No. 694,823. Patented Mar. 4, 1902.

R. BINNIE.

DRILL.

(Application filed Sept. 5, 1900.)

(No Model.) 2 Sheets—Sheet 1.

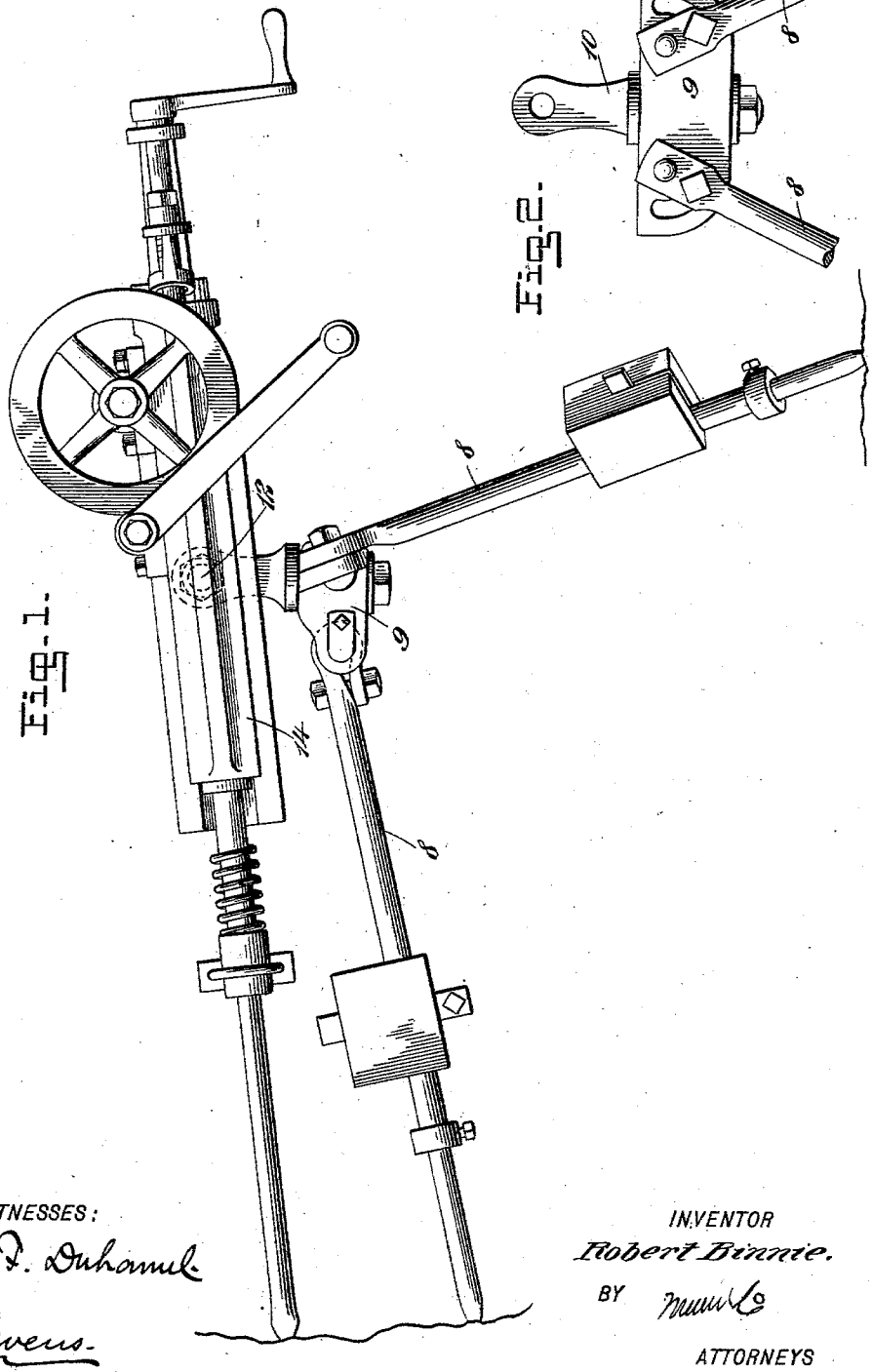


Fig. 1.

Fig. 2.

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Fig. 4.

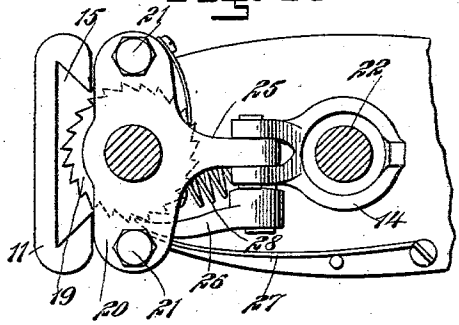


Fig. 3.

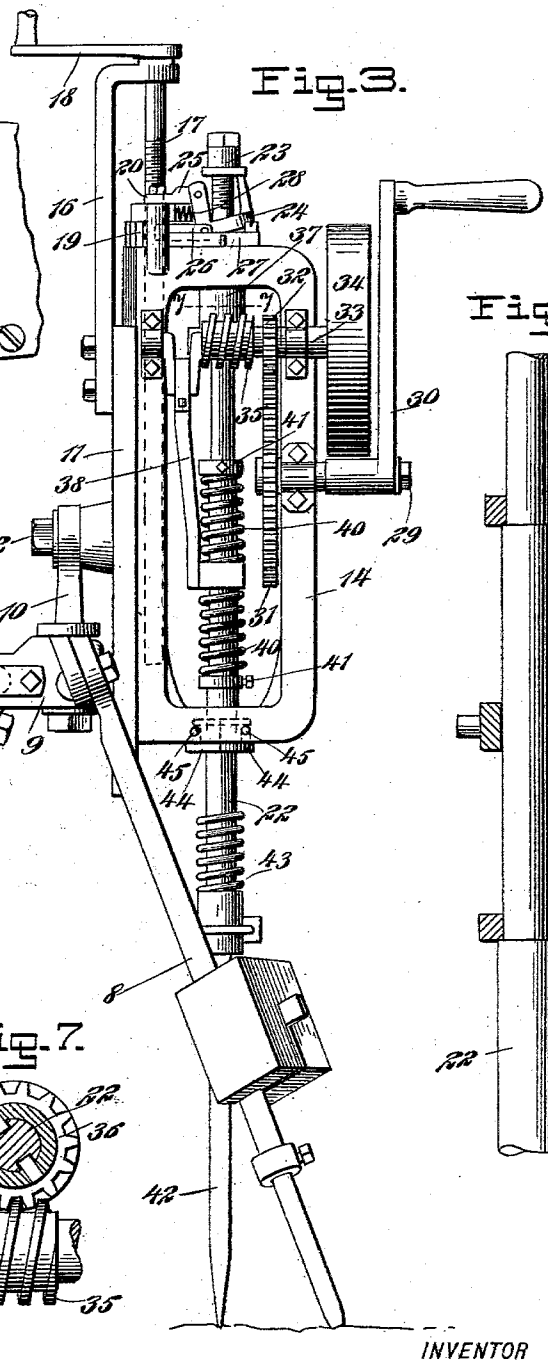


Fig. 6.

Fig. 5

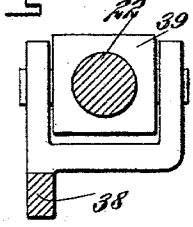


Fig. 8.

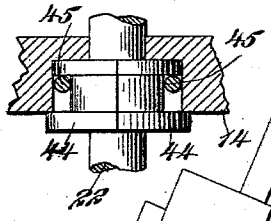


Fig. 7.

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UNITED STATES PATENT OFFICE.

ROBERT BINNIE, OF BOLIVAR, PENNSYLVANIA.

DRILL.

SPECIFICATION forming part of Letters Patent No. 694,823, dated March 4, 1902.

Application filed September 5, 1900. Serial No. 29,056. (No model.)

To all whom it may concern:

Be it known that I, ROBERT BINNIE, a citizen of the United States, and a resident of Bolivar, in the county of Westmoreland and State of Pennsylvania, have invented a new and Improved Drill, of which the following is a full, clear, and exact description.

This invention relates to an improved hand-drill for drilling coal, clay, and other relatively soft substances.

This specification is the disclosure of one form of the invention, while the claims define the actual scope thereof.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation of the drill at work. Fig. 2 is a detail view of the tripod-head. Fig. 3 is a front elevation of the drill at work in a position different from that shown in Fig. 1. Fig. 4 is a plan view, with parts in section, showing the feed mechanism. Fig. 5 is a detail section showing the means for attaching the connecting-rod to the drill-rod. Fig. 6 is a detail view of the drill-rod, and Fig. 7 is a detail section on the line 7 7 of Fig. 3.

The drill is mounted on a tripod, the legs 8 of which are weighted in the usual manner and connected with a head 9, so that the legs may be adjusted in any direction desired, thus placing the drill in various positions adapting it to the nature of the work to be performed. The head 9 of the tripod has a standard 10 thereon, which is attached to a guide-bar 11 in such manner as to permit the adjustment of the guide-bar around the axis of the bolt 12, through the medium of which such adjustment is effected. Mounted to slide on the guide-bar 11 is a frame 14, which is formed with a dovetail feather 15 sliding in the guide-bar. Attached to the guide-bar 11 is an extension 16, in which is fitted to turn a feed-screw 17, provided at its upper end with a hand-crank 18, permitting the revolution of the feed-screw. Working on the feed-screw is a nut 19, which has a circular ratcheted outer surface. This nut 19 is held on the frame 14 by means of a yoke 20, fastened down on the frame by bolts 21. By the revolution of this nut 19 the frame 14 may be moved longitudinally on the guide-bar 11, thus feeding the drill, as will be fully described hereinafter, and by turning the feed-screw 17 manually the frame 14 may be moved back and forth, as desired, to adjust it to the work or to recover the position of the drill-rod when a drilling has been effected.

The drill-rod 22 is mounted in the frame 14 to slide and to turn and is provided at its upper end with a cap 23, which is screwed thereon. This cap is arranged to strike as it moves downward on the free end of a bent lever 24, the other end of which is fulcrumed to an extension 25 of the yoke 20. The middle portion of the lever 24 is in the form of a ring embracing the drill-rod 22, and pivoted to the bent lever 23, just below its fulcrum, is a pawl 26, which is arranged to work with the ratchet-tooth on the nut 19 and which is pressed into engagement therewith by a spring 27, as best shown in Fig. 4. An expansive spring 28 serves to push the lever 24 and pawl 26 backward to the position shown in Fig. 3, and as the cap 23 comes down on the lever 24 it throws the pawl 26 to the right (see Figs 3 and 4) and imparts a slight movement to the nut 19, and this nut being incapable of axial movement is forced downward and carries with it the frame 14 and its attached parts.

A drive-shaft 29 is pivoted to a suitable crank 30 and is mounted to turn in the frame 14. This shaft carries a spur-gear 31, which meshes with a pinion 32 on a crank-shaft 33, mounted in the frame 14 and provided with a balance-wheel 34. The shaft 33 carries a worm 35, which is in mesh with a worm-wheel 36, carried fast on a sleeve 37. This sleeve is splined on the drill-rod 22. The worm 35 imparts a rotary movement to the worm-wheel 36 and sleeve 37, and this rotates the drill-rod, permitting the drill-rod to slide through the sleeve without interference therewith. The sleeve 37 is held to turn in the frame 14 in any suitable manner; but it cannot move longitudinally independently of the frame.

The crank of the shaft 33 is joined to a connecting-rod 38, the lower end of which is forked and connected with a block 39, which

slides on the drill-rod 22. Expansive spiral springs 40 are mounted on the drill-rod, respectively at the sides of the block 39, and are confined by collars 41, attached to the drill-rod. The rotation of the shaft 33 drives the block 39, and through the medium of the springs 40 a reciprocal movement is imparted to the drill-rod. This movement is cushioned by the springs 40. The drill-rod 22 carries a bit 42, which may be of any suitable form and which is designed to be disconnected therefrom, so that it may be replaced by any other form of bit, if desired. A spring 43 is mounted on the drill-rod below the frame 14 to limit the upward movement of the drill-rod. The drill-rod slides through the frame 14 and is mounted at the lower portion of the frame in a sectional bushing 44, fitted in the frame and secured by pins 45, engaging, respectively, the sections of the bushing.

As shown in Fig. 6, the drill-rod 22 is formed with several different diameters, such diameters gradually increasing toward the upper end of the drill-rod. Therefore by disconnecting the parts 41, 39, and 23 from the drill-rod it may be drawn out of the frame 14 for the purpose of repair or other purposes whenever desired.

From the foregoing description it will be apparent that by means of the mechanism which I have devised the drill-rod is given a rotating movement around its axis and a short reciprocating movement. It is further given a gradual forward feed. I therefore provide for three distinct movements, which enable the bit to operate with a high degree of effectiveness and which enable me to use a bit of any sort in the drill. By means of the tripod and the manner in which the drill is mounted thereon it may be adjusted to work against a bank of any possible disposition.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a drill, the combination of a sliding frame, a feed-screw supported independently thereof, a yoke attached to the frame and through which yoke the feed-screw passes, a nut held between the yoke and the frame and carried on the feed-screw, a bent lever one arm of which is fulcrumed to the yoke and the other arm of which is in the form of a ring, a reciprocally-driven drill-rod passing through the said ring of the bent lever and striking the lever to swing the same, and means actuated by the lever for driving the feed-nut.

2. A drilling-machine having a drill-rod, means for mounting the same, such means comprising collars engaged with the drill-rod and the drill-rod having varying diameters forming shoulders on the drill-rod which are engaged by said collars, for the purpose specified, a drive-shaft, and connections between the drive-shaft and drill-rod, to operate the latter.

3. In a drill, the combination of a slidably-mounted frame, a feed-screw supported independently thereon, a nut held to turn on the frame and working with the feed-screw, a bent lever the fulcrum of which is supported on the frame and one arm of the lever being in the form of a ring, a reciprocally-driven drill-rod passing through the said ring on the lever and striking the lever to swing the same, and means actuated by the lever for driving the feed-nut therefrom.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ROBERT BINNIE.

Witnesses:
D. B. GARLAND,
W. M. MCDERMOTT.