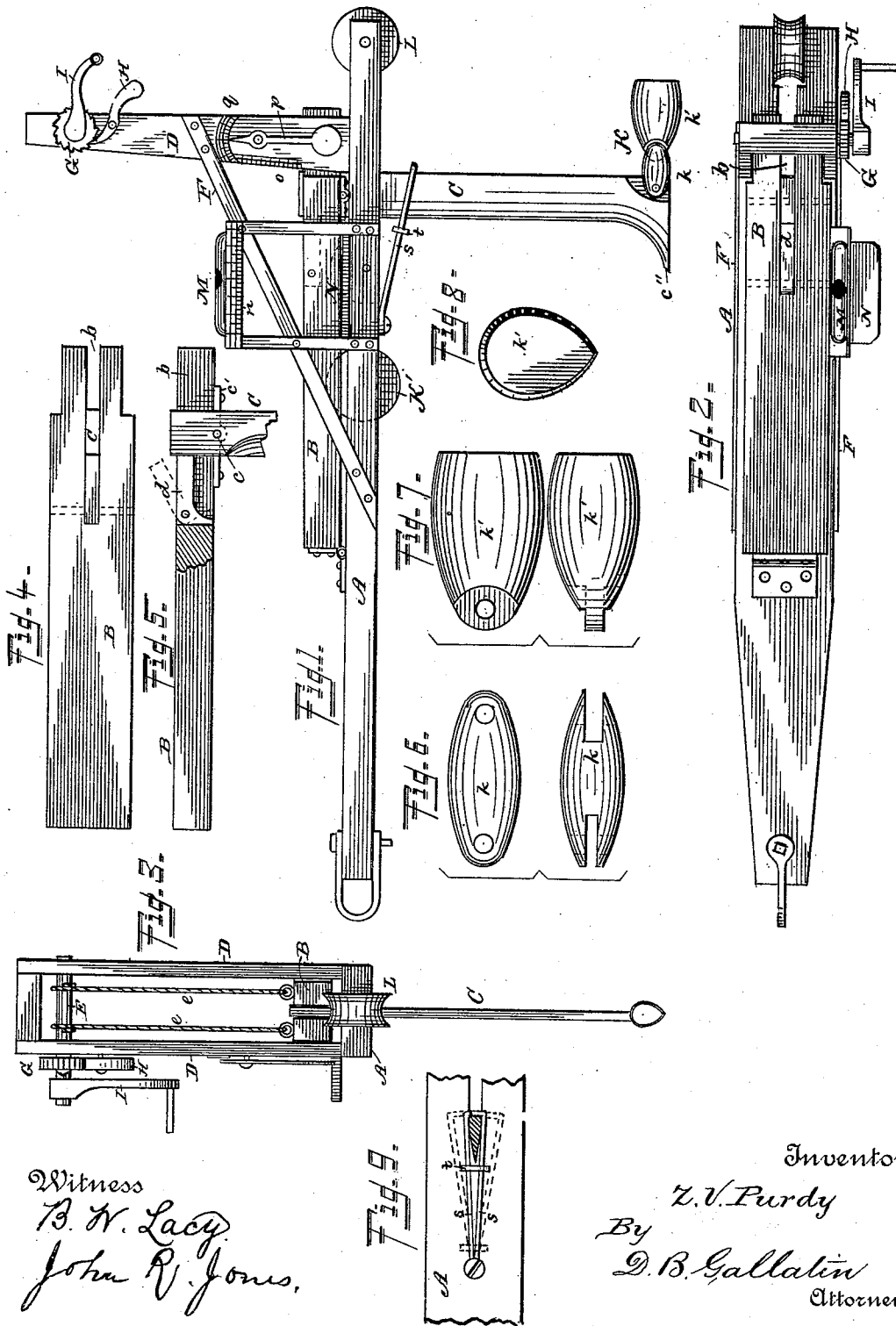


(No Model.)

Z. V. PURDY.
MOLE DITCHER.

No. 465,416.

Patented Dec. 15, 1891.



Witness

B. W. Lacy
John R. Jones.

Inventor

Z. V. Purdy

By

D. B. Gallatin

Attorney

UNITED STATES PATENT OFFICE.

ZACHARIAH V. PURDY, OF VIENNA, ASSIGNOR TO WILLIAM B. DODGE, OF FAIRFAX COUNTY, VIRGINIA.

MOLE-DITCHER.

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To all whom it may concern:

Be it known that I, ZACHARIAH V. PURDY, a citizen of the United States, residing at Vienna, in the county of Fairfax and State of Virginia, have invented certain new and useful Improvements in Mole-Ditchers; and I do 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, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to that class of ditchers commonly known as "mole-ditchers," which form an underground conduit in contradistinction to those which form an open ditch by excavating or turning out the earth.

It consists in the construction of the mole; in the means for raising and lowering the mole relatively to the main beam; in the combination, with the machine, of an indicator for determining the amount of elevation or depression in uneven ground, and in certain details of construction and combinations of parts, as hereinafter fully described, and pointed out in the claims.

In the accompanying drawings, which illustrate my invention and forms a part of this specification, Figure 1 is a side elevation of an apparatus constructed according to my invention. Fig. 2 is a plan view, and Fig. 3 a rear elevation. Figs. 4 and 5 are respectively plan and side views of the hinged adjustable beam which carries the sword, Fig. 5 being shown partly in section. Fig. 6 represents in side and plan view the front section of the mole. Fig. 7 represents similar views of the rear section. Fig. 8 is a rear end view of the rear section of the mole; and Fig. 9 is a bottom plan view of a section of the main beam, showing the means for staying and holding the sword.

A designates the main beam to which the draft is applied through a clevis *a* at its front end, and B is the auxiliary beam which carries the sword C. The front end of the beam B is hinged upon the beam A somewhat forward of the middle of the latter, so that its

rear end is capable of being raised and lowered.

Near the rear end of the beam A are two vertical standards D D, arranged side by side, the upper ends of which support a transverse revoluble shaft E, which constitutes a windlass for raising and lowering the beam B through intermediate cords or chains *ee*. The rear end of the beam B works between the standards D D, and is guided thereby and held against lateral movement.

F F are braces between the beam A and standards D D for strengthening and holding the latter.

On the shaft E is a ratchet-wheel G, which is engaged by a pawl H, pivoted on one of the standards to hold the shaft against backward rotation and the beam B in elevated position.

I is a crank for turning the shaft E.

The beam B is slotted from its rear end, as shown best at *b* in Figs. 2, 4, and 5, and in this slot is pivoted the upper end of the sword C, the pivot-pin *c* being supported by bearing-plates *c'*, bolted against the under side of the beam. The slot *c* extends forward of the sword, and in its front end is pivoted a dog *d*, which in its normal position bears against the upper end of the sword C above its pivot and forms a brace to hold the sword in vertical and operative position. When turned up, as indicated in broken lines in Fig. 5, the sword is released and is free to swing backward on its pivot. The beam A is also slotted at its rear end for the passage of the sword and to allow the latter to turn back, as when it is desired to take it out of the ground.

The sword C comprises a flat bar of steel, having its front edge sharpened to form a cutter, so as to enable it to cut its way through the ground and having at its lower end a point *c''* similar to the point of a plowshare.

K designates the mole, which is made in two parts *k k'*, pivoted together, and the front part *k* pivoted to the rear edge of the sword at its lower end, so as to be capable of swinging in a vertical plane. The rear part *k'* is larger than the front part *k*, and both are ellipsoidal in shape, with the vertical diameter somewhat greater than the transverse diameter. This shape is preferred for the rear

son that it forms a conduit whose walls will brace each other and so lessen the liability to cave and crumble. I have also found by actual experiment that by making the mole in two or more parts, tapered toward the ends, as shown, the front ends of the succeeding parts being smaller than the larger diameter of the next preceding and gradually increasing beyond that diameter, so that there will be an interval of time between the action of the succeeding parts in opening and enlarging the conduit at a given point, the walls will be more solidly compressed and thereby made stronger than if opened by gradual and continuous pressure until the full size is attained. In constructing the machines for actual use I shall probably elongate the sections of the mole, so as to bring their largest parts farther apart than represented in the drawings in order to obtain more fully the advantages referred to.

K' designates a rotary cutter journaled in the beam A in front of the sword C. This is for the purpose of cutting the sod, roots, &c., in order to relieve the sword as much as possible from the strain incident to cutting its own way.

L is a roller journaled in the slot in the rear end of the beam A back of the sword C. This roller is for the purpose of pressing down the earth and closing the top of the cut made by the sword, and in order to accomplish this more effectually I hollow out or concave the surface of the roller, as clearly shown in Figs. 2 and 3.

When operating on undulating ground, the sword C requires to be raised and lowered, according to the height or depth of the undulations, in order to run the conduit on a level or at any desired pitch, for it is evident that otherwise the conduit will rise and fall with the undulations of the surface, making some parts higher than others, so that the water would stand in the lower parts. The raising and lowering of the sword relatively to the beam A are effected by the windlass E, whereby the auxiliary beam B, to which the sword is pivoted, is raised and lowered, as above explained.

M is a spirit-level mounted in a suitable frame supported by standards *m m* rising from the beam A. At the side of the frame in which the spirit-level is mounted is a graduated scale *n*, which serves as an indicator to show the inclination of the surface over which the plow is passing and the adjustment necessary to meet such inclination, the adjustment of the beam B being measured by a scale *o* on one of the standards D, it being of course understood that the two scales *n o* correspond with each other.

Instead of the indicator M *n*, I may use the

pendulum indicator *p* in connection with a segmental scale *q* on one of the standards D. The pendulum *p*, being loosely pivoted at the side of the standard and its lower end weighted, will always hang vertical and will indicate on the scale the inclination of the beam A, or rather the degree of elevation or depression of the front end.

While I have stated that I may use the indicator *p q* instead of that shown at M *n*, it will of course be understood that both may be used, if so desired.

N is a platform arranged at the side of the beam A at a suitable point for the operator to stand upon and manipulate the windlass to adjust the machine. As a further support for the sword, I attach to the under side of the beam A two hooked spring-arms *s s*, the hooked or bent ends of which in their operative position stand behind the sword to hold and support it. The arms *s s* are held together by a ring or loop *t*, which is capable of sliding back and forward thereon. When moved forward, the arms spring apart, as indicated in broken lines in Fig. 9, and release the sword, which may then turn back, the dog *d* being also thrown out of engagement, as indicated in broken lines in Fig. 5.

Having now described my invention, I claim—

1. The combination, with the main beam A, of the auxiliary beam B, hinged at its front end to said main beam, the sword C, pivotally connected with the auxiliary beam and capable of swinging back and forth, and the windlass, ratchet, and pawl for holding the auxiliary beam and sword in adjusted position, substantially as shown and described.

2. The combination, with the main beam A, of the auxiliary beam B, hinged at its front end to said main beam, the sword C, pivotally connected with the auxiliary beam and capable of swinging back and forth, and the pivoted dog *d* and spring-hooks *s s* for holding the sword in rigid operative position, substantially as shown and described.

3. In a ditching apparatus of the character described, the combination of the main beam A, the auxiliary beam B, hinged thereto at its front end and capable of adjustment vertically, the sword C and mole K, pivotally connected with said auxiliary beam, and an indicator to show the adjustment required in uneven ground, substantially as shown and described.

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

ZACHARIAH V. PURDY.

Witnesses:

GEORGIA V. HOWELLS,
WM. B. DODGE.