F. E. HINCKLEY.

Mole-Plow.

No. 26,355.

Patented Dec 6, 1859

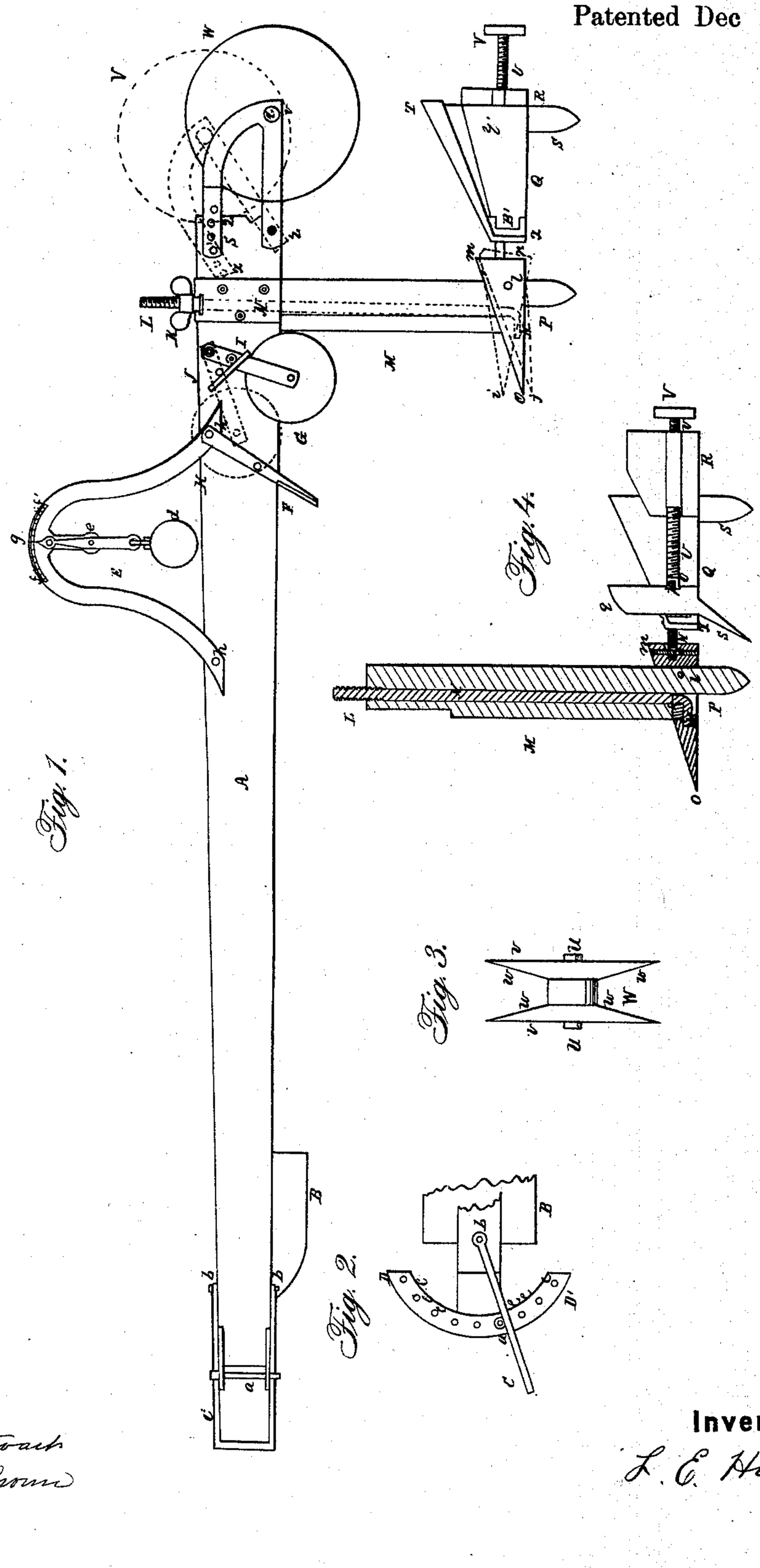

Fig. 1.

Fig. 4.

Fig. 3.

Fig. 2.

Witnesses:

Jno. C. Stewart
Saml. W. Brown

Inventor:

L. E. Hinckley

UNITED STATES PATENT OFFICE.

F. E. HINCKLEY, OF GALESBURG, ILLINOIS.

IMPROVEMENT IN MOLE-PLOWS.

Specification forming part of Letters Patent No. **26,355,** dated December 6, 1859.

To all whom it may concern:

Be it known that I, F. E. HINCKLEY, of Galesburg, in the county of Knox and State of Illinois, have invented a new and useful machine for underground draining, known as a "Mole-Plow;" and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a side view of the whole machine. Fig. 2 is a top view of the front end of the beam, circles, and clevis. Fig. 3 is a rear view, in perspective, of the rear wheel. Fig. 4 is a vertical longitudinal central section of the sword and moles, showing the rod through the sword, also showing the interior of the rear mole with one side swung around at right angles.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

The same letter marks the same part in all the figures.

In constructing my mole-plow I have carefully studied utility and durability of both the machine and the work it is to perform, and my conclusions are the result of experience and careful investigation.

In the drawings, A represents a beam of sufficient size and strength to draw the plow steadily—say of good oak, about eighteen feet long, six inches square at the front end, and six by ten at the rear—the front end being supported upon a sled, B, of any convenient size; or it may be supported upon wheels or trucks; but I prefer the sled for soft ground, the support being placed back about a foot from the end of the beam to give room for the clevis C to swing around, it being fastened to the beam by a pin, *b*, immediately in front of the sled, and being about three and one-half feet long, and an inch and a half thick. Across the front end of the beam, on both upper and under sides, I place a strap of iron, D, about two inches wide and a half-inch thick, curved back nearly to *b* on a circle of which the pin *b* is the center.

The sword M may be made of iron or steel, about four feet long, eight inches wide, and one and a fourth inch thick at the back end, tapered to an edge in front, with a hole or bore through it, or a groove in the outside large enough to admit a rod, N, equal to about one inch square, and any desired shape. The sword may be secured to the beam in any convenient way, either bolted on or fastened by straps at the side. The back half of the sword may extend through the mole about a foot below, in the shape of a knife, P, the object of which is to cut a deep gash in the bottom of the drain, and in case there should be pools or veins in its way to tap them and let the water run into the drain.

Over the upper end of the sword and lapping over the beam is a cap, N′, to assist in the fastening of the sword and to receive the flange on the lower part of the nut K. The rod N passes down through or upon the outside of the sword M until it gets about halfway through the mole O, when it turns and runs into the point of the mole loosely in a hole. The rod N is provided at its upper end with a thread or screw about six inches long, and a nut, K, a part of which is under and a part above the cap N′; or it may be arranged in other ways to accomplish the same thing.

I construct the mole in two parts, and for convenience will call them the "front" and "rear" mole. They may be of cast-iron, about a foot long each. The bottom of each must be straight or plain and on a line with each other. The sides may diverge. The mole O, I construct sharp at its toe and on a circle, its bottom flat, its sides nearly straight, a little diverging back, the top a little rounding, but on a straight line from the point O to the heel *m*.

The mole O is fastened to the sword M by a bolt, *l*, about an inch thick, passing through one side of the mole and through the sword loosely and screwed into the other side of the mole; or it may be put through the mole and riveted at both ends. The rear end of the front mole is hollowed out to admit the tongue *n*, which is fastened by the bolt *m*, and allows the mole O to move free in all directions.

The rear mole, Q, is made in sections, the sides *q q* and the top T are hinged to the head-block X, the sides of the mole Q are made to swing out or in laterally, and the top T to make a corresponding vertical movement. The insides of the sides *q q* of the mole Q are provided with dovetailed grooves, as seen at *p*, Fig. 4. A corresponding tongue on the sides

of the wedge R and the rod U passes through the wedge R and between the sides *q q*, and is firmly fastened to the head-block X. At the point *o* in the rod *u* is a swivel, *o*. The rod U is provided with a thread its whole length. The wedge R acts as a nut. The top T may be made of steel, its upper side rounding or convex and its lower side a corresponding hollow or concavity. The top of the sides *q q*, on which the top T rests, is made slanting or rounding out to correspond to the lower side of the top T, as seen at *q*, Fig. 4.

At the rear end of the mole Q, on both sides, is placed a knife, S S, eight or ten inches long, projecting longitudinally from the lower corner at an angle of about forty-five (45) degrees with the side and bottom of the mole. These knives may be made about an inch thick, but are only to be used in soft ground.

The hole through the sword that the rod N passes through may be larger than the rod, so as to admit the air to pass into the drain, passing down said hole and out at the back end of the mole O and through part of the mole Q, and thus into the drain. The air will also pass down behind the sword and into the drain through the mole Q, there being openings around the head-block X; or there may be a hole made through the head-block.

In front of the sword is placed a revolving colter, G, its upper end pivoted to the beam. Over the shank or arm that supports the colter G is placed a staple, forming sockets at I and J.

In front of the colter G is a clearer or hanging colter, F, bolted to the beam and set slanting back and extending down about six inches below the beam, but can be varied to suit the kind of ground or quantity of rubbish.

The level E is bolted to the beam at *h h*, its top being about four feet from the beam, the top arched or rounding. From the lower center of the arch downward projects a shank about two feet. To this is pivoted an index at the point *e*, and on the lower end of the index is a ball, *d*, weighing about five (5) pounds. On the arched top of the frame E is a graduated scale from *f* to *f'*.

Behind the sword I place a device for closing the gash left by the sword, which may be made solid, as shown at Fig. 3; or it may consist of two separate wheels or revolving colters. In either case the outer edge, which cuts through the sward or turf, should be sharp. It should be about two and a half ($2\frac{1}{2}$) feet in diameter, either of iron or steel, and generally allowed to cut into the ground about a foot.

The outsides *v v* may be plain or hollowed out; but the insides must be convex or conoidal, *w w*, to press the earth into the sword-cut. It revolves upon its axis *u u*, and its bearings are bolted to the beam at Z. The depth at which it is to run may be regulated at Z'.

Operation: The operation of my improved mole-plow is very simple. It may be drawn by steam or animal power. I contemplate running my plow by steam; but the most convenient way is to use a large capstan and a rope about ten rods long, and wind up the rope by oxen, mules, or horses. Two yoke of oxen are sufficient to run a plow in ordinary ground; but if harnessed direct to the machine it will require about fifty (50) horses to draw it. The power being applied to the clevis C, if the machine is to be drawn straight ahead, turn the nut K, and thereby depress the point of the mole O to the point *j*, and the machine will run into the ground up to the beam in going about eight or ten feet. Then turn the nut K back again until the mole O is on a line with the mole Q. The colter F should go into the ground about two inches, and from the position in which it stands it will gather all the grass or other rubbish, which can easily be removed by the operator. The colter G follows close behind the clearer F and cuts the sward and roots about six inches deep, thus clearing everything away from before the sword. If grass or roots are allowed to gather on the sword, they make the plow run very hard, and also tear the ground open unnecessarily, and thereby injure the ditch.

It is very desirable that the bottom of the ditch should be even, if the ground over which the beam passes should have depressions or elevations in its surface. As the front end of the beam raises or falls the point of the mole will do the same thing if it is firmly fastened to the sword, as in the ordinary way. To obviate this difficulty I have constructed my mole on a hinge near its heel, so that by turning the nut K, I can elevate or depress the point of my mole at pleasure. The inclination of the beam is noted by the index E, and as the front end of my beam goes up or down I have only to turn the nut K to correspond. The point O can move from *j* to *i*, swinging upon the bolt *l* as a hinge. If I wish to take the machine out of the ground, turn the nut K until the point of the mole is at *i*, and the machine will run out of the ground in about ten (10) feet. One advantage this mode of raising and lowering the point of the mole has over all others is its being so handy. There are no wheels or long stakes or large levers in the way of loading on a wagon, and being much easier and cheaper constructed than the other methods.

In very wet ground it is desirable to have a larger ditch than in drier ground. All the machines now in use have the mole fastened to the sword firmly, and but few, if any, attempt to make a larger ditch in very wet ground than in comparatively dry ground, as a machine will run easier in very wet than in partly dry ground. I have constructed my mole so I can expand it or contract it at pleasure to accommodate it to the condition of the ground. To this method there can be no disadvantage, while the advantages are very great to the utility and permanency of the drain.

The mole is contracted or expanded by turning the thumb-screw V and forcing the wedge R in between the sides of the mole, and as the

sides move out the top will move up to correspond, preserving the shape of the ditch. Reverse the wedge and the same will hold true.

The knives S S are for two purposes: first, to cut a deep gash in the lower corner of the drain, and thereby tap any veins or pools of water which may be in their course and allow the water to pass up into the ditch; and I claim that these knives are of as much or more service than if the mole extended solid to their extremities; and the other purpose of these knives is to support the rear end of the mole Q. The mole being fastened in front at only one point, the back would have a tendency downward, which is supported by these knives or hind legs.

The pressure upon the top and sides of the drain is so great as to almost entirely prevent the atmosphere having any influence in the ditch, and if one point in the ditch should be lower than the points to be passed over afterward when the plow passes such a point the drain will immediately fill with water, and as the plow passes there will necessarily be a suction to the plow. To prevent this I have provided my drain with a vent through the sword and moles of the plow. This helps to start the water in the drain and eases the draft of the machine.

If it is desirable to run out of a direct line from the plow to the capstan or power, the clevis may be turned around on the opposite from the one it is desired to turn the plow, and when so turned it can be fastened at any desired point by the pin *a* passing through the holes *c c c c* in the semicircles D and D′. Thus it will be seen by simply turning the clevis to the side of the beam lateral curves may be made or prevented without moving a heavy capstan or power. This is very essential in ditching sloughs, to make or prevent small curves in order to keep in the bed of the stream. This saves frequent loading and moving a heavy capstan, which is hard on man and beast, and consumes much time in the operation. Besides, with the clevis I can make the curve gradual and just where it ought to be, and thus make a better drain.

The wheel W being attached to the beam, so that its center is directly behind the center of the sword, it will cut two gashes in the ground about a foot in depth, and presses the soil laterally into the sword-cut and packs it tight, so that it effectually closes the sword-cut. It is impossible to do this by a simple wheel, or a grooved wheel, or a pulley, as usually constructed. The ground, being very wet before the ditch is made, will dry very rapidly after it is ditched, and if the sword-cut is not firmly closed the ground will crack on the line of the sword-cut and allow the top dirt to sift down into the drain. I have examined drains made by a machine having a wheel to follow its sword, and found the sword-cut open three or four inches wide at the top of the ground, and so large that I could easily see two feet down, and have dug down and found the crack to extend into the ditch. It is obvious that a ditch made in this manner will be of but little practical utility.

When we wish to turn the machine to make a curve the colter G and the wheel W are raised out of the ground to prevent their being bent or injured, the colter G swung up to H, its point of rest, and the wheel W, elevated to the point Y, remains at rest until the curve is made, when they are let down again.

I am aware that attempts have been made to construct mole-plows to overcome the difficulties in the way of making a drain of service and that will be permanent; but all that have been constructed prior to my invention have been so complicated in their construction, or illy adapted to the purpose for which they were designed, that but few of the parts now patented are of any practical utility. I not only effectually accomplish in the most simple manner all that has been before attempted, but I also construct my mole in such a manner that I can readily set it to accommodate its size to the kind of soil to be drained; and I also let the air into the drain to ease the draft of the machine and act as a vent to the drain to assist the water to run.

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

1. The combination of the clearer or hanging colter F and the rotating colter G, constructed and arranged, as described, for conjoint operation.

2. Constructing the sword M of a mole-plow with a hole or bore, N, through it of sufficient size and suitable shape to admit at the same time a rod of metal large enough to raise and lower the point of the mole, and also to admit the air to pass free into the drain through the sword and mole, as described.

3. Expanding and contracting the mole of a mole-plow substantially as and for the purpose described, or by any other mechanical means.

4. Constructing the mole of a mole-plow in sections consisting of two sides and a top hinged to a head-block and operated by a wedge, as described.

5. I am aware that packing-wheels have been used to press the earth vertically, and also that they have been made concave for the purpose of closing the sword-cut. I do not claim this construction; but I do claim two revolving cutters with plain outsides and conoidal insides, which may be placed upon a common axle and adjusted to the beam in such a manner as to be forced to cut into the ground and press the earth laterally into the sword-cut and firmly close it up, substantially as described.

F. E. HINCKLEY.

Attest:
AUGUSTUS WATSON,
CHAS. F. STANSBURY.