2 Sheets—Sheet 1.

I. W. HEYSINGER.

Horse Hay-Forks.

No. 213,986. Patented April 8, 1879.

Fig. 3.

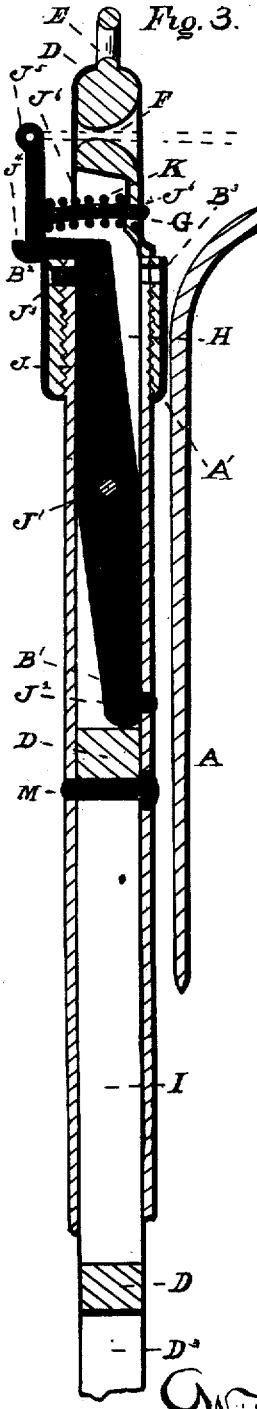

Fig. 1.

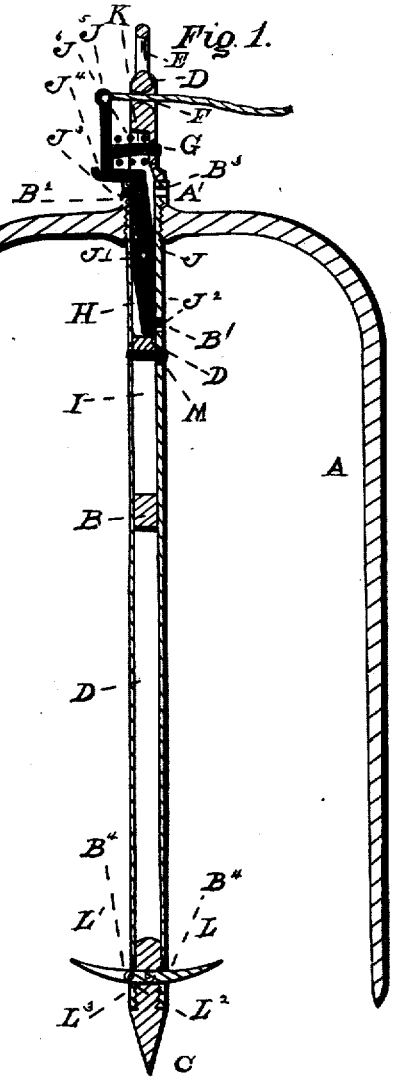

Fig. 2.

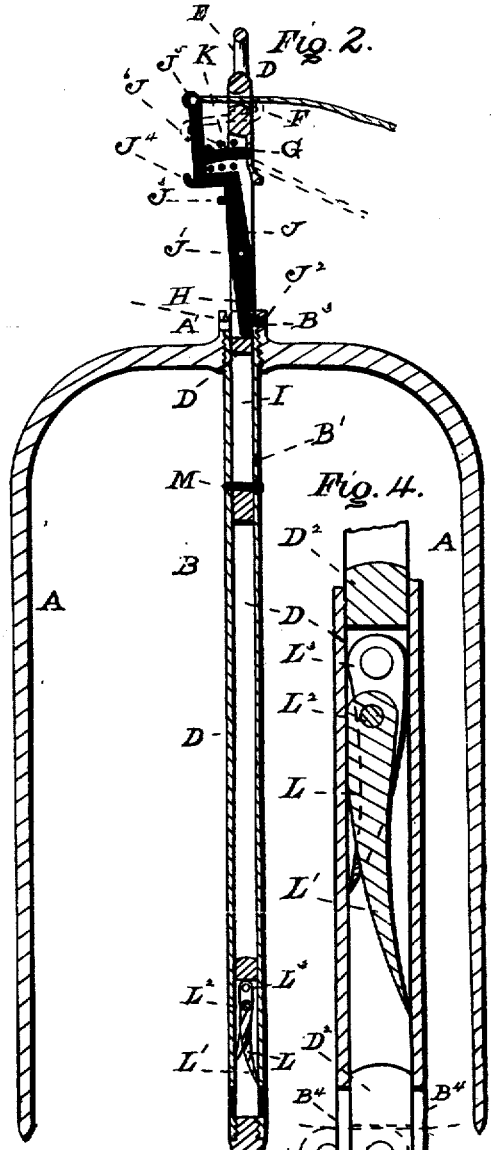

Fig. 4.

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Fig. 5.

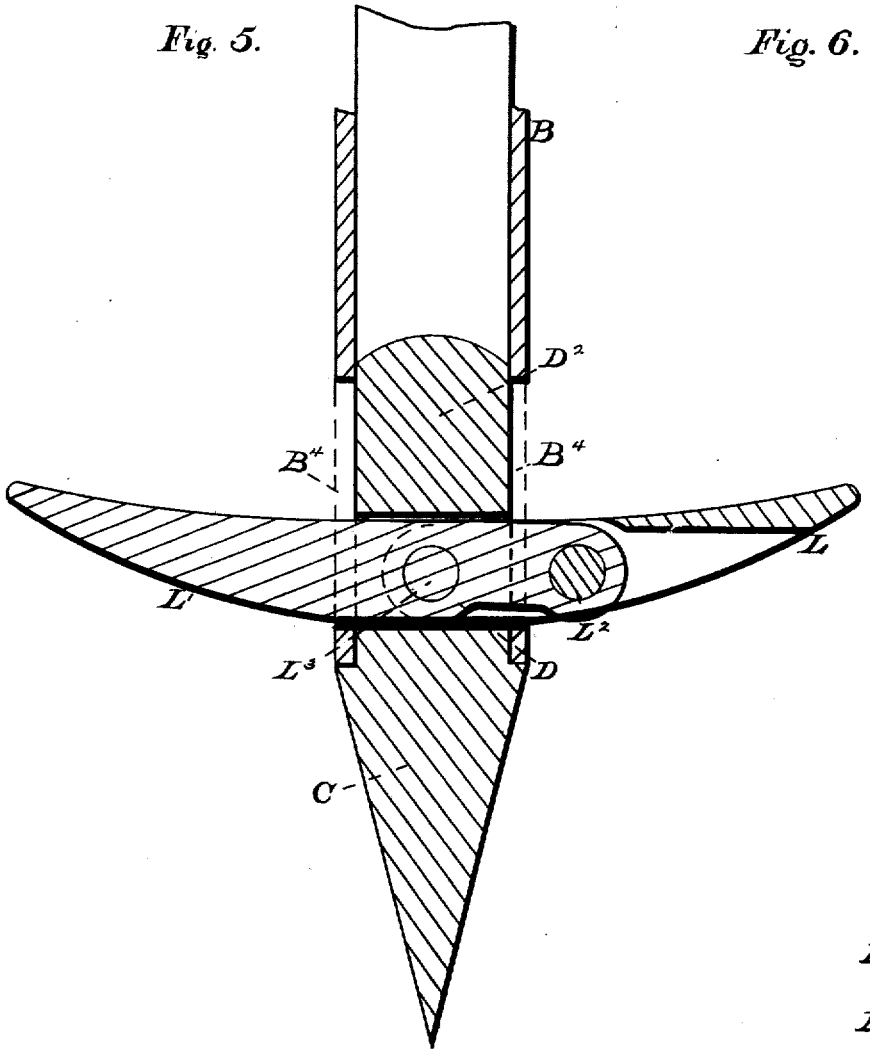


Fig. 6.

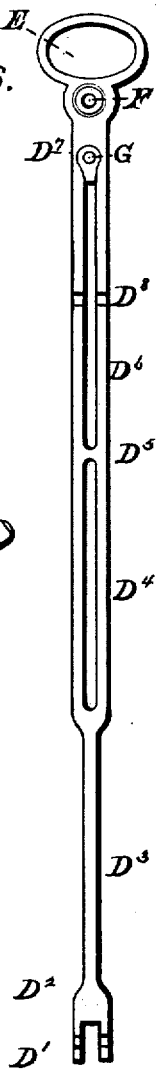
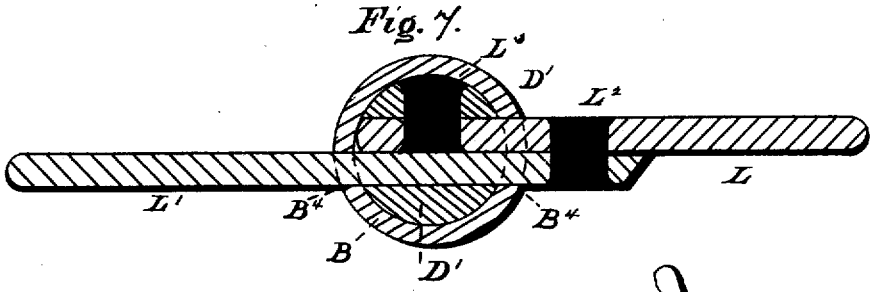


Fig. 7.



Witnesses:
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IMPROVEMENT IN HORSE HAY-FORKS.

Specification forming part of Letters Patent No. **213,986**, dated April 8, 1879; application filed August 31, 1878.

To all whom it may concern:

Be it known that I, ISAAC W. HEYSINGER, of Philadelphia, county of Philadelphia, State of Pennsylvania, have invented certain Improvements in Horse Hay-Forks, of which the following is a full, clear, and exact description, reference being had to the drawings accompanying and forming part of this specification.

Figure 1 is a vertical section of the fork, the plunger being down and the barbs projected. Fig. 2 is a similar view with the barbs retracted. Fig. 3 is an enlarged view of the mechanism for operating and locking the plunger. Fig. 4 is a sectional view of the barbs in two positions, showing the double-lever arrangement in front view. Fig. 5 exhibits one form of construction of the barbs, Fig. 7 being another, the principle being the same in both. Fig. 6 exhibits the plunger removed from its case. Fig. 7 is an end view of the plunger from beneath, showing the barbs projected laterally.

The lettering in all the figures is uniform.

Referring to Figs. 1 and 2, the tines A A are formed solid throughout, and are intended to prevent lateral displacement of the load borne by the barbs L L^1, as hereinafter described. They may be flattened laterally in their upper portion, to give increased rigidity against side strain, and a rib may extend along the front or back face for a like purpose.

The hollow tine B contains within it the mechanism for operating the barbs L L^1. It is firmly fixed at its upper end in the socket A′, provided therefor. At its opposite end it terminates in the point C, which forms a solid bottom for the tube B, and also insures easy penetration into the hay or other material. At B^4, upon a level with the upper surface of the plug C, are two lateral slots, opposite each other, for the projection of the barbs L L^1. At M, Figs. 1 and 2, the tube B is perforated for the reception of a cross-bolt to prevent the withdrawal of the plunger D, and a short distance above the point M there is another opening, B^1, which forms a catch for the locking-pin J^2 upon the lower end of the latch J. Near the upper extremity of the hollow tine B, in the same vertical plane, are seen two other openings, B^2 and B^3, opposite each other. Of these B^2 is for the reception of the upper locking-pin, J^3, of the latch J, which thus engages at the same time at both top and bottom, making a double gripe or lock, whereby additional strength and security under pressure are obtained. B^3 is intended to receive the pin J^2 when the barbs are retracted, and hold the fork open until the latch J is tripped and the plunger allowed to descend and again project the barbs into the hay or other material to be lifted, when it will be securely locked, as before described, by the engagement of the pins J^2 and J^3 in the openings B^1 and B^2.

Referring now to the construction of the plunger D, Fig. 6, it will be seen that it is a long rod, preferably in a single piece, provided with a hand-hold, E, at its upper end. At D^3, in order to save metal, it is flattened in a portion of its length. Near its bottom is the shoulder D^2, which forms an abutment for the barbs when projected, and prevents them from rising above the horizontal, and also, as it is circular in cross-section, fits into the tube B, and thus insures proper motion to the barbs and prevents lateral play. The lugs D^1 form the bearing for the barbs L L^1, one of which, L, is directly attached thereto, Figs. 4, 5, 7, the other, L^1, not being thus connected.

At D^4, Fig. 6, the plunger-rod D becomes a slotted cylinder, the slotted portion D^4 being for the reception of the cross-bolt M, upon which it plays to the extent of the slot, its upward motion being arrested when the barbs are retracted, thereby preventing the escape of the plunger from the tube B. The cross-piece D^5 adds strength to the construction, and also forms an abutment for the lower end of the latch J, whereby the load may be in great measure taken from the cross-pin J^1 and supported upon the latch, thus acting as a strut. This is clearly shown in Fig. 3.

The upper slot, D^6, Fig. 6, is made for the reception of the latch J, which turns midway upon a pivot passing through the holes D^8 in the said slot. At the upper end of D^6 is a depression, D^7, having a central hole, G, through which is arranged to pass the spring-pin J^6 of the latch J, while the spring itself, K, is supported by the metal D^7, surrounding the same. A short distance above the opening G is a larger one, F, which forms an eye for the pas-

sage of the tripping-rope, as shown in the first three figures. This opening is funnel-shaped, and rounded toward each side, but more especially upon the side opposite the lever J^5, so that should the load, while swinging freely in the air, partly revolve, a round smooth bearing, with little friction, may be provided for the tripping-rope in any case.

At the top of the plunger is the hand-hold and supporting-ring E. To this is attached the main rope, which elevates the load, and it is also made of such shape and size as to afford a ready grasp for the hand during the operation of inserting the fork into the hay, the foot, if necessary, being also placed upon the horizontal portion of the tines to facilitate the same, while the thumb has easy access to the tripping-lever J^5, which lies near by. This whole plunger-bar D, with its various parts, as above described, is cast or formed in a single piece, preferably of malleable cast-iron, and is so arranged as to be molded and drawn from the sand with facility, and to require but little subsequent finishing.

The latch J is likewise cast or otherwise formed in a single piece, as shown in Fig. 3. It may be described as a long flat bar, having a double elbow at its upper portion, pivoted near its middle, and provided with strong catch-pins at equal distances above and below the center upon opposite sides of the bar. These catch-pins or studs J^2 and J^3 are so arranged as to take into the holes B^1 and B^2, thereby locking the plunger-bar D down in place when the barbs are projected until the latch is tripped by a pull upon the lever-arm J^5, when the pins will be withdrawn from their respective holes, and the weight of the fork proper will cause it to descend, at the same time retracting the barbs and allowing the load to slip freely from the tines. When the fork proper has thus dropped and the plunger-rod D been withdrawn to the extent allowed by the cross-bolt M, the lower catch-pin, J^2, engages in the hole B^3, opposite B^2, and holds the plunger-rod up in place until the lever-arm J^5 is again depressed, disengaging the catch-pin J^2, and allowing the plunger to descend in its tube and again project the barbs L L^1.

The spring-pin J^6 is curved upon J^1 as a center, and forms a part of the latch J, which, playing to and fro in the hole G as the latch is operated, retains in place the spring K, and causes direct action upon the same.

The spring K may be coiled, as shown, Fig. 3, or may be a V-spring, perforated at its ends, if preferred. This spring K returns the latch to place after being tripped, and holds it there against accidental displacement.

J^4 is a stud formed upon the elbow portion of the latch, and its function is as follows: A load of hay carried by the fork, swinging freely at a considerable height, is apt to turn wholly or partly around, and may rotate more than once, thus hindering the operation of the tripping-lever by the rope, and causing loss of time, sometimes to the extent of rendering the fork worthless in its usual method of construction.

In this invention, however, no such difficulty can occur, the form of the lever J and the projection of the stud J^4 rendering it impossible, as, (see Fig. 2, where the rope is shown twisted over the lever,) however often the load may rotate, the last lay of the tripping-rope must pass over the arm J^4 J^5 of the lever, and a pull will then trip it as easily as though the action were direct. The stud J^4 merely prevents the coils of the rope slipping accidentally from the lower end of the lever-arm J^4 J^5 before acting upon the same.

An eye, J^5, is formed at the upper end of lever J for the attachment of the tripping-rope, which thence passes directly forward through the counter-eye F in the plunger opposite, and so insures a straight pull of the rope upon the lever in all cases.

The barbs or hooks L L^1 project equally from opposite sides of the tine B, but are themselves of unequal length, being constructed as follows, Figs. 4, 5, 7: The barb L, substantially of the form shown, is pivoted at L^3 to the lower end of the plunger-rod D, so as to be thrust out laterally from the slot B^4 by the descent of the plunger D. The opposite barb, L^1, however, is not attached directly to the plunger D, but is, instead, pivoted to the opposite barb, L, at any desired point in its length, the barb L^1 being thus longer than L by the distance of the pivot L^2 from the point L^3. In this way the leverage of a load resting upon the barbs is very greatly diminished, and, of course, the strain upon the working parts above, so that were the point L^2 removed far enough outward, the result would be practically a solid cross-bar suspended upon its center, and giving no upward thrust under any load. It is found sufficient, however, to remove the centers an inch or an inch and a half apart, whereby a diminution of the leverage of from four to six times will be secured, and the parts be found to work with perfect freedom.

By examining the position of the barbs when down, Fig. 4, it will be seen that they are prevented from rising above the horizontal line by the shoulder D^2, which lies immediately above. Any weight thrown upon the end of L^1 would form a lever, in which the fulcrum would be the bottom of the slot B^4, and the strain would be thrown upon the point L^2, tending to elevate it, instead of upon the bearing L^3, as in the ordinary construction; but at the same time the load upon the end of L would act in a directly opposite direction to bring down the point or fulcrum L^2, and so raise the extremity of L^1, only the excess above the difference of these two leverages, coming upon the pivot L^3 and the latch J, and which weight need not be more than sufficient to cause the parts to work freely. It is immaterial how these barbs are formed, so long as we obtain the leverages above described. A simple and inexpensive method is to bifurcate the barb L

toward its pivot end, Fig. 5, and allow the opposite long barb, L^1, to pass between the double portion of L, the same being held by the rivet L^2, which passes through the two sides of L and the interposed end of L^1. The rivet L^3 in this construction does not pass directly through the lugs D^1, Fig. 6, but is made in two portions, which are formed solid with and extend outward from the forked ends of L, passing through the lugs D^1, thus leaving a clear space for the reception of the flat barb L^1, as shown in Fig. 5; or the method clearly shown in Fig. 7 may be adopted, if so desired, as it is simple in construction and has proven efficient in use, the two sides of D^1 embracing the flat barbs L L^1 when down, and holding them firmly in place.

All these parts may be easily made of malleable cast-iron or cast-steel, whereby the cost of forging is avoided, and accuracy of fit and interchangeability of parts readily secured.

Having now described the construction of the fork, a few words will explain its operation: Being grasped by the hand in the position shown in Fig. 2, the tines are firmly thrust down into a load of hay or like material. At the same time the thumb presses upon the end of the latch-lever J^5, when the pin J^2 escapes from the catch B^3 and the plunger descends, thrusting out the barbs L L^1 successively, the barb L^1 first projecting and entering the hay. (See Figs. 2 and 4.) By this successive action of the barbs, as well as by the greatly-diminished leverage, the difficulty of locking the plunger against the lift of the barbs—a difficulty commonly met with—is avoided. As soon as the plunger is down, the latch J locks at both top and bottom in the holes B^1 and B^2 by the action of the spring K. The load is now lifted and carried by horse-power into the proper position, when a sharp pull upon the tripping-rope releases the latch, the fork descends upon the plunger, the barbs are at the same time retracted, the load deposited, and the fork locked open in position for use again, as shown in Fig. 2.

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

1. In combination with the external case, B, and plunger D, the latch J, formed in a single piece, pivoted at J^1, and provided with locking-pins J^2 and J^3, arranged to form a double lock upon opposite sides of the center, the whole constructed to operate substantially as described.

2. In combination with the plunger D of a horse hay-fork, the internal latch, J, attached thereto at the pivot J^1, and having an external upright portion, J^4 J^5, and a stud, J^4, so arranged that at each rotation of the load the tripping-rope may cross over the same, substantially as and for the purpose herein set forth.

3. The barb L, pivoted to the plunger D, in combination with the barb L^1, pivoted to the said barb L beyond its center L^3, substantially as and for the purpose described.

4. In combination with the hollow tine B and plunger D, the barbs L and L^1, of unequal length, so that one may be projected in advance of the other, substantially as and for the purpose described.

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