(No Model.)

J. W. HARRISON.

MINING MACHINE.

No. 267,424. Patented Nov. 14, 1882.

Fig. 2.

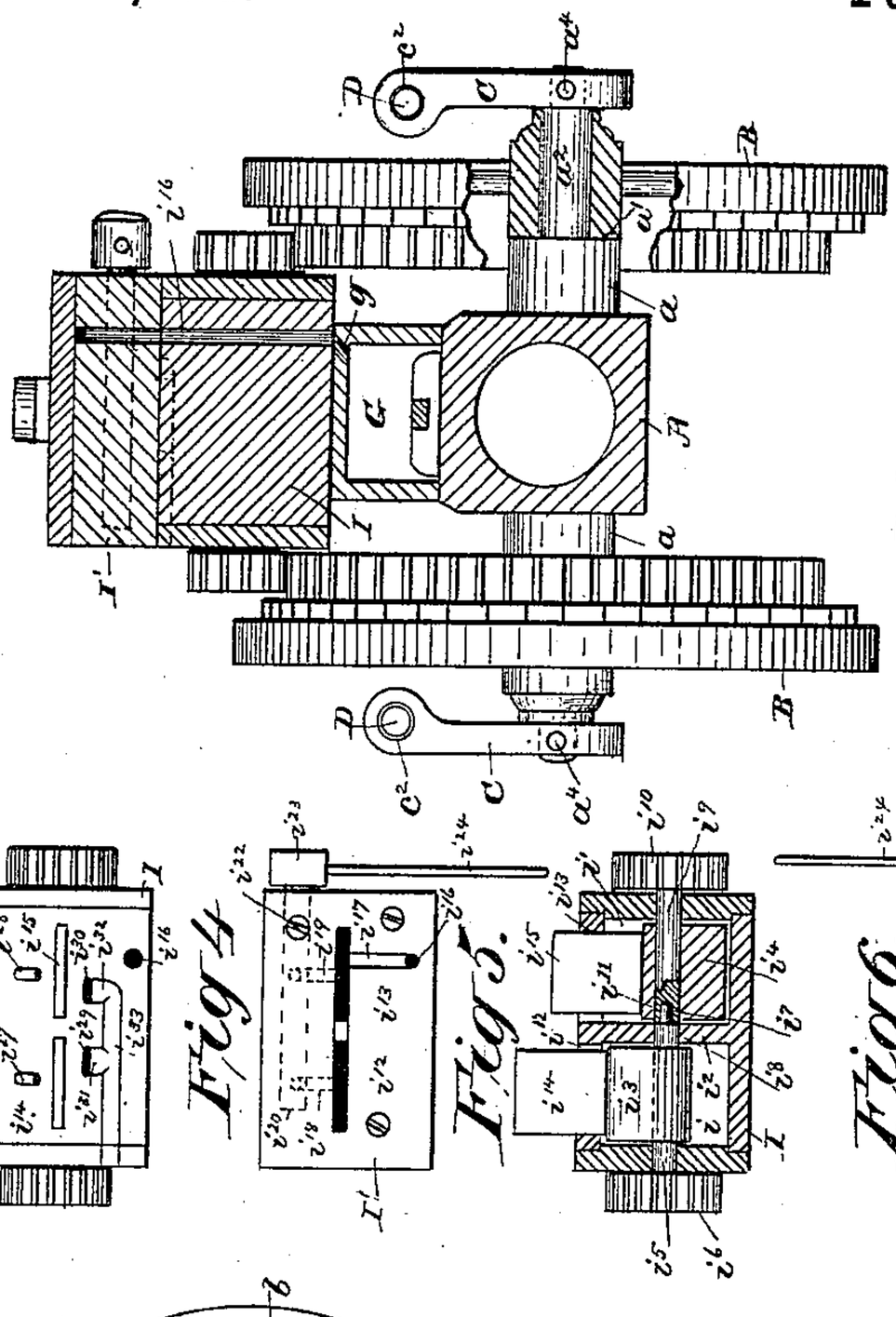


Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 9.

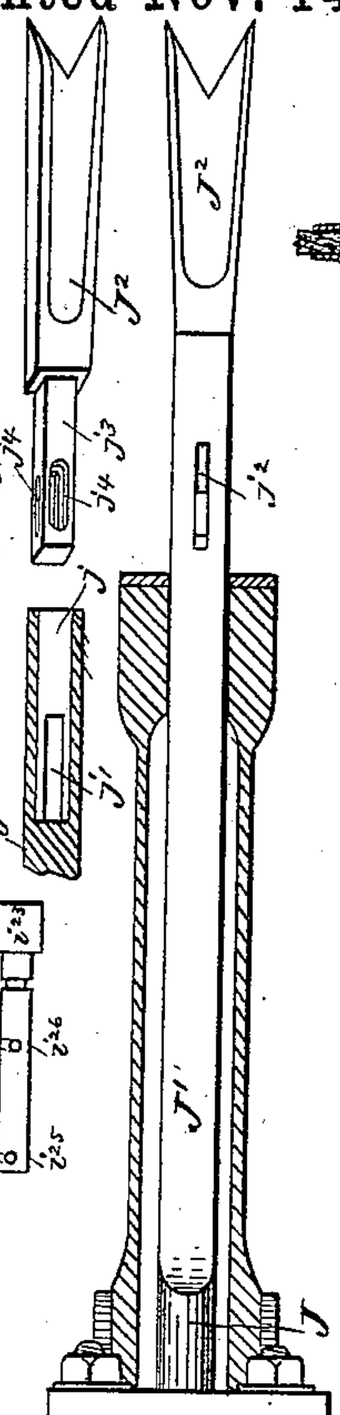


Fig. 8.

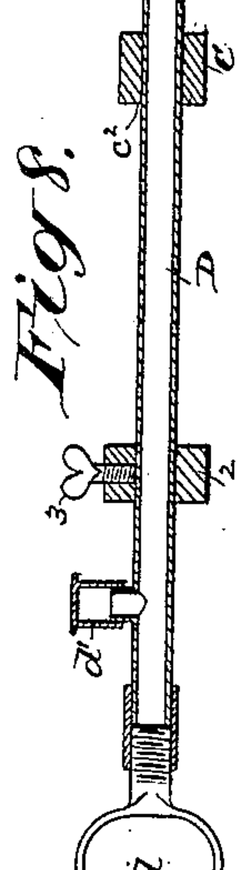


Fig. 7.

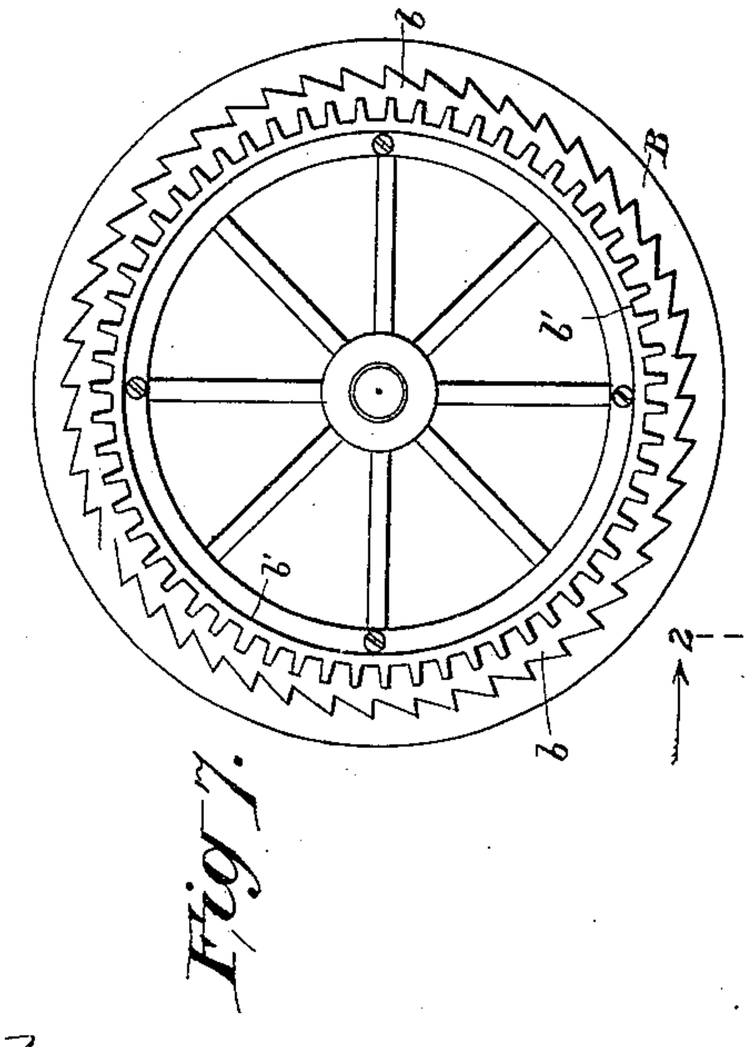
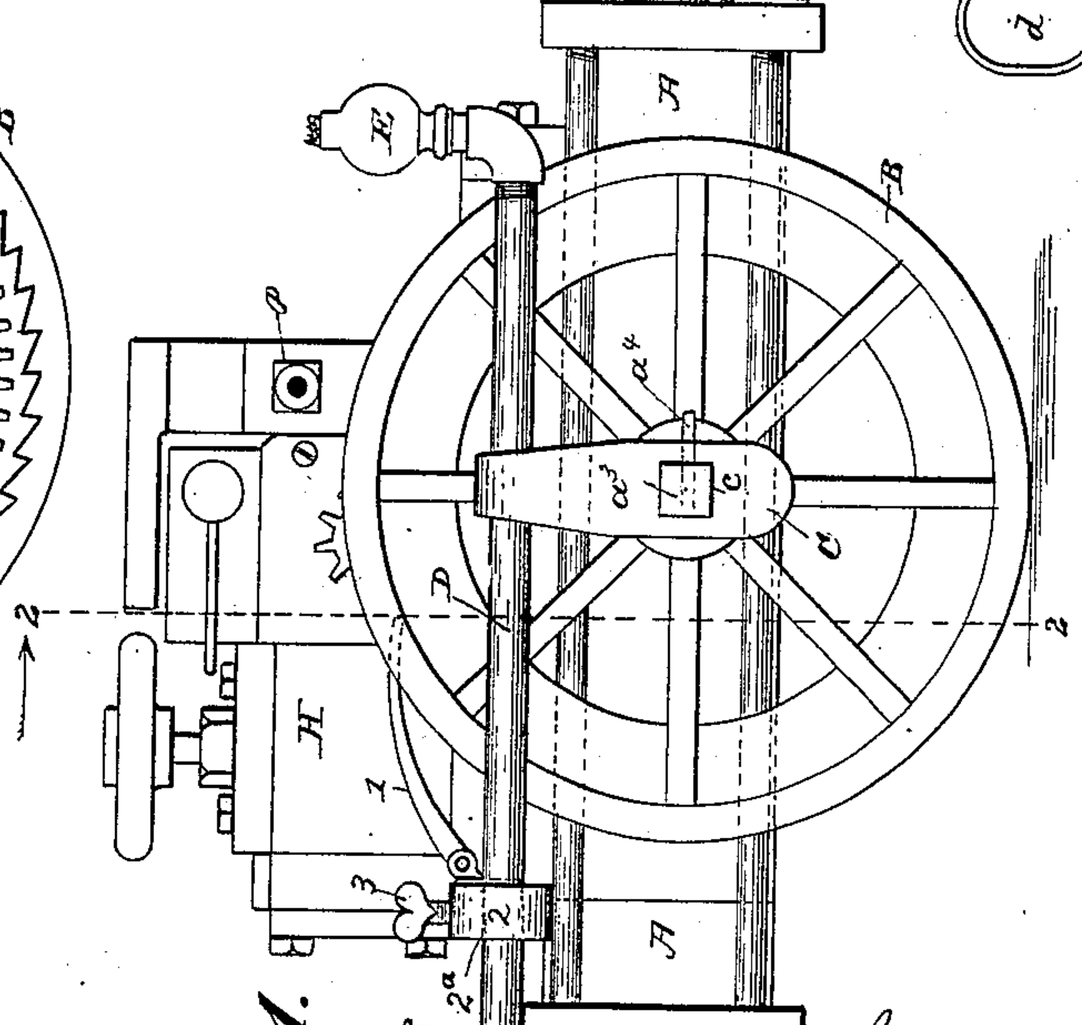


Fig. 1.



Attest

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UNITED STATES PATENT OFFICE.

JONATHAN W. HARRISON, OF YPSILANTI, MICHIGAN.

MINING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 267,424, dated November 14, 1882.

Application filed July 20, 1882. (No model.)

To all whom it may concern:

Be it known that I, JONATHAN W. HARRISON, a citizen of the United States, residing at Ypsilanti, in the county of Washtenaw and State of Michigan, have invented certain new and useful Improvements in Mining-Machines, of which the following is a specification.

My invention relates to that class of mining-machines which are actuated by air, steam, or other fluid; and the object of said invention is to provide such machines with a mechanism to automatically feed the machine forward, for the purpose of keeping the drill well up to its work, and for propelling the machine from place to place, as desired, thus relieving the operator of the exertion incident to such duties.

The said invention also has for its object the provision of a lighting device attached to the frame of the machine.

To this end my invention consists of a drill-cylinder supported upon two carrying-wheels, each of which is provided with a disk or circular rim having gear-teeth formed upon its periphery, said rims being attached to or formed upon the inner sides of the carrying-wheels. Acting in connection with these rims, through the medium of a pair of pinion-wheels, the teeth of each of which mesh with the teeth on each of the rims, is a double rotary engine mounted upon the valve-chest of the drill-engine, and actuated by the same volume of fluid (steam or air) which actuates the drilling-engine.

My invention also consists of two tubular reservoirs containing burning-fluid, mounted upon the sides of the machine, and carrying each at its forward end a burner for supplying light to the locality in which the machine is operating, the position of said burners being most advantageous to the ends for which they are intended. At the same time these reservoirs constitute the means by which the machine is guided in its work, and also in its movements from place to place, for which purpose the rear extremity of each reservoir is provided with a handle within convenient reach of the operator.

In order that my invention may be fully understood, I will proceed to describe it with reference to the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a side elevation of the machine. Fig. 2 is a transverse vertical section on the line 2 2 of Fig. 1 from the front of the engine. Fig. 3 is a plan view of the cylinder-casing of the propelling-engine. Fig. 4 is a plan view of the valve-casing of the propelling-engine. Fig. 5 is a longitudinal vertical section of the propelling-engine. Fig. 6 is a detached view of the plug-valve of the propelling-engine. Fig. 7 is a side elevation of one of the carrying-wheels. Fig. 8 is a vertical longitudinal section of one of the reservoirs. Fig. 9 is a detached view of the drill and drill-rod, the latter being partly in section and the former in perspective.

The cylinder A of the machine is provided on each side, about midway of the length thereof, with a trunnion, *a*, formed with a shoulder, *a'*, and a cylindrical outer portion, a^2, which constitutes the spindle upon which one of the carrying-wheels B is mounted. At its outer extremity each of the spindles a^2 is provided with a square or polyangular head, a^3, in which is formed an eye to receive a key, a^4, for a purpose presently to be stated. Each of the wheels B is provided on inner side with a ratchet-disk, *b*, the teeth of which incline toward the rear of the machine, as shown, and also with a gear-disk, *b'*, the teeth of which are formed radially upon its periphery, as shown. A pinion-wheel connected with a rotary engine, hereinafter described, engages with each of the gear-disks *b'* for the purpose of feeding the engine forward, and also for propelling it over the ground from point to point. Two pawls, 1, are hinged, one at each end of a cross-head, 2, upon the rear end of the valve-chamber of the drill-engine, and engage with each of the ratchet-disks *b*, and assist the propelling-engine to prevent retrogression of the machine while in operation.

At each side of the machine is a bracket, C, the lower end of which is formed with a square or polyangular opening, *c*, by means of which the said brackets are fitted into the square ends a^3 of the spindle a^2. Each of these brackets C is secured into the end of each trunnion *a* by a key, a^4, passing transversely through the lower part of said bracket, and through an eye in the head a^3 of the trunnion *a*. At their upper ends the brackets C are provided with eyes c^2, through which the tubular rods D pass. These rods D are hollow

tubes, supported partly by the brackets C, as before stated, and also at their rear portions by the rear cross-head, 2, before mentioned, on the valve-chamber of the drill-engine, said cross-head being provided with openings 2^a, through each of which one of the rods D passes, and a binding-screw, 3, is placed at each end of the cross-head 2, the lower end of which binding-screw presses upon the rod D to secure it in position. At the rear end of each of the rods D is attached a handle, *d*, within convenient reach of the operator, whereby said operator is enabled to guide the machine while passing from point to point, and also to shift its position when drilling. At the forward extremity of each rod is a burner, E, of suitable form, while near the rear end of each of said rods is a filling-aperture, *d'*, the entire interior portions of the rods D from the filling-apertures *d'* to the lamps E being utilized as reservoirs for the burning-fluid.

The drill-engine consists of the cylinder A, into which steam or air is introduced through a throttle, F, resting upon the valve-chamber, and contains a cylindrical piston-chamber, within which is a cylindrical piston-head connected to a piston-rod, J, extending out through the forward head of the cylinder A; a valve-chest, G, situated above the cylinder and containing a double connected slide valve working over induction and exhaust ports, arranged in pairs at each end of the valve-chamber, by which ports connection is effected between the valve-chamber and the piston-chamber. A valve-operating mechanism is inclosed in a casing, H, resting upon the cylinder A at its rear end. As these parts bear only an incidental relation to those parts of the machine which constitute my present invention, a particular description of them is not considered necessary, and they are illustrated in the drawings only with sufficient clearness to impart an understanding of their connection with the important features of the present invention.

The auxiliary engine for propelling the machine from point to point, and for automatically feeding the same forward when the drill-engine is in operation, so as to keep the drill well up to its work, is placed on top of the valve-chest G of the drill-engine, and consists of a piston-chamber, I, and a valve-chamber, I', suitably secured in position upon the said drill-engine valve-chest. In the upper side of the valve-chest G is port *g*, through which steam or air from the valve-chamber of the drill-engine is supplied to the auxiliary engine, passing through the port *g* into a channel extending vertically through the piston-casing I and through the valve-casing I'. The piston-casing I is divided into two piston-chambers, *i i'*, by a vertical diaphragm, i^2, extending transversely of the length of the piston-casing I. Within the piston-chambers *i i'* are the rotary cylindrical pistons i^3 i^4, respectively. The piston i^3 is mounted eccentrically on a shaft, i^5, which passes out through the end or head of its chamber, and carries on its outer end a pinion-wheel, i^6, the teeth of which mesh with the teeth of the gear-disk *b'* on the left-hand carrying-wheel B. The inner end of the shaft i^5 is formed with a pin or spindle, i^7, which passes through an opening, i^8, in the center of the diaphragm i^2, and projects a short distance into the opposite piston-chamber, *i'*. This pin i^7 forms the inner bearing for the shaft i^9 to permit of the independent rotation of the pistons when the apparatus is being turned on its wheels B B. In the chamber *i'* is the rotary piston i^4, mounted eccentrically on a shaft, i^9, extending out through the end or head of its chamber, and carrying on its outer end a pinion-wheel, i^{10}, the teeth of which mesh with the teeth of the gear-disk *b'* on the right-hand carrying-wheel B. The inner end of the shaft i^9 is formed with a socket or recess, i^{11}, which receives the spindle i^7 of the shaft i^5, projecting through the opening i^8 into the chamber *i'*. Two vertical elongated channels, i^{12} i^{13}, extend from the top of the chambers *i i'*, respectively, through the casings I I', as shown, and contain abutments i^{14} i^{15}, respectively, the lower ends of which abutments rest upon the pistons i^3 i^4, rising and falling as the latter rotate.

An induction-passage, i^{16}, for air or steam, communicates at its lower end with the port *g* of the drill-engine valve-chamber, and extends vertically through the casings I and I', communicating at its upper end with a transverse channel, i^{17}, formed in the upper part of the casing I, and extending horizontally to the top of abutment-channel i^{13}. In the forward vertical sides of the abutment-channels i^{12} and i^{13}, respectively, and opening therefrom, are horizontal channels i^{18} i^{19}, extending into a cylindrical channel, i^{20}, extending longitudinally of the casing I'. This channel i^{20} forms the seat for a cylindrical plug-valve, i^{21}, which is held in its seat by a gland, i^{22}, as shown, and is provided on its outer extremity with a head, i^{23}, and a handle, i^{24}. This valve i^{21} is provided with two angular channels, i^{25} i^{26}, which communicate (when the valve is opened) at their upper ends with the channels i^{18} and i^{19}, respectively. The lower ends of the plug-valve channels i^{25} i^{26} communicate respectively (when the valve is opened) with induction-channels i^{27} i^{28}, which extend vertically downward through the casings I' and I, and open respectively at their lower ends into the piston-chambers *i i'* on the live-steam or air sides of the abutments i^{14} and i^{15}. From the upper sides of the piston chambers *i i'*, on the opposite sides of the abutments from the induction-openings i^{27} i^{28}, respectively, open exhaust-channels i^{29} i^{30}, which extend vertically upward and communicate, through short horizontal passages i^{31} i^{32}, with an exhaust-channel, i^{33}, extending horizontally in the casing I, and opening to the air at its outer end, as shown.

The piston-rod J of the drill-engine extends out through the forward head of the cylinder A, where it is surrounded by suitable packing, and outside of said head it is formed square or non-circular externally, such squared por-

tion J′ forming the drill-rod. In its forward end is a square recess or socket, *j*, and through two of its opposite sides is an elongated slot, *j′*, to receive a key, j^2. The drill J^2 is provided at its inner extremity with a square tongue, j^3, provided with two transverse elongated slots, j^4, each of which registers with the slot *j′* of the drill-rod J′. The tongue j^3 is inserted into the socket *j* of the drill-rod J′. The key j^2 is inserted into the slot *j′* of the said drill-rod, passing through one of the slots j^4 of the drill J^2 and locking the parts. When the position of the drill is to be changed the key j^2 is withdrawn, the drill J^2 pulled out of the socket *j*, turned half around, and again inserted into the socket *j*, bringing the other slot, j^4, in position to be locked by the key j^2.

The operation of my invention is as follows: Supposing the machine to be in proper position for drilling, steam or air is introduced into the drill-engine through its throttle F, and said engine works with reciprocatory strokes in a manner not necessarily to be described. Meantime the air, steam, or other actuating-fluid passes in part through the opening or port *g* and upward through the channel i^{16} and i^{17}, exerting its pressure on the upper ends of the abutments i^{14} i^{15}, forcing them downward upon the pistons i^3 i^4. The valve i^{21} being opened, the current passes through the passages i^{18} i^{19}, angular passages i^{25} i^{26}, and passages i^{27} i^{28}, entering the piston-chambers *i i′* on the live-steam or air sides of the abutments i^{14} i^{15}. As the pistons revolve the steam passes around to the exhaust sides of the abutments and passes upward through the exhaust-channels i^{29} i^{30} i^{31} i^{32} and out through the passage i^{33}, escaping into the air. When the drill-engine has finished its work, and it is desired to transport the machine to another place for future operations, the said drill-engine is thrown out of gear by means of mechanism contained in the casing H. The steam, air, or other fluid passing through the valve-chest G enters the propelling-engine through the port *g*, channel i^{16}, &c., as above described, and the engine works as before described, the result being that, its progress not being impeded by the surface before being drilled, the machine is propelled over the ground to the place desired, and upon arriving at such place the drilling and feeding operations before described are repeated.

During the operation of drilling, and while the machine is being propelled over the ground also, the machine is controlled by the operator having hold of the handles *d* of the guide-rods D.

During the operation of drilling, and at other times, the burners E are lighted, and (owing to their peculiarly advantageous position) sufficiently illuminate the surroundings to enable the operator to see clearly and relieve him of the necessity of carrying a hand-lantern.

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

1. A mining-machine provided with an auxiliary engine for propelling it from point to point and for feeding it forward during the operation of drilling, so that the drill shall be kept well up to its work, said auxiliary engine being attached directly to the drill-engine casing and receiving its motive fluid directly therefrom, substantially as set forth.

2. A mining-machine the drilling-engine of which is mounted upon two or more carrying-wheels having each a gear disk or rim upon its inner side, in combination with an auxiliary propelling and feeding engine operating in connection with the carrying-wheels, through the medium of two or more pinion-wheels engaging with the gear-disks of said carrying-wheels, substantially as described.

3. In a propelling and feeding engine for mining-machines, the piston-casing I, having the diaphragm i^2, provided with the opening i^8, in combination with the piston i^3, mounted eccentrically on the shaft i^5, said shaft being provided with the pin i^7, and the piston i^4, mounted eccentrically on the shaft i^9, said shaft being provided with the recess or socket i^{11}, substantially as and for the purposes set forth.

4. In a propelling and feeding engine for mining-machines, the pistons i^3 i^4, mounted eccentrically in piston-chambers *i i′*, and provided with pinions i^6 i^{10}, engaging with the gear-disks of the carrying-wheels B B, in combination with abutments i^{14} i^{15}, working in abutment-channels i^{12} i^{13}, and suitable induction and eduction channels, substantially as described.

5. In a propelling and feeding engine for mining-machines, the induction-passages i^{16}, i^{17}, i^{18}, i^{19}, i^{20}, i^{27}, and i^{28}, in combination with the plug-valve i^{21}, with its angular passages i^{25} and i^{26}, substantially as described.

6. In a mining-machine, the brackets C, mounted at their lower ends on the trunnion-heads a^3, and provided at their upper ends with eyes c^2, and the cross-head 2, with hand-nuts 3, and with eyes in its ends, in combination with the hollow guide-rods and oil-reservoirs D, provided with filling-apertures *d′*, and lamps or burners E, substantially as and for the purposes set forth.

7. In a mining-machine, the guide-rods D, provided with handles *d*, in combination with the trunnions *a*, having spindles *a′* and square heads a^2, the wheels B, and brackets C, as set forth.

JONATHAN W. HARRISON.

Witnesses:
PHILANDER M. CAMPBELL,
THOMAS NINDE.