N. D. LEVIN.

DRILLING MACHINE.

APPLICATION FILED APR. 7, 1917.

1,374,590.

Patented Apr. 12, 1921

2 SHEETS—SHEET 1.

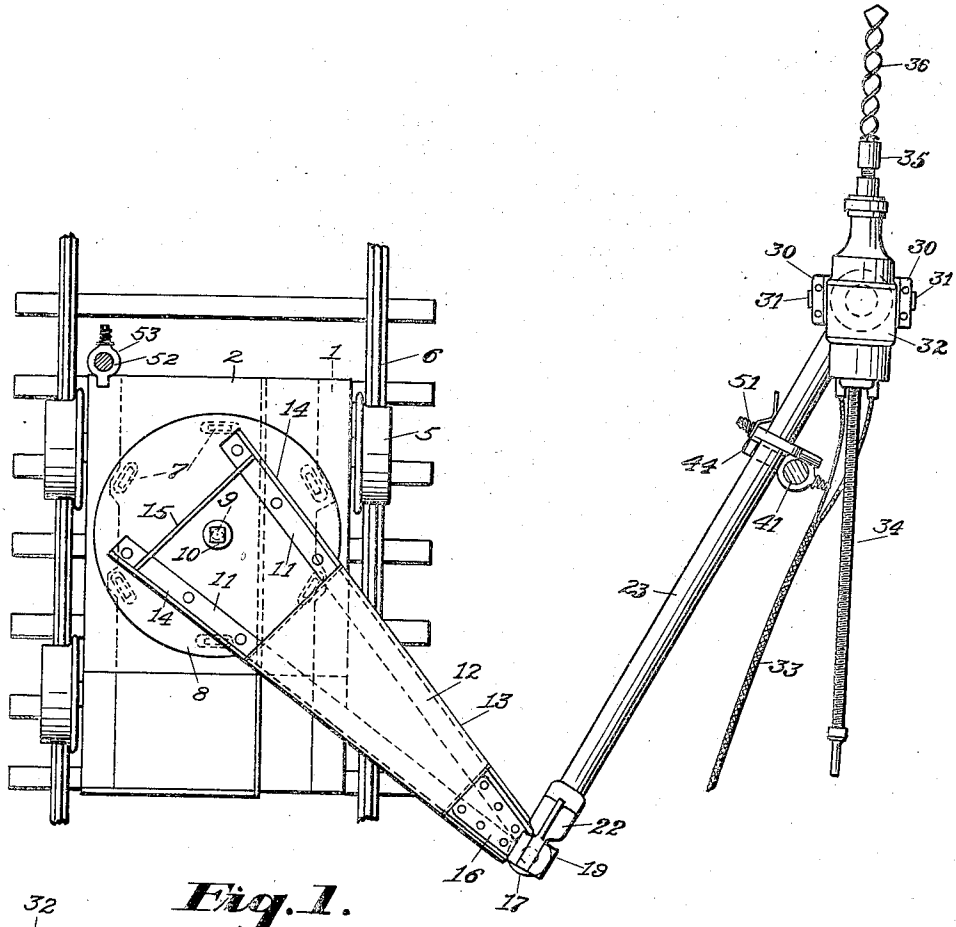

Fig. 1.

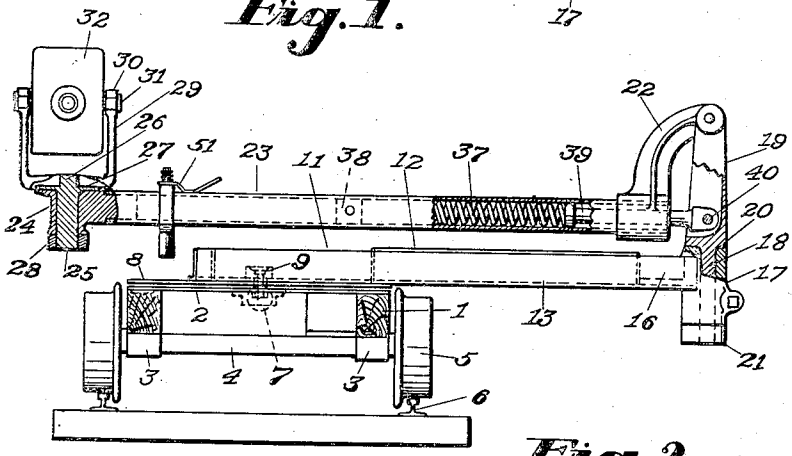

Fig. 2.

WITNESSES:

Harry C. Dean.

Dudley T. Fisher

INVENTOR.

BY Nils D. Levin

H. T. Bliss

ATTORNEY.

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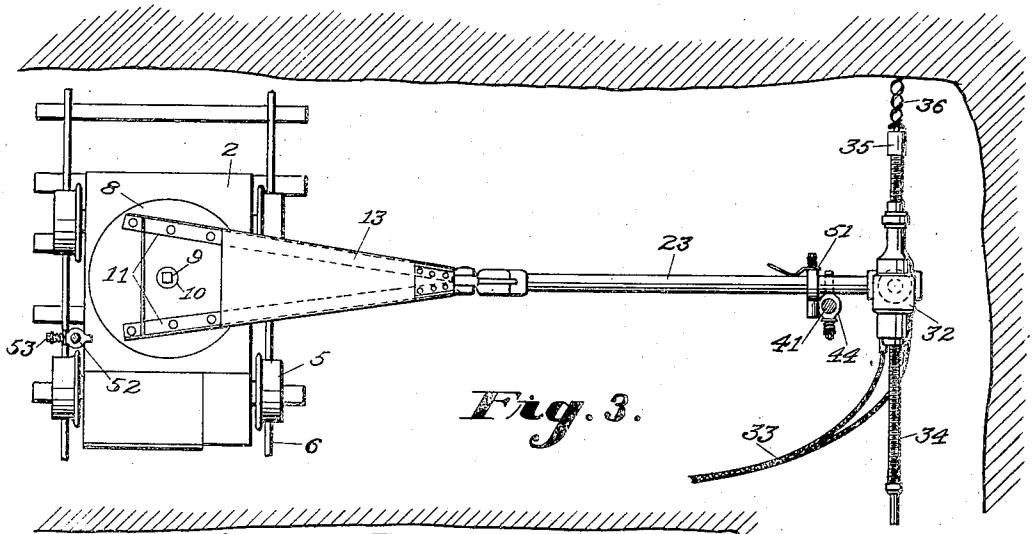

Fig. 3.

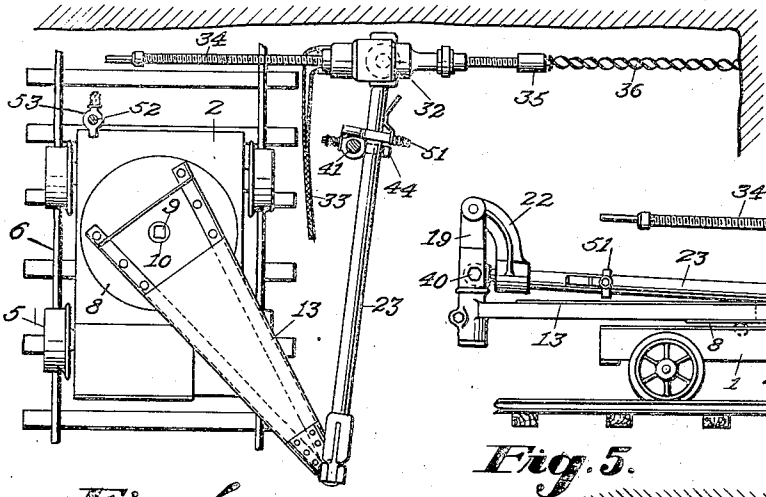

Fig. 4.

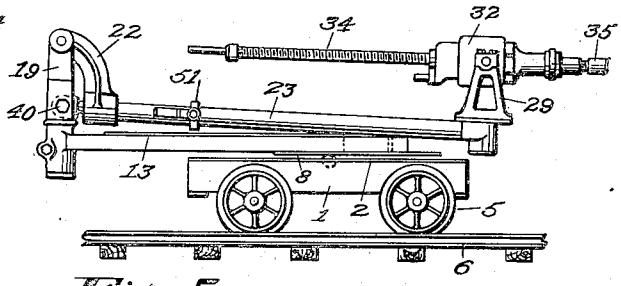

Fig. 5.

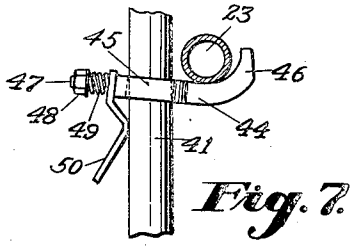

Fig. 7.

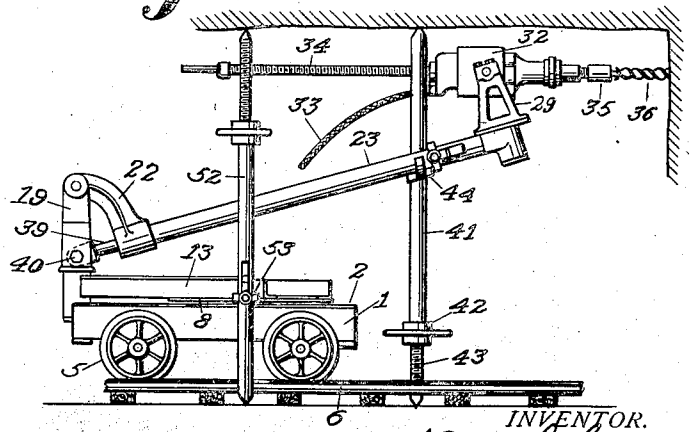

Fig. 6.

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Harry C. Dean.

Dudley T. Fisher.

INVENTOR.

BY Nils D. Levin

H. T. Bliss

ATTORNEY.

UNITED STATES PATENT OFFICE.

NILS D. LEVIN, OF COLUMBUS, OHIO, ASSIGNOR TO JEFFREY MANUFACTURING COMPANY, OF COLUMBUS, OHIO, A CORPORATION OF OHIO.

DRILLING-MACHINE.

1,374,590. Specification of Letters Patent. Patented Apr. 12, 1921.

Application filed April 7, 1917. Serial No. 160,517.

To all whom it may concern:

Be it known that I, NILS D. LEVIN, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Drilling-Machines, of which the following is a specification, reference being had therein to the accompanying drawing.

The present invention relates to certain new and useful improvements in drilling machines adapted to the production of blast holes in coal and other mines.

The especial object of the invention is to provide a drilling machine, such as is commonly used in coal and other mines, supplied with supporting devices associated with a transporting truck whereby the drill may be conveniently transported from one working place to another and may be quickly and conveniently positioned for operation in any desired relation to the material to be drilled with a minimum expenditure of effort.

The devices by which I attain this object are fully set forth in the following specification, and illustrated in the accompanying drawings of which—

Figure 1 is a general plan view of the preferred embodiment of my invention.

Fig. 2 is an elevational view of the devices illustrated in Fig. 1.

Fig. 3 is a plan view of the machine illustrated in Figs. 1 and 2 in position to operate upon the extreme right hand side of the mine face.

Fig. 4 is a plan view showing the machine in position for operating upon the mine rib adjacent the mine face.

Fig. 5 is a side elevation of the machine arranged for transportation.

Fig. 6 is an elevational view of the machine adjusted to operate upon the mine face near the roof.

Fig. 7 is a detail of the supporting jack.

Like numerals refer to similar parts in the several figures.

My improved drilling machine, as illustrated in the drawings, consists essentially of a wheel supported truck adapted to travel along the mine tracks and having a laterally projecting pivotally supported and jointed supporting arm to which is attached a drilling mechanism adapted to form blast holes in the mine wall.

The truck comprises a frame 1 to which is secured a steel floor plate 2. Attached to the underside of the frame 1 are journal boxes 3 in which are mounted the axles 4. Attached to the axles 4 are track wheels 5 adapted to support the truck upon the rails 6 of the mine track. Mounted upon the floor plate 2 are a plurality of antifriction rollers 7 and upon these bears a circular turn table plate 8 adapted to rotate about a center bolt 9. The center bolt 9 is provided with a broad head 10 which engages the upper surface of the turn table plate 8, and extends through the floor plate 2 and is provided with a suitable nut to prevent the accidental displacement of the turn table. Riveted to the turn table plate 8 are two laterally extending converging angle bars 11, braced together by a steel plate 12 to form the arm 13. The steel plate 12 may be attached to the angle bars 11 in any preferred manner as by electrically welding its lateral edges to the upturned flanges of the angle bars. The flanges 14 of the angle bars are further stiffened by a cross bar 15 electrically welded in place. The turn table 8 is of large diameter, with its vertical axis situated within the wheel base of the truck, and being rigidly connected to the arm 13 provides a widely extended swiveling or pivoted base or support for it. At the outer end of the arm 13 is secured a bracket 16 having a vertically extending journal bearing 17 in which is journaled the stem 18 of the pivot post 19. On the pivot post 19 is formed a shoulder 20 which bears upon the upper end of the journal bearing 17 and to the lower end of the stem 18 is fixed a set collar 21 to secure the parts in operative relation. Pivotally connected to the upper end of the pivot post 19 and adapted for oscillation in a vertical plane, is a goose neck bracket 22 to which is attached a steel tube 23 which forms the second supporting arm. To the outer end of the tube 23 is fixed a vertically perforated socket bearing 24 in which is journaled the downwardly extending stem 25 of the yoke casting 26. The yoke casting 26 is formed with the shoulder 27 which bears upon the upper end of the bearing 24, and is held in place by a set collar 28 pinned to the lower end of the stem 25. On the yoke casting 26 are formed two upstanding arms 29 at the upper ends of which are journal bearings 30. In these journal bearings are

supported the trunnions 31 formed on the sides of the main frame 32 of the drill about which the drill may be rotated in a vertical plane. The drill may be of any preferred construction, and actuated from any convenient source of power. For purposes of illustration I have shown an electrically actuate drill of well known construction adapted to use in coal mines for the formation of blast holes, and arranged to be connected with the power circuits of the mine through a suitable conductor cable 33. The drill as here illustrated, is provided with a threaded feed bar 34 extending longitudinally through the drill frame 32 and provided with a socket 35 to receive the drill tool 36. The feed bar 34 is connected with the mechanism contained within the drill frame 32 to rotate and advance the drill 36 to its work. As the construction of the drill forms no part of the present invention further description at this time is not thought to be required.

Within the tube 23 is a compression spring 37 one end of which engages an abutment 38 fixed within the tube, and the other engages a plunger 39 adapted to movement longitudinally of the tube and abutting against the pivot post 19 to which it is pivotally attached by a bolt 40. By the counterbalancing action of the spring 37 the drill may be placed in any position of its vertical adjustment with very small effort, and by the freedom of motion upon the turn table plate 8 and about the pivots 18, 25 and 31, it may be swung into any preferred place and turned to any desired angle relative to the coal face without removing the drill from the supporting yoke 26 or the truck wheels 5 from the track rails 6.

To resist the outward thrust of the drill I have provided a jack post 41 adapted to contact with the outer side of the supporting arm 23 adjacent the drill. The jack post 41 is formed of a steel tube one end of which is adapted to contact with the wall of the mine and the other end to contact with a hand wheel nut 42 in which is screw threaded an adjustable section 43 the outer end of which is adapted to contact with the wall of the mine. When the jack post 41 is set in position with one end resting upon the floor of the mine the hand wheel 42 is rotated to force the other end into contact with the roof to hold the jack securely in place. Upon the jack post 41 is mounted a grip clutch 44 adapted to engage the arm 23 to prevent its movement longitudinally of the jack. As illustrated in Fig. 7 of the drawings, this clutch consists of a ring portion 45 loosely encircling the tube 41, from the opposite sides of which extend radially the stems 46 and 47. To the stem 47 is screw threaded a nut 48 against which abuts the compression spring 49. Pivotally mounted upon the stem 47 beneath the compression spring 48 is a presser foot 50 adapted to be placed in engagement with the tube 41 to hold the opposite side of the ring 45 in contact with the tube 41. When pressure is applied to the stem 46 longitudinally of the tube 41 in the direction toward which the pressure foot extends, the ring 45 will be cramped upon the tube 41 gripping it to prevent movement of the clutch along the tube. By the rotation of the presser foot 50 out of contact with the tube 41 the ring 45 loosens its grip upon the tube and the clutch may be freely moved to any desired position. A similar clutch attachment 51 is mounted upon the supporting arm 23 and adapted to engage the jack post to prevent movement of the supporting arm transversely of the jack post. I have provided a second jack post 52 to be placed adjacent the truck and having a grip clutch 53 adapted to engage the frame of the truck to prevent its movement along the rails of the track and to prevent the lifting of the wheels from the rails during the operation of the drill.

When the drill is to be transported from one working place to another the feed bar 34 and the arms 23 and 13 are placed in the central vertical plane of the truck and the accessory parts, such as the jacks, conductor cable and drill bits loaded upon the truck. Upon arrival at the working place it is only necessary to swing the arms 13 and 23 upon their respective pivots and to turn the drill upon the yoke pivot 25 and trunnions 31 to place the drill in position for drilling the blast holes at any desired part of the coal face, at any desired elevation, and at any desired angle relative to the face. After the drill is so positioned the jack post 41 is set adjacent the outer side of the arm 23 and securely clamped between the floor and the roof. The grip clutch 44 is then adjusted to resist movement of the parts longitudinally of the jack post and the grip clutch 51 is adjusted to resist movement transversely thereof. The jack post 52 is placed adjacent the truck securely clamped between the floor and the roof, and the grip clutch 53 adjusted in contact with the floor plate 2 to securely hold the truck in place. As soon as the conductor cable 33 is connected between the drill and the source of electric supply the apparatus is ready for use. After the completion of one blast hole it is only necessary to loosen the jack post 41 swing the drill into position for the next hole and readjust the jack 41 and grip clutches 44 and 51.

It will be seen that I provide a mechanism having but few parts, by which a practically universal adjustment of the drill and of its supporting devices can be attained. The support interposed between the truck and

the drill is so constructed that it can be rotated in relation to the truck entirely around a vertical axis. And the parts of the support are so related that not only can it be directed either toward the front or toward the rear of the truck or toward the right or toward the left, but the drill, proper, can be elevated and held to operate in any of numerous horizontal planes. The drill itself, and its carrier 25, 26, 27, 29 are related in such way that the drill can be universally adjusted, being adapted to swivel horizontally in the bearing 24 and to swing vertically in the bearing 30; and similarly the base arm 13 and the second arm 23 are joined by a universal connection having a vertical pivot and a horizontal pivot.

The mechanism having the parts described can be quickly placed to operate at a point either directly in front of the truck or in the rear of it, or at a point in a vertical plane at any of numerous inclinations to the vertical planes of the truck.

What I claim is—

1. The combination of a truck, an arm mounted upon said truck rigid against vertical movement relative thereto and adapted to pivotal movement about a vertical axis thereon, an extension arm universally pivotally mounted at the free end of said horizontal arm, and a drill universally pivotally mounted at the free end of said extension arm.

2. The combination of a truck, an arm mounted upon said truck rigid against vertical movement relative thereto and adapted to pivotal movement about a vertical axis thereon, an extension arm universally pivotally mounted at the free end of said horizontal arm, a drill universally pivotally mounted at the free end of said extension arm, and means associated with said extension arms to counterbalance said drill.

3. The combination of a truck, an arm mounted upon said truck rigid against vertical movement relative thereto and adapted to pivotal movement about a vertical axis thereon, an extension arm universally pivotally mounted at the free end of said horizontal arm, a drill universally pivotally mounted at the free end of said extension arm, and a spring acting between said arms to counterbalance said drill.

4. The combination of a truck, an arm mounted upon said truck rigid against vertical movement relative thereto and adapted to pivotal movement about a vertical axis thereon, a tubular extension arm universally pivotally mounted at the free end of said horizontal arm, a drill universally pivotally mounted at the free end of said extension arm, and a spring within said extension arm and abutting against said horizontal arm to counterbalance said drill.

5. The combination of a truck, an arm mounted upon said truck rigid against vertical movement relative thereto and adapted to pivotal movement about a vertical axis thereon, an extension arm universally pivotally mounted at the free end of said horizontal arm, a drill universally pivotally mounted at the free end of said extension arm, and auxiliary devices adapted to anchor said extension arm in any preferred position during the operation of the drill.

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

NILS D. LEVIN.

Witnesses:
HARRY C. DEAN,
DUDLEY T. FISHER.