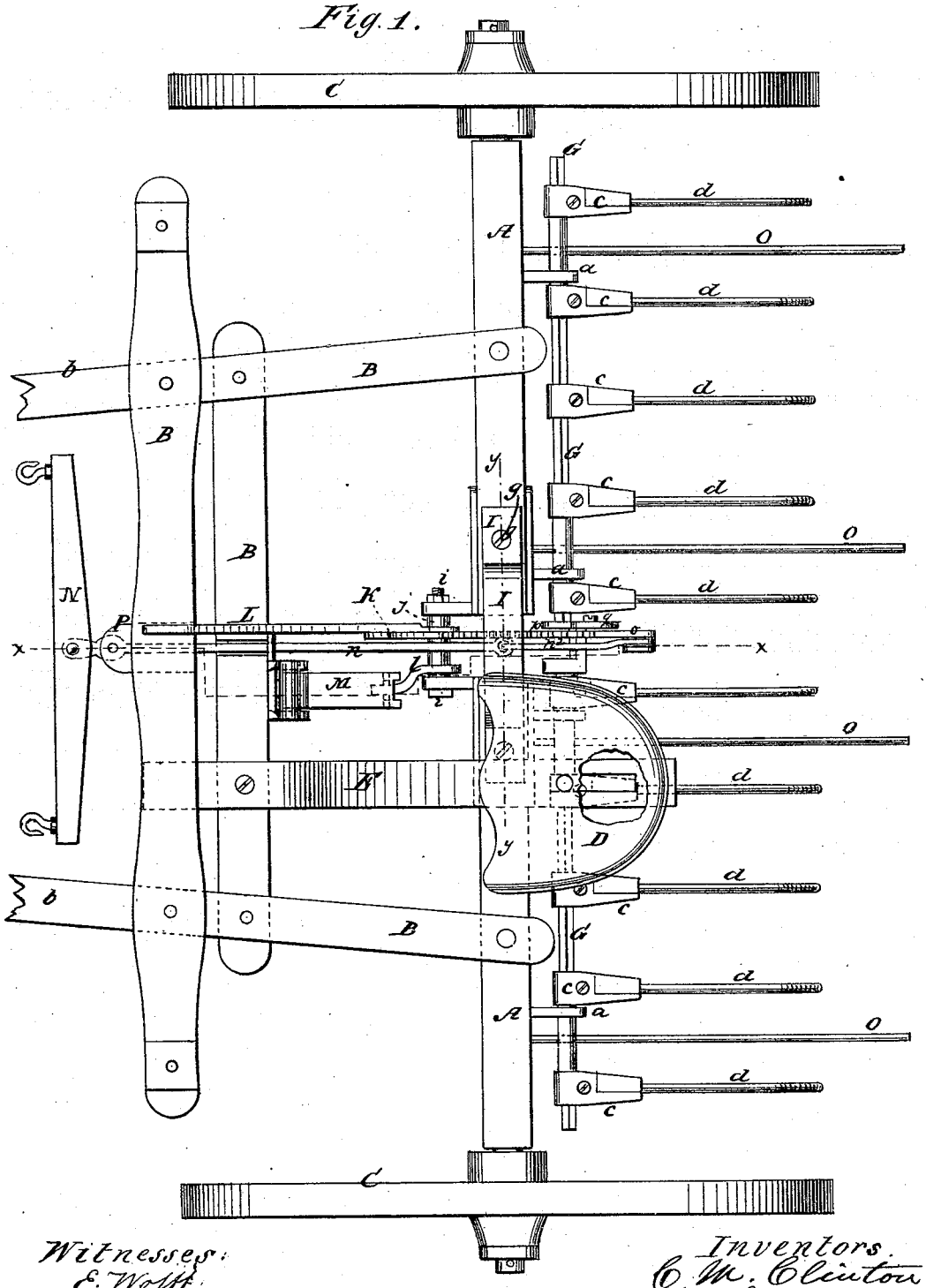
4 Sheets--Sheet 1.

C. M. CLINTON & L. MOOD.

Horse-Rake.

No. 164,266. Patented June 8, 1875.

Fig. 1.



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4 Sheets--Sheet 2.

C. M. CLINTON & L. MOOD.

Horse-Rake.

No. 164,266. Patented June 8, 1875.

Fig. 2.

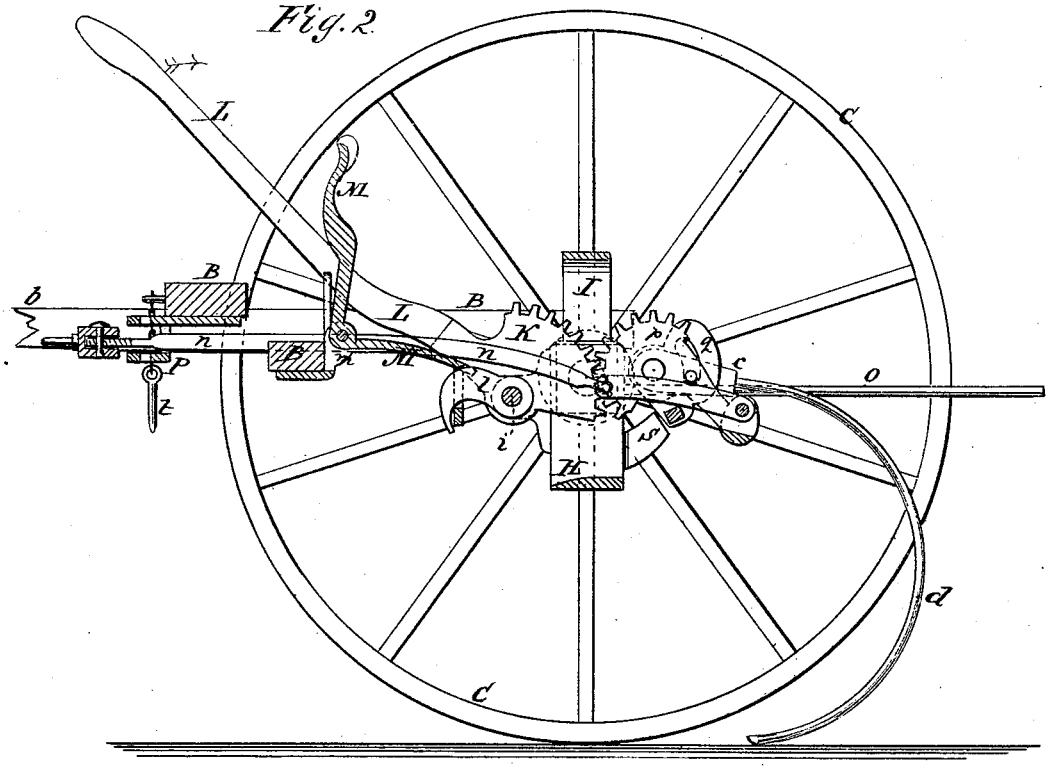
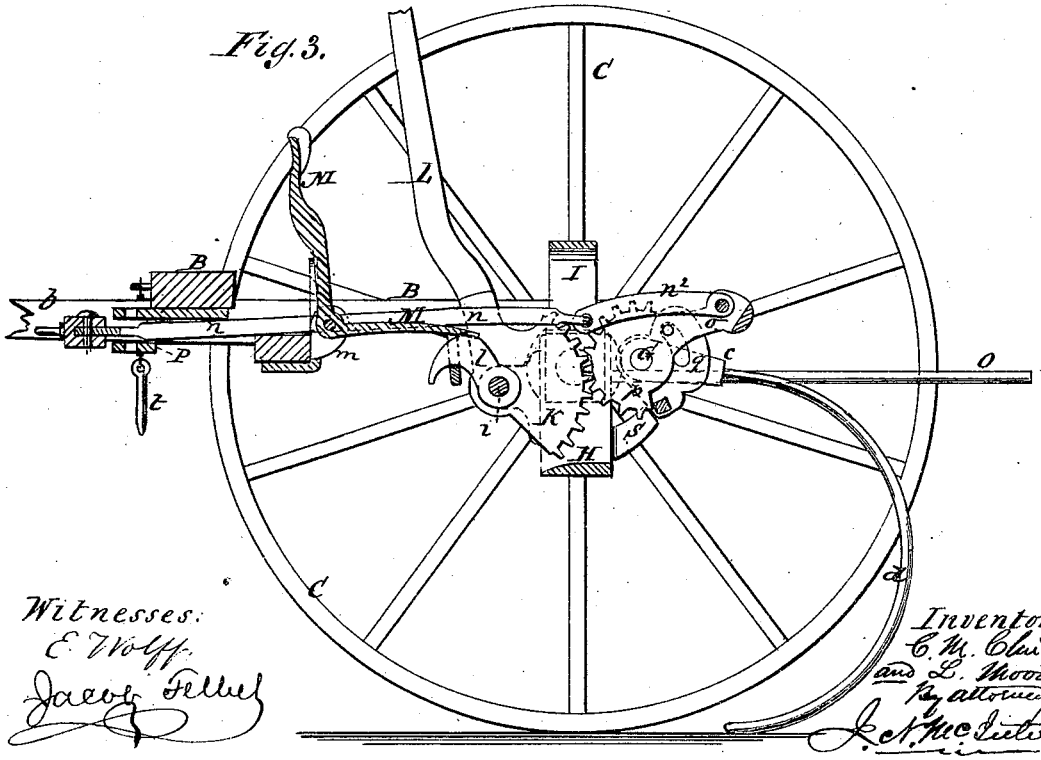


Fig. 3.



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4 Sheets--Sheet 3.

C. M. CLINTON & L. MOOD.

Horse-Rake.

No. 164,266. Patented June 8, 1875.

Fig. 4.

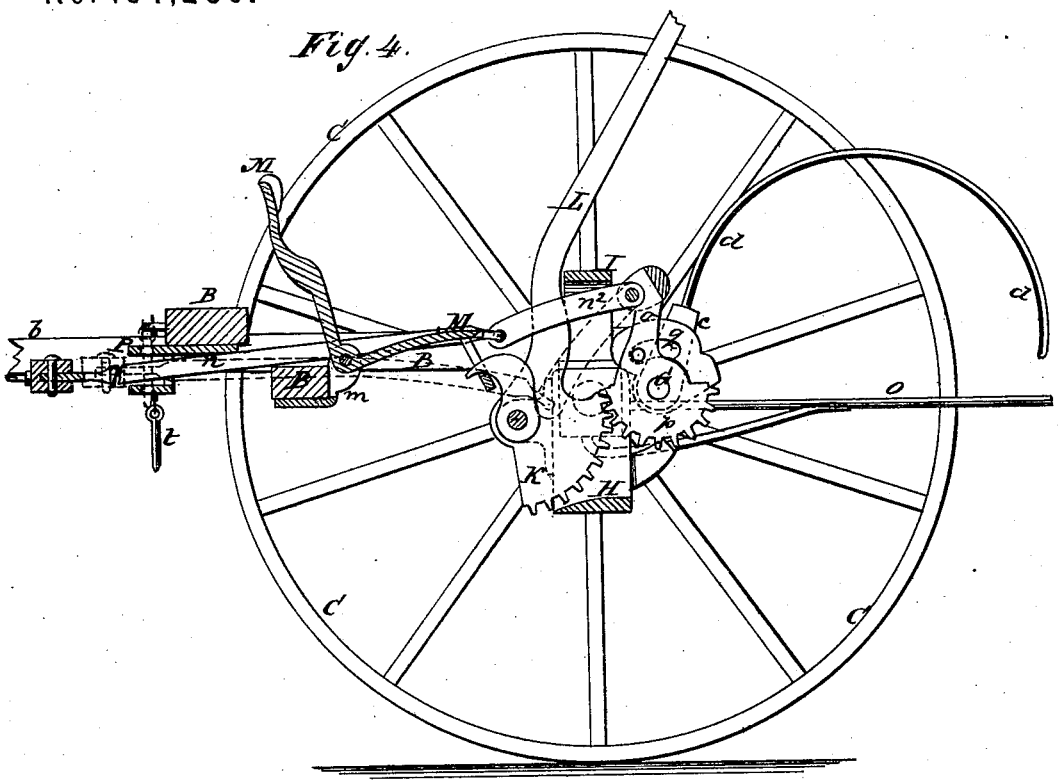


Fig. 5.

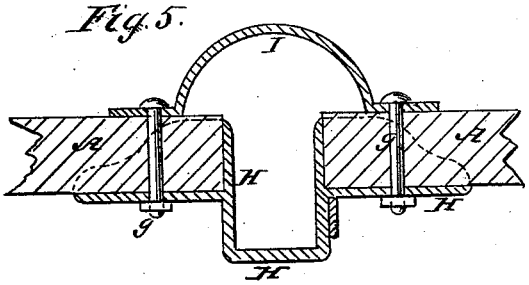


Fig. 7.

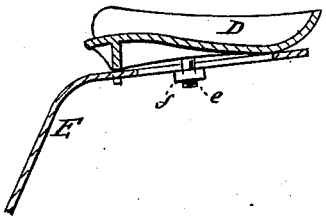
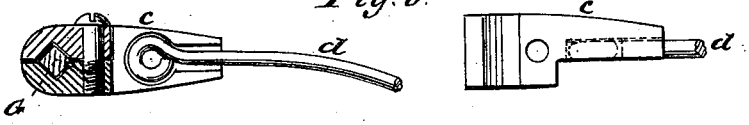


Fig. 6.



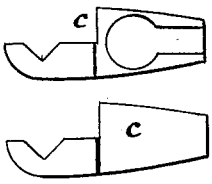


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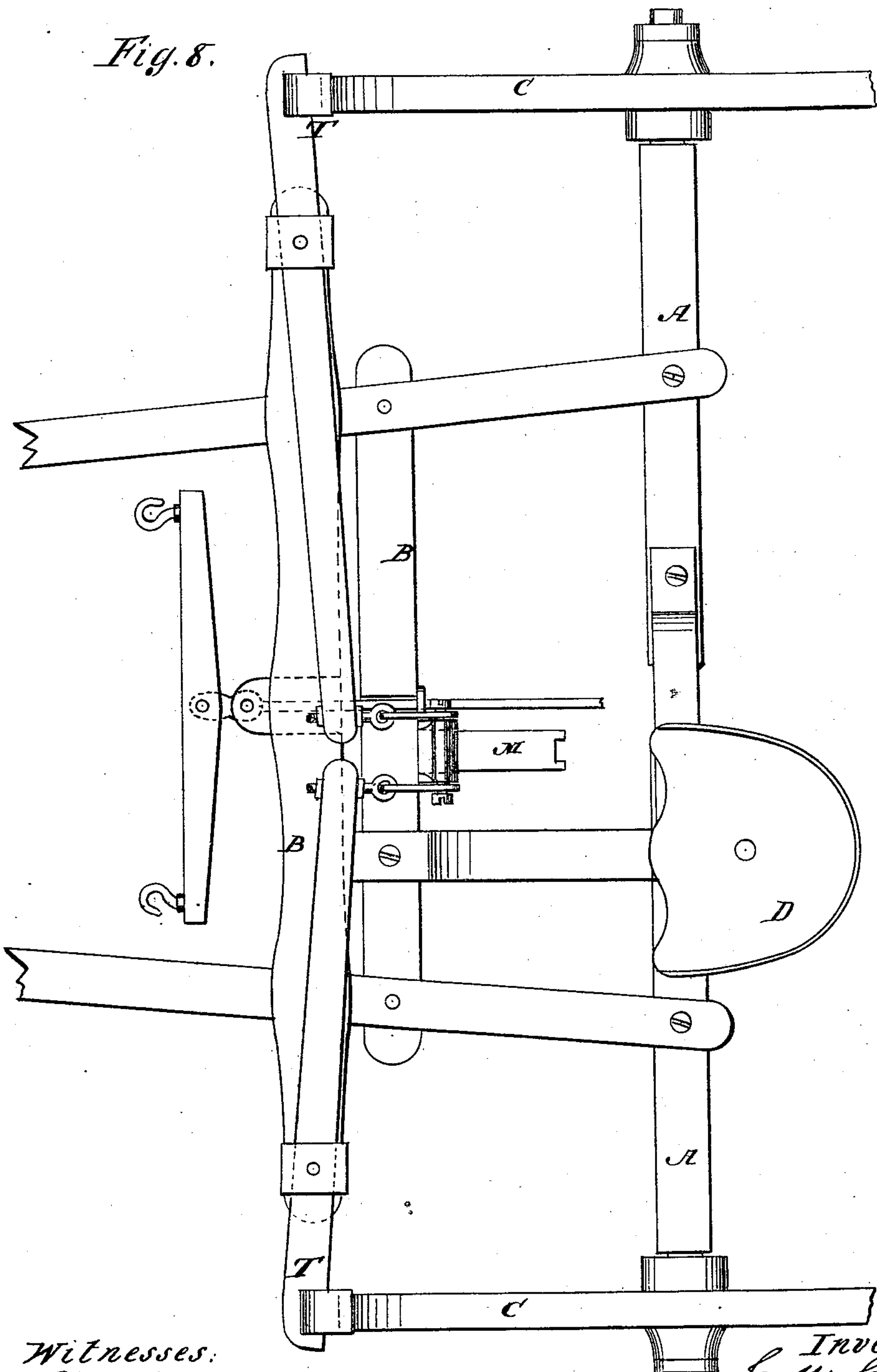
Fig. 8.



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UNITED STATES PATENT OFFICE.

CHARLES M. CLINTON AND LYNFRED MOOD, OF ITHACA, NEW YORK.

IMPROVEMENT IN HORSE-RAKES.

Specification forming part of Letters Patent No. **164,266**, dated June 8, 1875; application filed August 17, 1874.

To all whom it may concern:

Be it known that we, CHAS. M. CLINTON and LYNFRED MOOD, of Ithaca, Tompkins county, in the State of New York, have invented Improvements in Wheel Horse-Rakes; and we do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings and to the letters of reference marked thereon.

Our invention relates to that class of rakes known as wheeled horse-rakes, and in which the teeth, which drag along over the ground to gather the hay, or other material, are lifted with an oscillatory motion to discharge the gathered load.

Previous to our invention it was customary in rakes of this class to have the teeth swing or oscillate either with or about the main axle of the machine, as an axis of motion, or about an auxiliary shaft or bar arranged parallel to and near the main axle of the machine. And it was also customary to provide means by which the draft of the team could be utilized in lifting the rake-teeth to dump the gathered load or charge, and means by which the rake-teeth could be held down to their work by the driver of the machine. But in rakes possessing these characteristic features of construction and operation it was usual, where the rake-teeth oscillated about the main axle as a center of motion, to have the draft power communicated from the driving-wheels of the machine to the rake mechanism, and where the rake-teeth oscillated about an auxiliary shaft to have the draft power applied through the medium of some device which took hold of the rake-teeth, generally a device known as a drag-bar; and it was usual in one case to hold the rake down to its work solely by a hand or foot lever operated by the driver, and in the other case to hold the rake down to its work by hand or foot power applied to the rake-teeth through the medium of a drag-bar or some such device.

Where the draft-power was utilized through the medium of the driving-wheels, not only was the construction complex and undesirable, but this radical objection existed in the principle of operation, viz., that the machine had necessarily to progress or travel forward a given distance during the dumping motion of the rake, the effect of which was to drag the charge while dumping in lieu of making a compact and clean windrow.

Where the draft power was utilized through the medium of some device operating directly and continually on the teeth of the rake to lift them, the driver was obliged to not only exert a power to hold the rake down to its work, but also a force to counteract the lifting tendency of the draft power, and in every sort of means employed to hold the teeth down, where a drag-bar or other device bearing on the teeth was used, the important capacity of the teeth to spring and yield, while their points were passing over obstructions, was materially affected or almost destroyed.

We propose by our improvements to overcome these and other objections in that class of machines to which our invention relates, and provide for use a wheeled horse-rake in which, beside the embodiment of less important advantages, the great desideratums shall be attained of a perfect utilization of the draft power to both lift the rake in dumping and hold it down to its work in raking; a free and unobstructed springing capacity in the teeth from their roots or places of attachment to their points; a capacity for a conjoint or separate action of the driver's power and the draft power at the pleasure of the operator; a greater capacity to clean out the hollows in the surface raked over; greater perfection in the construction, operation, and endurance of the parts of the machine; and greater simplicity, strength, durability, and ease of manipulation in the whole.

To these ends and objects our invention consists in the several characteristic features of construction hereinafter specified as peculiar to our improved machine, and referred to in the claims.

To enable those skilled in the art to make and use our invention, we will proceed to more fully describe the construction and operation of our rake, referring by letters to the accompanying drawings, in which—

Figure 1 is a top view of the same; Fig 2, a vertical section at the line *x x*, Fig. 1; Fig. 3, a similar section, showing the parts in different positions. Fig. 4 is a similar section, showing the parts in another condition; Fig.

5, a partial vertical section at the line *y y*, Fig. 1; Fig. 6, detail views (enlarged scale) of the tooth-holder; Fig. 7, a sectional view of seat and supporting-standard; and Fig. 8, a partial top view, showing a proposed brake attachment.

In the several figures the same part will be found designated by the same letter of reference.

A is the main axle, and B the frame, of the machine, which is provided or formed with the usual thills or shafts *b b*, and is supported and travels upon two wheels, C C, mounted loosely on the ends of axle A, as illustrated. D is the driver's seat, which is supported on a spring-standard, E, secured at its lower end to the frame of the machine, and formed with a slot at its upper end, by means of which and a securing-bolt or screw and nut, *e f*, the seat may be adjusted to and held at the proper place to suit the size of the person who is to drive and manage the rake. G is a square shaft or bar, mounted to turn freely in bearings in its supporting-stands *a a a a*, and having securely fastened to it the holders *c c*, &c., which carry the teeth *d d*, &c., of the rake. This shaft or rake-head G is arranged a short distance in rear of and parallel to the main axle A, and the stands *a a a a*, which support it, project rearwardly from said main axle, as represented. The shaft G has a yoke or bell-crank formed at about its middle, to accommodate the rod or bar through which the draft-power is applied to said shaft, as will be presently explained; and the main axle A is made in two parts, lengthwise, as shown, coupled rigidly together by means of a casting, H, and metallic arch I. The casting H is formed with seats, into which the adjacent ends of the two parts of the axle snugly fit, and in which said ends are secured by bolts *g g*, which pass vertically through the arch I, axle A, and casting H; and said casting is also formed with ears or projections, in which is mounted a stud or pivotal bolt, *i*, upon which turns the sleeve or hollow shaft *j* of the sector-plate *k* and cam-like arm *l*.

To the said sector-plate is made fast the lower end of the hand-lever L, and to the said cam-like arm *l* is coupled, by a slot-connection, one end of a bent foot-lever, M. This lever M is pivoted, at its angle, to a metallic stand, *m*, bolted to the frame B, and is so shaped and located that its upper end may be conveniently pressed upon by the foot of the driver. The stand *m* is formed with a vertical slotted arm or portion, which constitutes a guide-plate to the draft-bar, which passes through it. *n* is the said draft-bar, the rear end of which is connected, by a link, n^2, to the arm *o* of a sector-plate, *p*, the teeth of which engage with the teeth of sector-plate *k*, and the forward end of which is attached, as shown, to the whiffletree N. This draft-bar *n* is free to slide longitudinally back and forth, and operates only upon the rake mechanism—that is to say, it is in all its movements perfectly independent of the rest of the of the machine; and when the machine is set or adjusted for the utilization of the draft this independent draft-bar is continuously operative—that is to say, is always in the performance of one of its two functions—either tending to hold the rake down to gather, or assisting in lifting the rake to dump.

The sector-plate *p* is mounted on the shaft or rake-head G, and, through the medium of a slotted arm, *q*, serves to turn said shaft G′, as will be presently explained. O O, &c., are the cleaner-bars or fingers, which extend or project horizontally rearward from the main axle A, by which they are supported. These cleaners are formed of round metallic rods, and are braced and strengthened by brace-rods *r*, extending from the axle A out to a point sufficiently far therefrom not to interfere with the proper gathering capacity of the rake and desired operation of the cleaners. P is a stand bolted to the forward portion of the frame B, and so made that while it serves as a guide-plate for the forward portion of the draft-bar *n*, it also, together with a securing-pin, *t*, which may be passed through holes in said stand, and an eye in the forward portion of said draft-rod, may be made to serve the purpose of locking fast the said bar *n*, for a purpose to be presently explained.

The peculiar construction of the tooth-holders *c* is so clearly shown at Fig. 6 that we need not further describe their construction here.

On the rear portion of the casting H is formed or secured a projecting stand or part, *s*, against which the bent portion or bell-crank of the shaft G strikes to stop the descent, beyond a proper limit, of the rake-teeth.

With the foregoing references to the several parts of the machine, the following explanations, in connection with the drawings and the foregoing description, will, we think, make clear the operation of our improved rake, and enable others to fully distinguish the features of novelty which constitute our invention.

In the operation of the machine the driver sits, as usual, on the seat D, and as the machine is drawn along over the ground by the horse the hay is gathered or scraped up by the teeth *d* of the rake until it is desirable that the collected quantity of material be discharged to form the windrow. While the rake is thus gathering the hay it is kept down to its work by the draft of the team, while at the same time the teeth, individually and collectively, can rise and fall sufficiently to follow the undulations and irregularities of the ground's surface, and ride over all surmountable obstructions.

This peculiarity of operation we may thus more particularly explain: When the rake is down in its gathering position, the point at which the link n^2 of draft-rod *n* is pivoted or coupled to the sector-plate *p*, which turns the rake-head or shaft G, is below the level or line of said axis or shaft G, and hence the pull on the said bar *n*, through its connecting-link n^2,

tends constantly to turn the shaft G backward and downward, and hence continually pulls the teeth *d* attached to said shaft down toward the ground; but, as the pull or strain is in a line only a little below the dead-center, and the rake-head or shaft G can only turn to a limited extent in the downward direction just mentioned, any serious resistance at the lower ends of the rake-teeth will easily overcome the tendency of the draft power to hold them downward, and they will rise against such tendency; and, as each tooth is free to play up and down by reason of the capacity of its root or upper end to swivel to a certain extent in its holder *c*, it follows that, while each tooth can drop at its point a certain distance below the level to which it would be forced down, each tooth can also rise a certain distance independently of the other teeth. Thus it will be seen that, by reason of the capacity of the teeth to separately rise and fall a certain distance, and the capacity of all the teeth and the rake-head to oscillate to a certain extent between the point of elevation, at which the draft-rod *n* would pull dead against the axis of motion of the rake-head, and the point at which the rake-head comes against the sustaining rest or stop, the rake is kept well down to its work without any exertion or attention of the driver, and at the same time allowed to perfectly accommodate itself to the irregularities of the ground's surface, and perfectly clean out all the small depressions or hollows.

When the driver desires to dump the rake or discharge the gathered hay, he first, either by means of the hand-lever L or foot-lever M, or by both together, turns the toothed sector *k* in the direction indicated by the arrow at Fig. 2, so as to partially rotate the sector-plate *p*, and bring the point of attachment of link n^2 to plate *p*, some distance above the level of the shafts G; he then continues the rotatory motions of the said sector-plates, assisted by the pull of the draft-rod *n* and link n^2 on the sector-plate *p*, until the rake-teeth shall have been lifted clear up and the load dumped. The driver then lets the rake descend by gravity to its normal position, when the gathering operation is renewed, as usual.

It will be seen that in the operation thus of the machine, although the sliding draft-rod *n* is always pulling on the rake mechanism proper, the tendency of such pull is to hold the rake down during the gathering, where it naturally inclines to rise to a slight, but undesirable, extent, and to pull it up and assist in the dumping operation, when it becomes necessary, in the discretion of the driver, to do the dumping; and that thus, while the draft power is utilized to both hold down and lift up the rake at the proper times, it at no time necessitates the application of any counteracting force by the driver, but always either completely relieves him of, or assists him in, the application of manual or pedal labor during the operations or workings of the machine.

The great importance of these advantages cannot be overestimated, since, by the mode of operation just described as peculiar to our machine, not only is the rake made capable of performing the desired work with greater perfection and facility, but the management of the machine, even in the heaviest kind of work, is rendered so easy that any mere boy or farm-hand not competent for other and more laborious duty can, with perfect convenience, run the machine successfully. By having the plate *p* connected with the rake-head or shaft G, to be turned through the medium of the slotted arm *q*, the said plate *p* can be turned far enough to throw the pull of the draft-rod clear above the level of shaft G without exerting any power to operate the rake-teeth, and when the teeth are subsequently thrown up, by the further rotation of said plate *p*, the parts cannot come to a dead stop and jar; but as this is not very liable, and as very little power is necessary during the first part of the lift of the rake, there being a natural tendency at first to rise, it may be found expedient to dispense with the slotted connection just mentioned, and simply make the sector-plate *p* fast on the shaft G. By such change the throw of the hand and foot levers would be diminished some and the construction cheapened. The only object in having the link n^2 or the flexible connection between the draft-bar *n* and the sector-plate *p* is to permit the free working of the other parts should it be desired to throw the said draft-bar into disuse, by securing its forward end in the stand P by the key or securing-pin *t*. In lieu of making the bend or yoke in the middle of shaft G, to permit the descent of the link n^2 below the axis of the rake-head, as shown, the said shaft may, of course, be made straight, and the link n^2 be bent or yoked over the shaft; and instead of the peculiarly-shaped foot-lever M, connected by its slot to the arm *l*, for the purpose of turning the sector-plate *k*, some differently-shaped foot lever or treadle may, in some other manner, be connected with the said sector-plate to turn it. Both the foot and hand levers should, however, be so connected to the driving sector-plate *k* as to move during the same time and in opposite directions.

Aside from the advantage gained in the organization of the working parts, by dividing the main axle into two parts, as shown, a subdivision of said axle during its length may enable a much more economical employment of stock in the manufacture of the machines than would be possible were the axle made of one piece of wood.

It will be seen by reference to the detail views at Fig. 6 of our tooth-holder device *c* that it possesses these peculiar features of construction, viz: That while one portion of it serves as a holder or socket to grasp and retain the root of the tooth *d* the other portion acts as a clamp or vice to grasp and hold a bar or shaft, G, running in a line at right

angles to the line of the tooth-wire *d;* also, that said tooth-holder, by the union of its two parts, has brought into action, simultaneously, both of the just-mentioned qualifications; also, that while it holds the root of the tooth it permits it to vibrate vertically, and to a limited or given extent only.

The vibration of the tooth *d*, it will be seen, is permitted by reason of the peculiar form of the seat in which it is held, and the eye-form of the root of the tooth *d;* but the same effect might, of course, be attained by a modification of form, or the passage of a pivot or pintle (of the holder) through the eye of the tooth *d*.

We have contemplated the possible advantage which might arise, under some circumstances, from the combination, with our machine, of a brake mechanism—such, for instance, as shown at Fig. 8—so arranged that by a slight motion forward of the foot-lever M (just precedent to the dumping operation) the brakes T would be applied to the wheels C C of the machine, so that it would be positively and instantly checked in its travel, while the continued motion of the horse would effect (or assist in) the dumping operation; but in our experimental use so far, of our machine, we have found that the moment the sector-plate *p* is so turned as to bring the draft power into use the natural tendency is to turn or oscillate the rake, instead of drawing the whole machine along. In carrying out our invention many variations in the details of construction of the machine may of course be made without departing from the peculiarities of construction and operation which give to it its novelty over prior machines, and some of these peculiarities may be employed with more or less advantage without adopting the whole of our invention.

It will be understood that by attaching the teeth separately to the rake-head, or polygonal shaft G, by means of griping or clamping holder devices C, as shown and described, not only is a simple, durable and efficient mode of attachment adopted, but, in case of accident to any tooth a new tooth or holder, (or both,) can be substituted for a broken or injured one without removal of any of the other teeth or holders; and the rake can be made coarser or finer, to suit different kinds of work, by simply shifting the positions of the holders on shaft G, and either removing some of them or adding others. It will be seen that each tooth, in lieu of having a given amount of up and down play about the axis on which the rake oscillates, is afforded the proper amount of vertical play at a different point, viz: where the root of the tooth is pivoted in the holder *c*. By this peculiarity of construction and operation, it will be observed, the points of attachment of the teeth (or holders of the teeth) to the rake-head may be made firm and duable, and the root of the tooth being held laterally for some distance by the socket portion of the holder *c*, any wriggling sidewise of the tooth is to a great extent prevented. Thus the whole organization is improved in form and operation. The advantage gained by the perfect freedom of each tooth to spring up and down, clear back to the point at which its root is held fast, is of great value, since thereby the points of the teeth are allowed to pass over and under stones and other obstructing objects, which would otherwise bend, break, or injure the teeth.

In all the rakes in which the teeth are held down to their work by a drag-bar or other appliance for exerting pressure (on the body of the tooth) in rear of their points of attachment to the rake-head, such pressure-exerting device materially detracts from the capacity of the tooth to spring, because it materially shortens or decreases the length of the horizontal or straight portion of the tooth, the very part in which the springing must occur, and the spring capacity of which is great just in proportion as it is long.

By having both the hand and foot levers move during the same time the operation is made convenient, and by having the rotatory plate *k* combined with the shaft G by a gear system or its equivalent, as described, the leverage is the same during all parts of the dumping movement.

Having so explained, by reference to the drawings, our invention that any skilled person can, from our specification and the said drawings making part thereof, fully understand the said invention, and make and use a machine embodying our several improvements, what we claim as new, and desire to secure by Letters Patent, is—

1. The combination, with the rotatory rake-head, of a draft device, having a motion independent of the rest of the machine, substantially as described, and which, when operating to lift the rake, exerts no material tendency to draw the machine along.

2. In a wheeled horse-rake in which the movements of the teeth are controlled by a rake-head, independent of the axle, the combination, with the said rake-head, of a draft device, arranged and operating to hold the rake down to its work, substantially as set forth.

3. In a wheeled horse-rake in which the rise and fall of the teeth are effected and controlled by the rake-head, the combination, with the said rake-head, of a draft device, the whole so arranged and operating that, by means thereof, the rake-teeth can be either lifted or depressed by the action of the draft power.

4. The combination, with the rake-head and the teeth thereto attached, and thereby controlled, of a draft device which operates both to hold down and to lift up the rake-teeth, when arranged to pull directly on the rake-head.

5. As a means for utilizing the draft power to both hold down the rake (in gathering) and to lift the rake, (in dumping,) the sliding draft-rod arm *o*, and rotatory rake-head, com-

bined and operating together, substantially as set forth.

6. A tooth-holder or device by means of which the tooth is secured to the rake-head or shaft, formed substantially as described, so as to constitute both a socket for the reception and retention of the root of the tooth, and a clamp to embrace and make fast to the rake-head, substantially as described.

7. A tooth-holder, formed substantially as described, so as to constitute both a socket for the root of the tooth and a clamp to embrace the rake-head, as described, and having its socket so made as to permit in the tooth a slight play or articulation, as and for the purposes set forth.

8. In combination with the rake mechanism and a means for lifting the rake by the power of the driver, the jointed draft device $n\ n^2$ and a locking pin or device, the whole so arranged and operating that the power of the team may be brought into, or kept out of, action at pleasure, during the operation of the machine.

In testimony whereof we have hereunto set our hands and seals this 1st day of August, 1874.

CHARLES M. CLINTON. [L. S.]
LYNFRED MOOD. [L. S.]

In presence of—
A. H. GREGG,
H. D. DONNELLY.