link (7 inches long) therefore forms a tangent at the arcs, which produces a strain upon the chain equal to twice the horizontal distance from the end of the link to the curve of the arc, which relaxes as soon as it passes the versed sines. It will be readily seen that this alternate tension and relaxation will cause a jerking and irregular action, which consumes power uselessly, and wears out the machine rapidly. This difficulty is obviated by Messrs. Harder's machine, by putting in an odd, instead of an even series of links. In this way only *one* of the links can be a tangent at the versed sine at once; the point of *greatest tension* at one end, will always be met by the point of *greatest relaxation* at the other, which equalizes the strain and causes it to move much more smoothly and with greater economy of power.

3d. The same principle is carried out in the arrangement of the reels. The usual way of constructing these powers, is, either to carry round the lower end of the chain on a curved railway, or on a reel having the same number of arms as the upper one. It will be readily seen that when both these arms are in the same straight line, the tension will be much greater than when they are not in the same line. To prevent the occurrence of this difficulty, Messrs. Harder's make their upper reel with *seven* clutch arms, while the lower one has only *five;* by this arrangement, the point of *greatest tension* in the upper reel corresponds with the point of *least tension* in the lower one.

This equalizing feature of the links and clutch arms is a distinctive feature of this machine, and the result is, that it works *more equably*, *more smoothly*, and with *less waste of power* than any machine that we have ever met with.

4th. Most Endless Chain Powers carry the chain and friction rollers around the curve at the lower end, on a railway. When the upper part of the chain is moving downward, towards the lower end, the friction rollers are rotating in the same direction as the hands of a watch, but when they pass the extremity of the curve, their motion is reversed, so that their rotation is opposite to the hands of a watch; the same change of direction of course occurs at their passage from the lower to the upper side of the chain, the power employed in overcoming the inertia of these wheels is therefore lost, and at the points where the change of direction is made, the surface of the railway is abraded, the rollers themselves are more worn, and the friction is therefore more cumulatively increased, and, after continued wear, becomes very objectionable.

In this machine, the chain is carried round both the curves, by the clutch arms of the reels, the upper and lower railway terminating where they cease to be parallel. On leaving the railway, the friction rollers revolve on their own axes, in free space, and in passing the distance of 17 inches their motion of rotation is arrested by friction on their own axes, and when they re-enter the railway, there is no inertia to be overcome, their advent is *quiet and noiseless*, and without injury to the roller or the railway. We believe that this arrangement is peculiar to this machine, and is in our opinion, a great merit.

5th. The construction of this machine is such as to produce a sufficient speed for threshing, by a *very slow and easy* movement of the horses, as will be seen from the following statement.

The large cog wheel, which is keyed on to the large reel shaft, makes $4\frac{3}{7}$ revolutions to one revolution of the chain. The pinion, which is keyed to the band wheel shaft, and is carried by the large cog wheel, makes $5\frac{1}{2}$ revolutions to one revolution of the large wheel. The diameter of the band wheel is $38\frac{1}{2}$ inches. The average number of revolutions of the chain in one minute, was, according to our observation, while threshing, $6\frac{3}{4}$ to 7.

Assuming seven revolutions per minute, as the true motion of the chain, we have 15 rods less than $1\frac{1}{2}$ miles travel of the horses, in an hour. This slow rate of movement of the chain, adapts it better to the use of oxen, as well as horses, than any others, which require a more rapid rate of travel.

6th. The friction rollers in this machine have a *greater diameter* than most other machines, being six inches. The result of this is, that they make fewer revolutions on their axes in traveling a given distance, than those of a less diameter, and therefore the friction is proportionally diminished.

7th. The *mechanical execution* of this power is deserving of high commendation. A very careful examination of every part, showed thorough and conscientious workmanship and material in every place; nothing was slighted; the strength of material was admirably distributed, and the gearing was very superior throughout. The boxes of the main shafts were of metal, which run without heating.

We have seen of late, that some manufacturers build bridges without cross rods. We have had no experience ourselves, of the effect of this omission, on the durability of the machine, but the fact that Messrs. Harders have retained these rods, gives us more confidence in its durability, and makes us feel more safe in commending it with assurance to the farmers of the state, as one which will be little liable to give them trouble by breaking.

8th. The following experiments were made to test the friction and the useful power of the machine.

The weight of the horses was 2,326 lbs. When the front end of the machine was elevated 56 minutes, it produced a motion of the platform sufficient to thresh grain, or seven revolutions of the chain per minute. A Prony's Brake was screwed to the periphery of the band wheel, so tightly that it could not slip, the radius

of the circle being 3.97 feet. It required 13 lbs. applied at the extremity of the radial bar to counterbalance the weight of the horses when the angle of the machine was 13 degrees. The nuts were now turned so as to permit the band wheel to revolve slowly in the brake, when it required 13¾ lbs. to counterbalance the radius.

It follows from this, that the horses travel 127.75 feet per minute, on the hypothenuse of a right angled triangle, whose angle opposite to the perpendicular is 56 minutes. By the usual trigonometrical process, the perpendicular is ascertained to be 2.081 feet. This height, 2.081 feet × 2,326 lbs., the weight of the horses =4.840,406÷3,300 lbs., which is one horse power=0.146, horse power consumed by friction.

Seven revolutions of chain in one minute × 4,428, the number of revolutions of driving wheel to one revolution of the chain × 5½, the number of revolutions of pinion to one revolution of driver × 25, the circumference of the circle formed by the revolutions of the brake = 58,601, 81 lbs. raised one foot high in a minute, ÷ by 3,300 lbs., which is one horse power, = 1.776 horse power, as the effective force of the horses. This amount of useful effect exerted by the horses, added to 0.146 of a horse power consumed by the friction, amounts to 1.922 horse power. The remainder of 0.78 horse power, probably arises from the fact that a higher angle than 13 degrees is required to exhibit the maximum power of the horses.

We have no hesitation in awarding to this power, a Gold Medal.

CLASS X.

TWO HORSE COMBINED THRESHERS AND CLEANERS.

Entry No. 7.

Weight of Machine, 1,100 lbs. Price, $210.00. Dust Flue, Extra—Price, $10.00.

This machine is of great value, and has several features different from any thresher and cleaner within our knowledge.

1st. The thresher is overshot. The cylinder is of wood, covered with sheet iron, and heavily banded; is heavier than usual; accurately balanced, so that very little vibration is produced when revolving at its highest speed. The cylinder revolves about 1,100 times a minute, when the horses travel at the rate of 1½ miles per hour.

2d. The teeth, which are heavy, are not put into the cylinder with a screw, as is usual, but are driven in, and clinched on the inner side. By this arrangement, if the tooth breaks, another can be replaced in the same spot, which cannot so well be done when put in with a screw.

3d. The feed table ascends 2½ inches next to the cylinder, at which angle the straw enters most readily between the teeth of the cylinder and concave, and stones and other hard substances which may be in the straw, roll downward, without injury to the teeth of the thresher.

4th. The ends of the cylinder shaft are of cast steel, and are a quarter of an inch more in diameter, as claimed by them, giving a wider bearing against the boxes.

5th. A dust flue is attached to the thresher (when ordered), which is a very great relief to the operator.

6th. The concave is so adjusted that in raising it by means of the nuts, the front edge raises somewhat more rapidly than the hinder one, by means of which there is more room in front to receive the straw easily, when in its stiff and unbroken state, and allowing the back teeth to do the most threshing when the straw has been bruised and softened, consequently less power is required to take through the same amount of straw.

7th. The feed table is easily removed, and can be as easily replaced.

8th. The cylinder shaft is provided with a rachet coupling, by means of which the cylinder continues to revolve freely when the horse power is suddenly stopped, which avoids the dangerous wrench which would ensue if the great velocity of the cylinder were suddenly arrested.

9th. It can be changed from right to left hand by a very simple and easy adjustment.

10th. The arrangements for separating the grain from the straw, are unusually good; two forked arms in the separator are continually rising and falling, which keep the straw loose and facilitate the separation of the grain.

It has a quick vibration of 4 inches.

The end most remote from the cylinder, is hung 4½ inches higher than that which is nearest to it, and by a peculiar arrangement of the hangers, the jerk is materially improved.

11th. The sieves are larger than usual; they are five in number, shaken laterally, and are supplied with a very powerful stream of wind.

12th. The mechanical construction and execution are of the very best kind, and we have no hesitation in saying, that in our opinion this machine embodies the greatest advances that have yet been made in the art of separating grain from the straw.

In our trial it threshed 250 bundles of wheat in 40 minutes, producing 11 bushels of clean wheat. It delivered the grain in a very clean and excellent condition. We fully believe it to be admirably adapted to meet the wants of the farmers, and therefore we recommend to the Executive Committee to give a gold medal to this machine.

We Hereby Certify, that the foregoing are true copies of the Report of the Judges, at the Implement Trial, held at Auburn, in July last, relative to the machines exhibited by R. & M. Harder, of Cobleskill, N. Y., at said trial.

JOHN STANTON GOULD, *President.*

B. P. JOHNSON, *Sec'y.*

Hudson, N. Y., Sept. 1st, 1866.