(No Model.)

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J. W. HARRISON.

COAL MINING MACHINE.

No. 262,225. Patented Aug. 8, 1882.

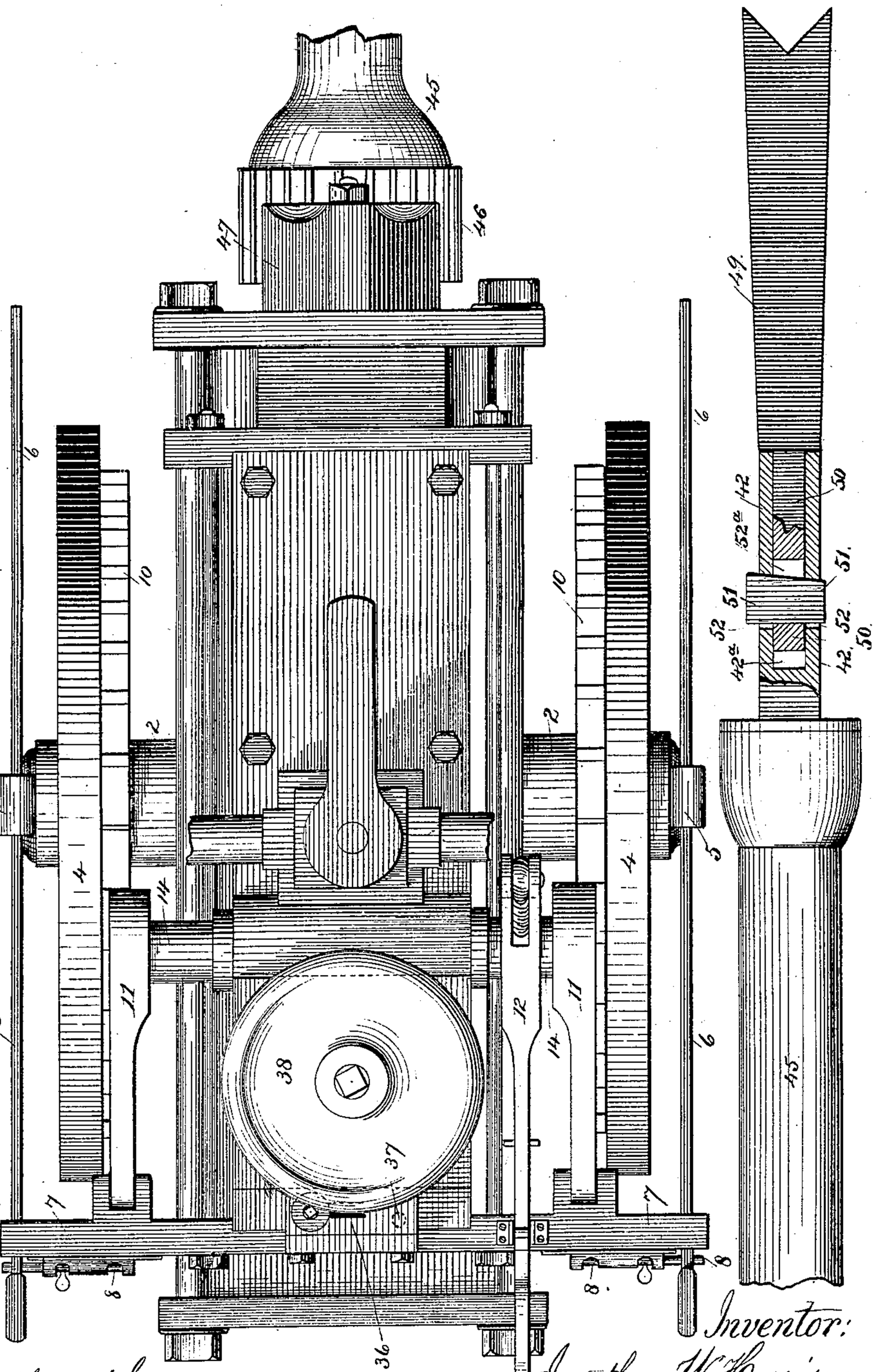

Fig. 1.

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L. M. Hopkins

Inventor:
Jonathan W. Harrison
BY Knight Bros
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Fig 5.

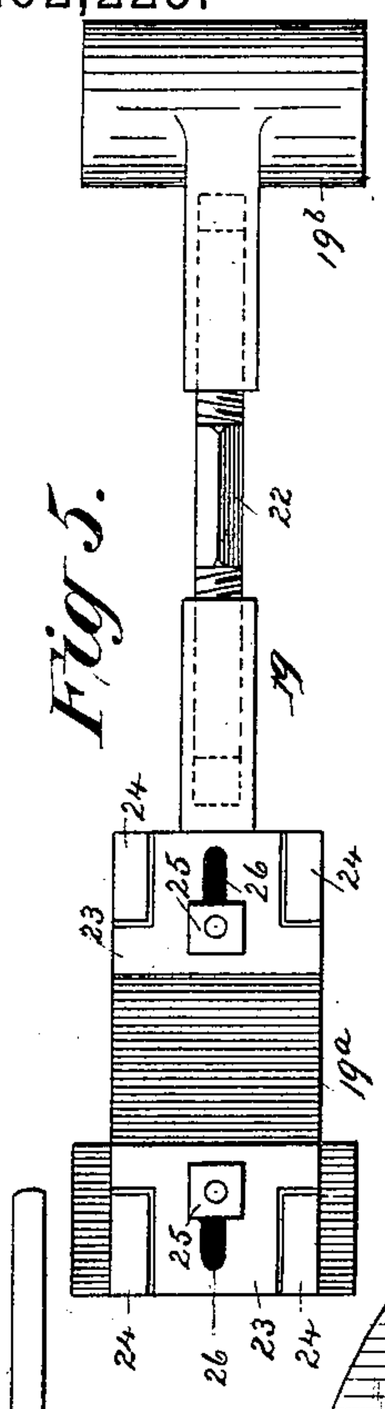

Fig 2.

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Fig 4.

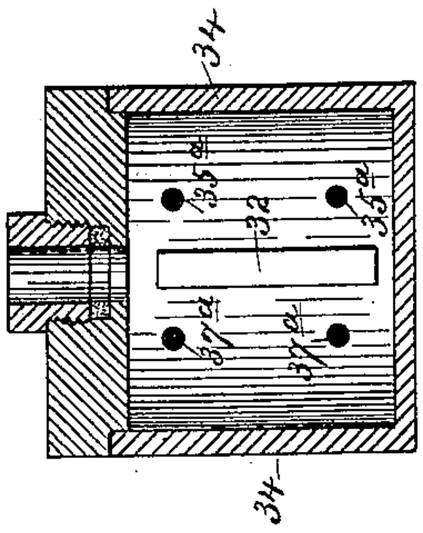

Fig 3.

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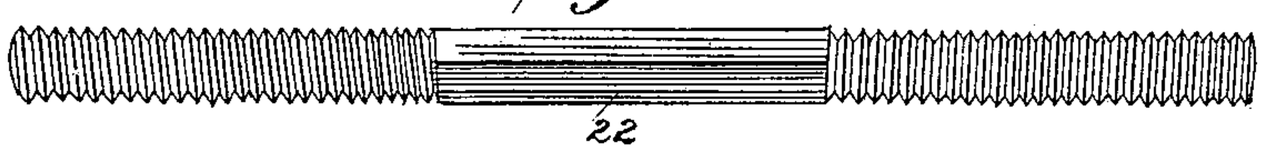
Fig 6.



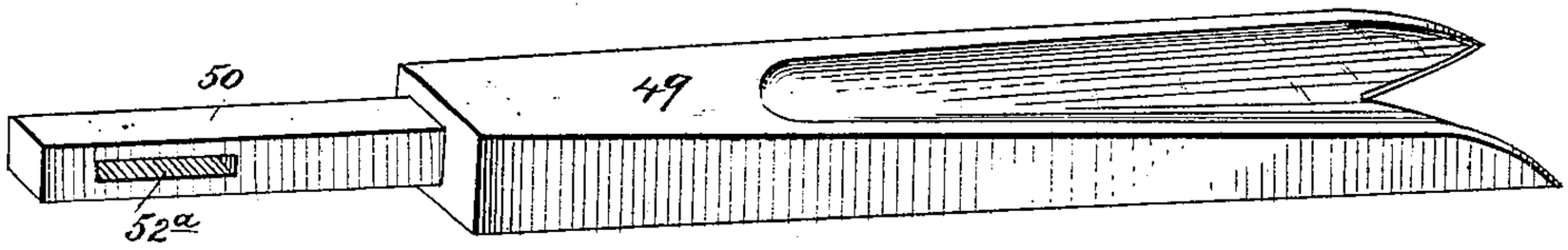
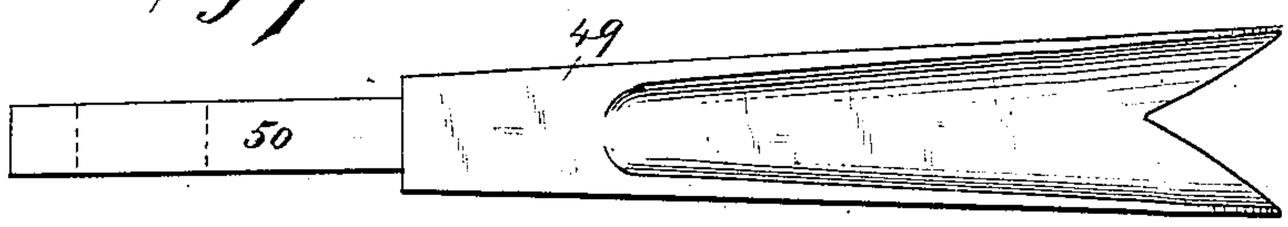
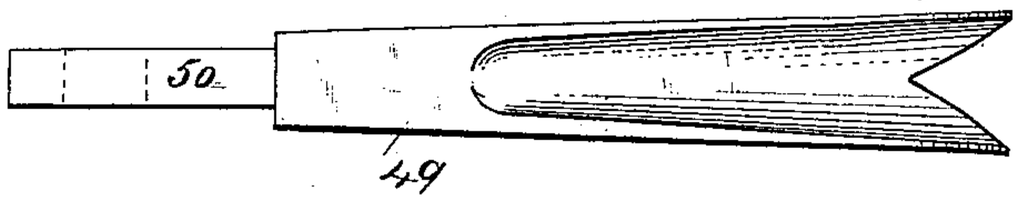


Fig 7.





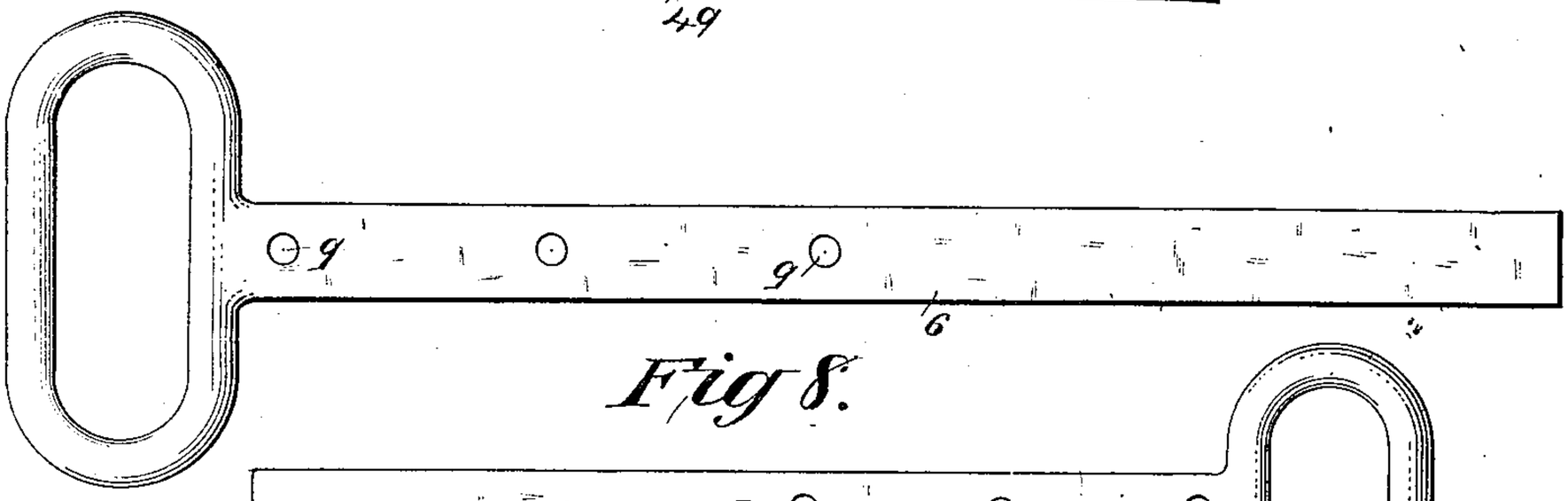
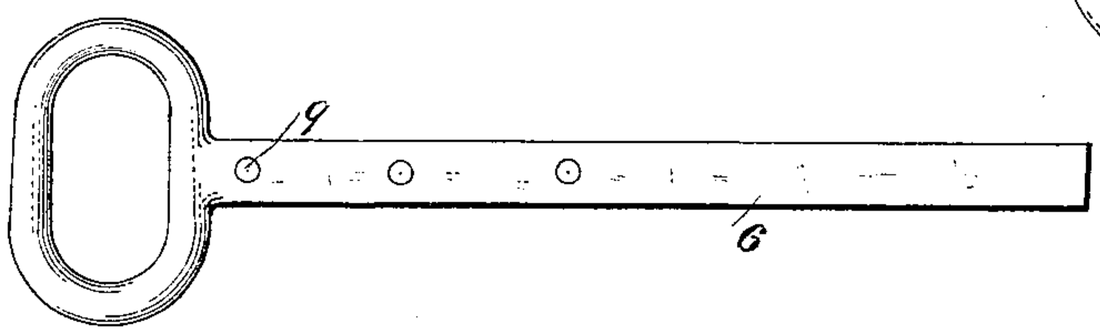


Fig 8.



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L. M. Hopkins.

Inventor;

Jonathan W. Harrison.

By Knight Bros

Attys

UNITED STATES PATENT OFFICE.

JONATHAN W. HARRISON, OF RICHMOND, MICHIGAN, ASSIGNOR TO GEORGE D. WHITCOMB, OF CHICAGO, ILLINOIS.

COAL-MINING MACHINE.

SPECIFICATION forming part of Letters Patent No. 262,225, dated August 8, 1882.

Application filed September 3, 1881. (No model.)

To all whom it may concern:

Be it known that I, JONATHAN W. HARRISON, a citizen of the United States, residing at Richmond, in the county of Macomb and State of Michican, have invented Improvements in Coal-Mining Machines, of which the following is a specification.

This invention relates to improvements on the Harrison mining-machine described in my former Letters Patent, granted the 25th December, 1877, No. 198,610, which improvements are intended to remedy certain defects found by continued practice to exist in the former machine.

My present improvement consists, first, in combining with a mining-machine operated by compressed air or steam an upright rotary engine of improved construction for operating the slide-valve; second, in a slide-valve of peculiar construction, together with devices for changing the lead and amplitude of stroke of the valve; third, in an improved method of packing the piston; fourth, in a supporting and guiding sleeve for the drill-rod; fifth, in a locking and unlocking device for the supporting-wheels.

In the accompanying drawings, Figure 1 is a top view of the machine. Fig. 2 is a vertical longitudinal section, the end of the drill-rod being broken off. Fig. 3 is a side view with one wheel removed. Fig. 4 is a transverse section through the valve-engine with the piston removed. Fig. 5 is a top view of the slide-valve. Fig. 6 is a detached view of the right-and-left threaded screw. Fig. 7 is a view showing three lengths of drill detached. Fig. 8 is a view showing three different sizes of handle.

1 is a cylinder, supported by lugs 2 cast thereon, and carrying spindles on which revolve the wheels 4. The extremities of the spindles are made square to rigidly support brackets 5, which are slotted to receive adjustable handles 6, supported at rear by being passed through similar slots in the transverse bracket 7. The handles are adjustable forward and backward at pleasure, and may be fixed in any position to which they are set by bolts 8 entering holes 9.

The machine is held up to its work by ratchets 10 on the wheel 4 and pawls 11, pivoted to the brackets 7, and lifted out of engagement with the ratchet, when it is desired to back the machine, by lever 12 and cams 13 on shaft 14. A stop or projection, 15, holds the lever 12 to either its protracted or retracted position.

The stand-pipe 16 is provided with ports 16^a at both sides for receiving compressed air or steam from either direction.

17 is the throttle-valve.

18 is the slide-chest, within which is the peculiarly-constructed slide-valve 19.

20 20 are ports for supplying air from the slide-chest to the cylinder, and 21 21 the exhaust-apertures communicating with the atmosphere at the side of the cylinder, as shown in dotted lines in Fig. 2.

The slide-valve consists of two portions, 19^a 19^b, the two parts being joined by right-and-left threaded screw 22. By turning this screw one way or the other the distance between the parts 19^a and 19^b is increased or lessened at will, thus allowing the accurate regulating of the lead of the slide-valve. On the end 19^a of the slide-valve are gibs 23 23, adjustable longitudinally between projections 24 24 by means of bolts 25 25 and slots 26 26. The eccentric 27 for actuating the slide-valve revolves between these adjustable gibs, and it will readily be seen that by setting the gibs nearer together the amplitude of movement of the slide-valve is increased, and by setting them farther apart the movement is lessened, while by adjusting them irregularly the cut-off at either end of the cylinder may be increased or lessened as desired.

The eccentric 27 is set on "quarter-center" on the vertical piston-rod 28 of an upright rotary engine. Steam or compressed air is supplied to the chest 30 from the slide-chest 18 through port 31. The abutment 32 is held by steam or air pressure constantly against the surface of the rotary piston 33, the compressed air or steam entering the cylinder 34 through ports 35 when the abutment is protracted sufficiently to open the same. A slide, 36, under the control of the operator, enables the closure of the exhaust-port 37 at pleasure, the closure

of the said port stopping the engine. Ports 37^a 37^a in the cylinder connect with the exhaust, while ports 35^a 35^a admit the steam or air under pressure from the chest 30. The wheel 38 is used to start the engine, and also serves as a fly-wheel.

The horizontal cylinder 1 is counterbored slightly at 1^a 1^a, and more deeply at 1^b 1^b. Within these counterbored portions are cushions 38 38, made of two or more disks of steel or iron, each about one-half inch thick, having an interposed disk or disks of rubber or leather, as shown in Fig. 2. At each end of the counterbored portions are shoulders 39 39^a, against which the cushions rest. Ports 40 afford communication from the counterbore in rear of the cushions to the slide-chest 18. These admit air or steam to the rear of the cushion in that end of the cylinder from which air or steam is being exhausted, throwing the cushion up against the shoulder 39^a. By this means I provide an air or steam cushion for the piston-head in its next vibration and materially lessen the risk of bursting the cylinder either by knocking off the head or by the expansion of the cushions under the impact of the piston-head, while the rubber or other soft packing material of which alternate disks of the cushions are composed, when under pressure, expands and produces a perfectly-tight packing around each cushion and around the piston-rod.

The piston-head 41 is held in place on the rod 42 by a pin, 43. Around the head and covering both ends of the pin is a packing, 41^a. With the packing of common construction it has been necessary, when removing the piston-head, to remove the packing-ring before obtaining access to the pin. My improved packing is made with slots or apertures 44, so that on turning the packing-ring in its seat the head of the pin will be uncovered, allowing its removal without disturbing the packing.

The sleeve 45, supporting the rod 42, is held from rotation and set at any point desired by its teeth 46 gearing with similar teeth, 48, on an adjustable block, 47. The outer portion of the rod 42 is square in cross-section, as shown, and slides in a similarly-shaped bore in the sleeve 45.

To prevent the rotation of the drill 49 and consequent tightening of the key common in the former machine, I make the drill with a tongue, 50, of square or other non-circular cross-section, and fit it into a similarly-shaped socket, 42^a, in the end of the rod 42. The drill is held in place by a key, 51, passing through slots 52 52^a in the rod 42 and tongue 50.

By these improvements the side sway of the machine, rapidly causing leakage, due to the old form of rotary engine, is avoided. The eccentric being set on "quarter-center," the engine does not have to perform any work while passing the dead-center. I am not obliged to make the eccentric of a certain size, but make it larger than is necessary at first and take up wear by means of the sliding gibs 23. I am enabled to change the lead of the valve so necessary in a case of this kind, the piston-head invariably having a tendency, unless some such provision is made, to strike one cushion harder than the other and to remain in one end of the cylinder. The forms of cylinder and piston-head and cushions prevent the bursting of the cylinder under a violent blow of the piston, and the wheel-locking devices are permanent and strong.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. In a reciprocating mining-machine operated by steam or compressed air, the combination, with a slide-valve controlling the ports of the drill-cylinder and a chest containing said valve and receiving steam or air directly from the boiler or reservoir, of a vertical rotary engine operating said slide-valve by a cam on its piston-rod, and itself driven by steam or air from the slide-box, as set forth.

2. The two-part slide-valve for reciprocating mining-engines, having its ends or shells joined by a right-and-left threaded screw for adjusting the lead of the valve, and carrying independently-adjustable guides at one end for regulating the cut-off, substantially as shown and described.

3. In combination with a circumferentially-grooved piston-head and its attaching-pin, the annular ring or packing filling the said groove, covering the end of the pin, and having cut-away portions or slots to allow of the removal of the head on shifting the packing, as set forth.

4. In a reciprocating mining-engine, the combination, with a non-circular drill-rod, of its supporting-sleeve projecting beyond the cylinder, having a similar non-circular bore, and mechanism, constructed as shown and described, applied directly to the said sleeve for allowing rotary adjustment through it to the drill-rod.

5. The wheel locking and unlocking device, consisting of ratchets 10, pawls 11, shaft 14, having eccentrics 13, and lever 12, combined substantially as described.

JONATHAN W. HARRISON.

Witnesses:
SIMON R. HARRIS,
GEORGE B. HARRIS.