(No Model.)

2 Sheets—Sheet 1.

I. N. GORDON.

HORSE HAY RAKE.

No. 386,312. Patented July 17, 1888.

Fig. 1.

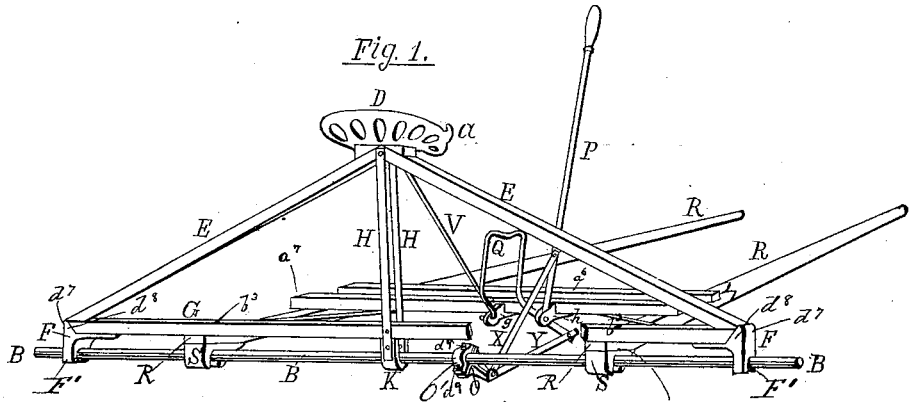

Fig. 2.

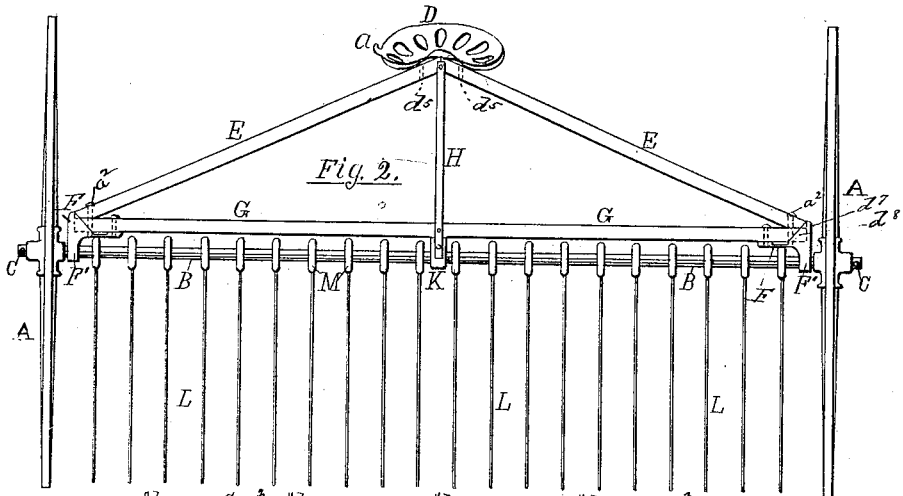

Fig. 3.

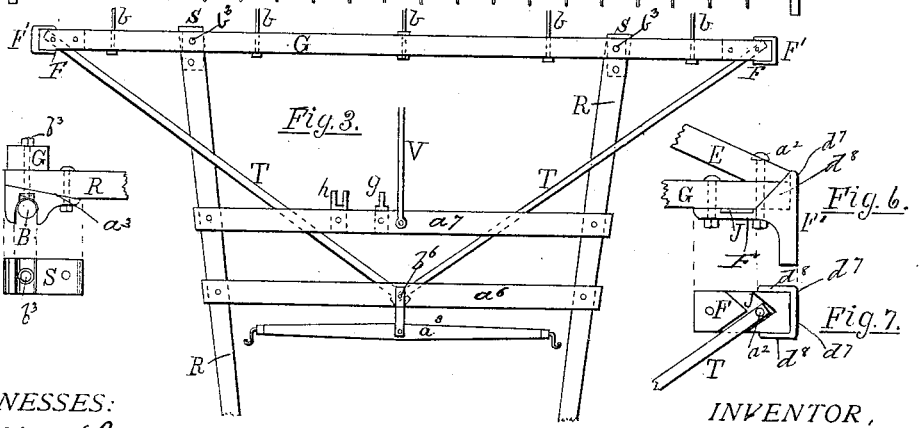

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

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(No Model.) 2 Sheets—Sheet 2.

I. N. GORDON.

HORSE HAY RAKE.

No. 386,312. Patented July 17, 1888.

Fig. 8.

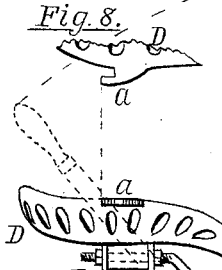


Fig. 9.

Fig13*

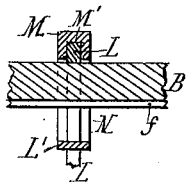


Fig. 10.

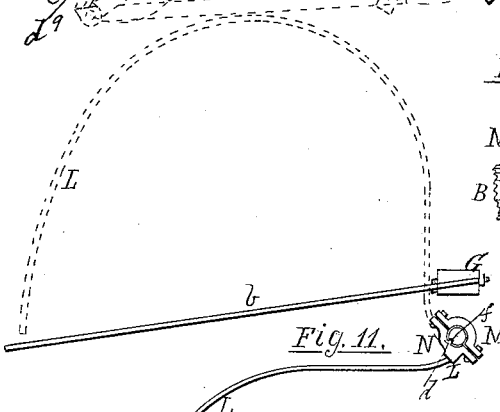


Fig. 11.

Fig. 12.

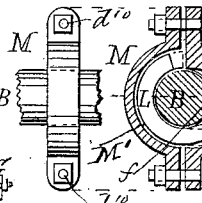


Fig. 13.

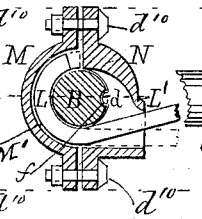


Fig. 14.

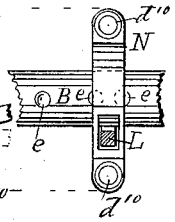


Fig. 15.

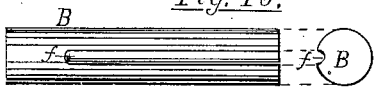
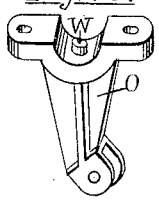


Fig. 16.

Fig. 17.

Fig. 18.



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ISAAC NEWTON GORDON, OF BELLEFONTE, PENNSYLVANIA.

HORSE HAY-RAKE.

SPECIFICATION forming part of Letters Patent No. 386,312, dated July 17, 1888.

Application filed July 18, 1887. Serial No. 244,671. (No model.)

To all whom it may concern:

Be it known that I, ISAAC NEWTON GORDON, a citizen of the United States, residing at Bellefonte, in the county of Centre and State of Pennsylvania, have invented certain new and useful Improvements in Horse Hay-Rakes; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The chief object of this invention is to simplify the construction of horse-rakes, to reduce their cost of manufacture, to make them more easily operated, and to lighten their weight, and yet make them more substantial and durable.

The invention consists in the construction and arrangement of parts, which are more fully set forth in the following description, reference being had to the accompanying drawings, which form a part of this specification, and in which—

Figure 1 is a perspective view of the general frame-work of the rake with the wheels, cleaner-rods, teeth, and tooth-boxes removed, and having a part of the cross-bar cut away, so as to better show the dumping device. Fig. 2 shows the elevation of part of the rake, including the cross-frame, as seen from the front. Fig. 3 is a top view of the shafts and general frame-work. Fig. 4 shows the manner of attaching the shafts to the cross-bar and to the cast-iron bearing which rests on the axle. Fig. 5 shows the under side of the cast-iron bearing which is attached to the end of the shafts. Fig. 6 shows the cast-iron bearing which rests on the axle inside of the wheels, and the manner of securing same to the rake-head or cross-frame. Fig. 7 is a top view of the cast-iron bearing which supports the end of the rake-head. Fig. 8 is a top view of a part of the seat, showing the hook or catch for holding the hand-lever. Fig. 9 is a vertical side view in elevation of the dumping device. Fig. 10 is a vertical rear view of the dumping-levers. Fig. 11 shows the relative position of the cleaner-rods and teeth. Fig. 12 shows the cap or front half of the tooth-box bolted onto the axle. Fig. 13 is a cross-section of both halves of the tooth-box bolted on the axle. Fig. 13* is a horizontal section of Fig. 13. Fig. 14 shows the rear half of the tooth-box and the depressions in the axle to keep the box from turning. Fig. 15 shows a part of the axle containing a groove to prevent tooth-boxes from slipping. Figs. 16 and 17 show cross-sections of teeth, and Fig. 18 is a perspective view of the arm connecting dumping-levers with the axle.

It will be noticed that the drawings are not all made to the same scale, but that throughout the several views similar letters of reference indicate like parts.

In the drawings, A A are the wheels which run loose on the iron axle B, which latter extends the entire width of the rake, the wheels being secured to it by ordinary linchpins, C.

The supporting-frame is triangular in shape. It consists of three stiff wooden pieces, E E and G, which are securely bolted at each outer end to a cast-iron support or abutment-bearing, F, the outer end, F′, of which extends down like an inverted U (∩) and rides on the axle close up to the wheel. The pieces E E at their upper ends form a convenient support for the seat D, and are securely attached to it by means of bolts d^5. The seat in this way serves as a means of rigidly connecting the inclined pieces E and E together.

H H are flat iron supporting rods or struts, which support the axle in the middle by being secured to a U-shaped bearing, K, passing around under the axle. The struts H H are also secured to the horizontal base-beam G and to the inclined pieces E E at the seat. The under side of the inner ends of the shafts R are beveled, as at a^3, and are bolted, as at b^3, under the base-beam G and to a cast-iron bearing, S, which rides on the axle B, as shown in Fig. 4.

T T are diagonal braces which reach from the bolt b^6, to which the whiffletree is attached, to the ends of the base-beam G. Their outer ends lie in a depression or groove in the top of the bearing F, as shown in Figs. 6 and 7, and are held between the bearing F and the cross-bar G by the same bolt, a^2, which secures the bearing F to the pieces G and E. The groove J is made V-shaped, so that the same casting answers for either end of the cross-bar. The braces T T, being placed in this manner, not only stiffen the shafts and general frame-work against lateral or side strain, but in case either wheel meets an obstruction the pulling

force of the horse acts directly through the brace T to that wheel (or to the bearing F immediately inside of it) without straining the general frame-work. The usual way of building rakes is to brace the shafts in some way and attach the whiffletree a^8 to a cross-bar, as a^6, in the shafts; but this point of attachment is not strengthened by braces running directly to points of the frame just inside of the wheels; but the power or force of the horse passes through more or less of the frame-work, which in this case must be much heavier, and even then be much more liable to breakage and become loose from sudden strain than when braced as in my rake. The bearings F (see Fig. 6) at their outer ends extend up a considerable distance, which forms a flange or end wall, d^7, and acts as a support against which the outer ends of the inclined pieces E abut, and which prevents them from spreading. This wall is also braced by side walls, d^8, or flanges of bearing F, which extend on each side of the pieces G and E, and which tend to keep the latter in position as well as stiffen the bearing F. The inclined pieces E E are not intended as seat-braces, although, because of of their position, they form a convenient support for the seat; but, taken in connection with the horizontal cross-bar G and struts H, and bound together, as described, they form a rigid triangular supporting-frame, which serves, with the casting K, the double purpose of stiffening the axle in the middle and placing the weight of the driver on the axle immediately inside of the wheels, and consequently it will be impossible for the rake to sag.

The wheels in an ordinary hay-rake are about eight or nine feet apart, and when the rake is made sufficiently light it will sag down in the middle in spite of all precautions, and thus throw the teeth out of line. Some manufacturers have attempted to overcome this difficulty by placing a truss-rod underneath the cross-frame or axle; but this is of little or no use, because it is not practicable to give the truss-rod a drop of more than three or four inches on account of obstructing the hay, and a truss-rod eight feet long with a drop of only three or four inches is almost a straight line, and practically is of little or no use; but in my rake the inner ends of the inclined pieces E E are about twenty inches above the base of the triangle, which makes a perfectly rigid and stiff structure.

In Figs. 1 and 9, V shows a rod extending from the cross-piece a^7 of the shafts or thills R to and through the upper ends of the pieces E E and the struts H H, this rod holding the seat and the pieces E E from forward and back motion.

In Figs. 3, 9, and 11, *b* shows the cleaner-rods in the base-beam G, and which are made of steel, and thus can be made stiffer and more durable than when made of wood.

Figs. 1, 9, and 10 show the dumping device, which consists both of a hand and a foot dump. The teeth being rigidly attached to the axle, we have simply to rotate the axle through about one-fourth of a turn in order to raise the teeth to empty them or dump the load. An arm, O, Fig. 8, for the purpose of effecting the dump of the load, is securely attached to the axle B by means of a half-box formed on it and another half-box, O′, the half-boxes being connected together by bolts, as shown, and it is operated by two connecting-links, X and Y, one of which, X, is attached to the hand-lever P and the other, Y, to the foot-lever Q, so that each lever acts on the arm O by its own connecting-piece X or Y. The foot-lever is of the angular shape shown in the drawings, and its two sides are separated a sufficient distance to allow the foot of the operator to rest on the cross-bar between them without interfering with the working of the lever, so that the teeth can be raised either by the foot or by the hand, or by both, as desired. In pulling back the hand-lever to raise the teeth the operator naturally braces himself with his foot, and in the device shown can brace himself against the foot-lever, which aids in raising the teeth, and thus makes an exceedingly easy way of dumping the load. When it is desired to raise the teeth and secure them in that position, the hand-lever P can be placed behind the hook or catch *a*, which is cast in the side of the seat next to the lever.

The arm O is clamped on the axle B by two bolts, d^9, as shown in Fig. 9, and to secure the arm against slipping that part which fits around the axle has a projection or knob, W, Fig. 18, which fits in a corresponding recess in the axle.

The rake-teeth are made of steel, having a square cross-section, as shown in Fig. 16, or, if preferred, may be a little thicker in one direction than the other, as shown in the rectangular cross-section, Fig. 17. They are preferred in this shape, because a square piece of iron or steel is stiffer or stronger than a round piece having the same area of cross-section, and a piece of steel having a cross-section, as shown in Fig. 17, is stronger still if bent edgewise. Consequently rake-teeth made of square or rectangular steel, when set so that the diagonal of their cross-section is not vertical, can be made smaller or lighter and endure the same amount of strain as round teeth, which is the usual shape.

The manner of attaching the teeth to the axle is by means of clamp-boxes, as shown in Figs. 12, 13, and 14.

Fig. 13 shows a cross-section of the tooth-box, in which L is the tooth encircling halfway around the axle B. One half, M, of the box has a groove, M′, cast in it a little deeper and broader than the tooth, so as to allow the tooth to freely slide around between it and the axle. The other half, N, of the box has a projection or neck, L′, a little broader than the tooth and high enough to allow the tooth to move up and down a sufficient distance to enable the lower point of the tooth to accommo-

date itself to the unevenness of the ground and yet be free from any lateral or side motion.

The halves M and N of the tooth-boxes when placed around the axle do not quite come together, so that when bolted together by the bolts d^{10} they hug or clamp the axle, and as an additional security against slipping and turning the boxes have one or more raised knobs or projections, *d*, Fig. 13, which fit into corresponding recesses *f* in the axle. The recesses to receive the projection on the boxes may either be a small hole, as *e*, in the axle B, Fig. 14, deep enough to receive the projection *d*, or they may be widened out into a slot or groove, *f*, running lengthwise in the axle, as shown in Fig. 15, either of which will answer the purpose and not only secure the tooth-boxes from slipping, but keep them in line.

The relative position of the cleaner-rods with the teeth is shown in Fig. 11, the dotted line in which shows the teeth as raised by turning the axle.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a horse hay-rake, the combination of the axle B, the triangular supporting-frame composed of the base-beam G and the inclined pieces E E, and the vertical struts H H, extending from the apex of the frame to the base-beam and axle, substantially as and for the purpose described.

2. In a horse hay-rake, the combination of the axle, the wheels, the draft-frame having the cross-bar a^1, the triangular supporting-frame, and the brace V, extending from the said cross-bar to the apex of the frame, substantially as described.

3. In a horse hay-rake, the combination of the axle, the wheels, the draft-frame, the triangular supporting-frame composed of the base-beam G and the inclined pieces E E, the abutment-bearings F, upon which the lower ends of the pieces are seated and provided with the grooves J, and the braces T T, extending from the draft-frame into the grooves in the abutment-bearings, substantially as and for the purpose described.

4. In a horse hay-rake, the combination of the axle, the wheels, the draft-frame, the triangular supporting-frame, the abutment-bearings F, the braces T T, reaching from the point of attachment of the whiffletree to the draft-frame to points near the ends of the base-beam of the triangular supporting-frame and then secured thereto by bolts a^2, substantially as and for the purpose described.

5. In a horse hay-rake, the combination of the base-beam G, inclined pieces E E, abutment-bearings F F, the pieces seated at their lower ends on and secured to the latter and to the base-beam by the bolt a^2, the axle, the wheels, the rake-teeth, and means for raising and lowering said teeth, substantially as and for the purpose described.

6. The abutment-bearing F, formed with end and side flanges, in combination with the axle and supporting-wheels, rake-teeth, and triangular supporting-frame, substantially as and for the purpose described.

7. In combination with the axle, wheels, and rake-teeth and triangular supporting-frame and braces T, the bearings F, provided with V-shaped grooves J, and the end and side walls, whereby they afford substantial support for the triangular supporting-frame and can be used on either right or left hand end of base-beam G of said frame, substantially as and for the purpose described.

8. The shafts R, provided with bearings S, which are bolted to the base-beam G and straddled upon the axle B, in combination with the said axle and the rake-teeth thereof, substantially as and for the purpose described.

9. The rake-teeth L, curved into semi-encircling form at their upper ends, in combination with the axle having a recess or recesses in its periphery, the half-clasp bearing-plate M, having a groove for the curved part of the tooth, and the half-bearing N, with neck L′, stop projection *d*, and clamp-bolts, substantially as and for the purpose described.

In testimony whereof I affix my signature in presence of two witnesses.

ISAAC NEWTON GORDON.

Witnesses:

WILBUR F. REEDER,

W. E. GRAY.