(No Model.) 2 Sheets—Sheet 1.

S. STUTZ.

MINING MACHINE.

No. 302,956. Patented Aug. 5, 1884.

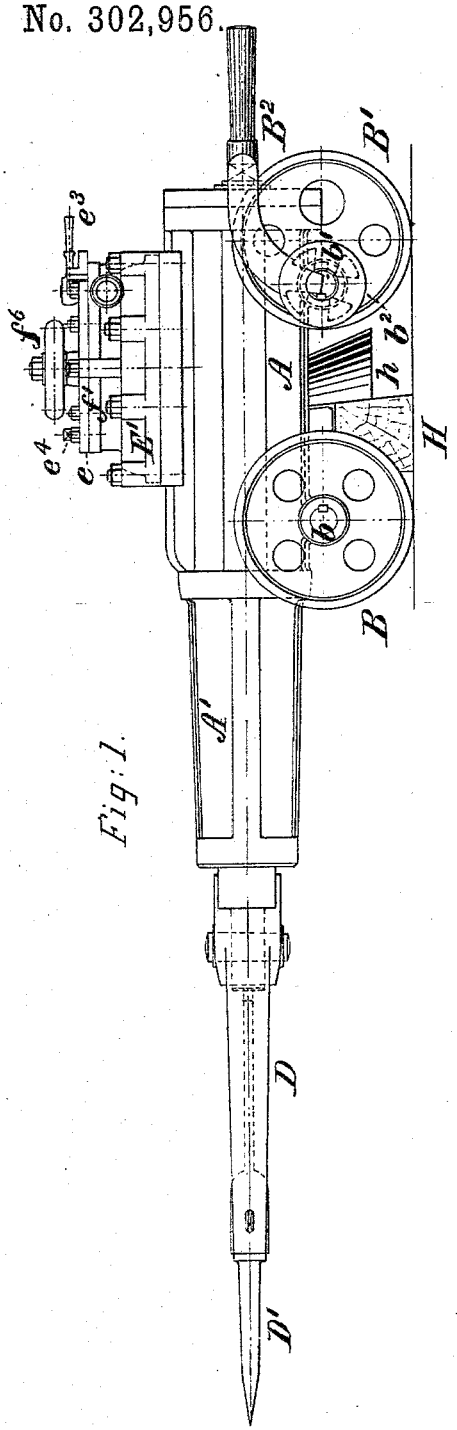


Fig: 1.

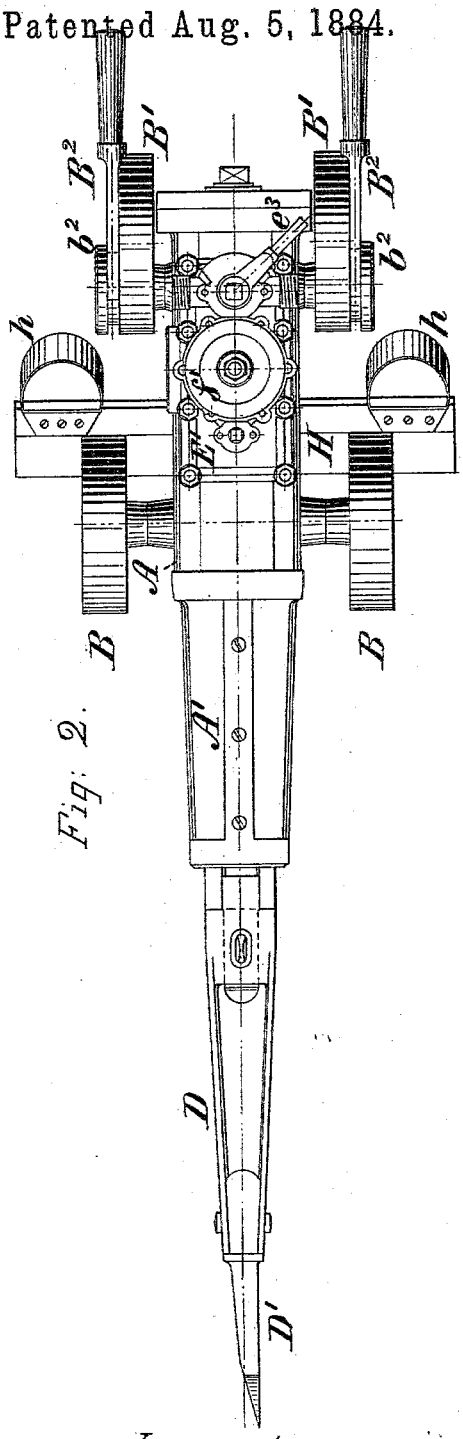


Fig: 2.

Witnesses.
J. Snowden Bell.
Darwin S. Wolcott

Inventor:
Sebastian Stutz,
by George H. Christy
his Atty

(No Model.) 2 Sheets—Sheet 2.

S. STUTZ.

MINING MACHINE.

No. 302,956. Patented Aug. 5, 1884.

Fig: 3.

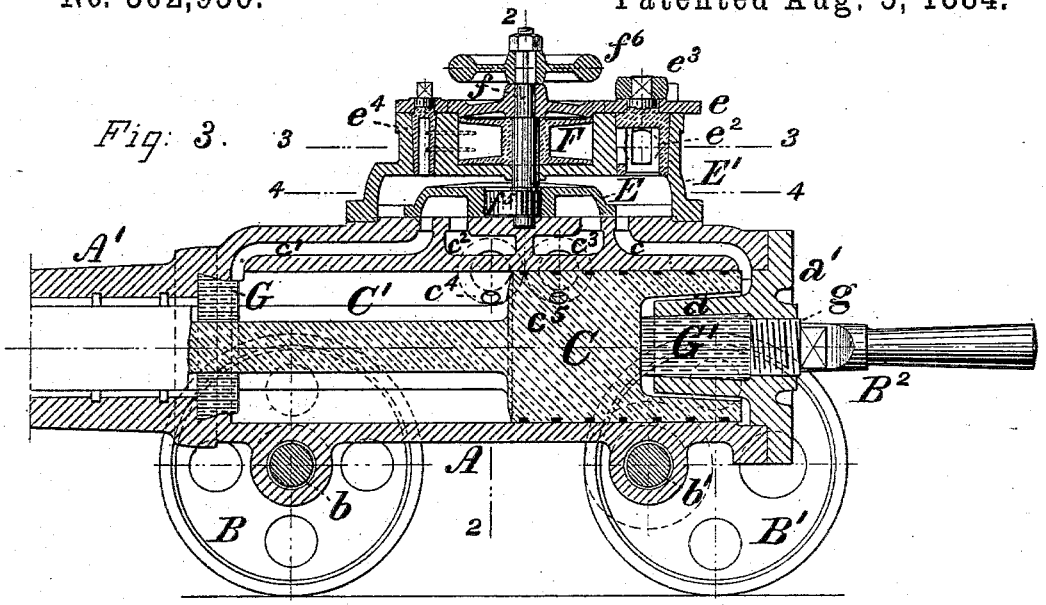


Fig: 4.

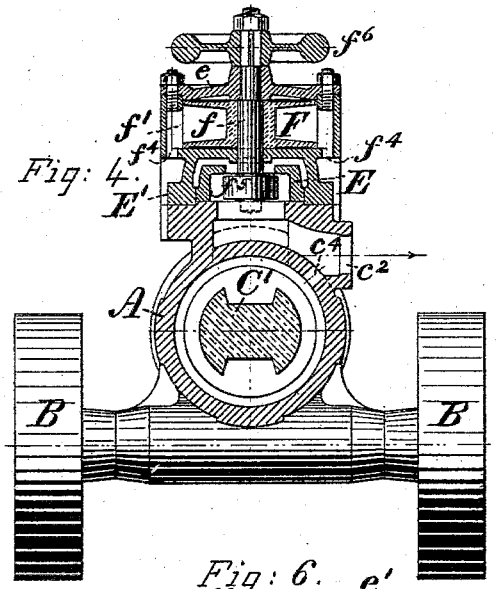


Fig: 5.

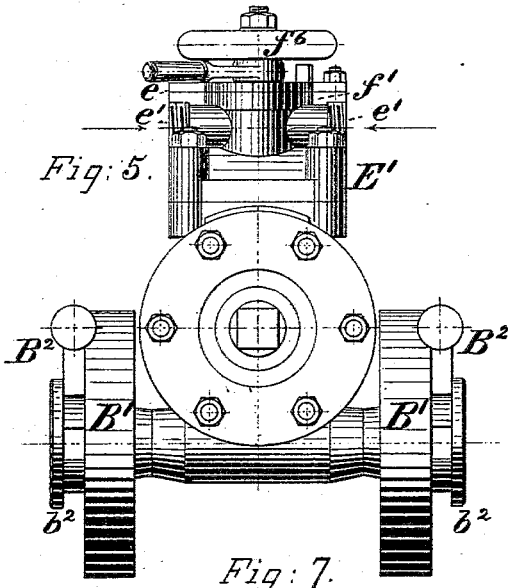


Fig: 6.

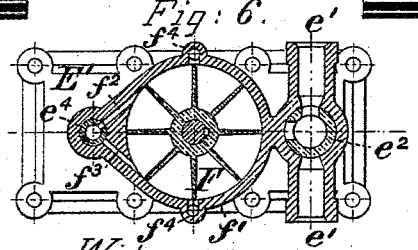
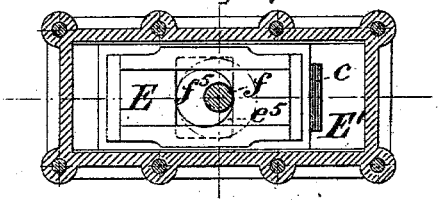


Fig: 7.



Witnesses:
J. Stanley Bell.
Samuel S. Wolcott

Inventor:
Sebastian Stutz.
by George H. Christy
his Atty

UNITED STATES PATENT OFFICE.

SEBASTIAN STUTZ, OF PITTSBURG, PENNSYLVANIA.

MINING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 302,956, dated August 5, 1884.

Application filed October 1, 1883. (No model.)

To all whom it may concern:

Be it known that I, SEBASTIAN STUTZ, a citizen of the United States, residing at Pittsburg, county of Allegheny, State of Pennsylvania, have invented or discovered a new and useful Improvement in Coal and Ore Mining Machines; and I do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—like letters indicating like parts—

Figure 1, Sheet 1, is a side view in elevation of a mining-machine embodying my invention; Fig. 2, a plan or top view of the same; Fig. 3, Sheet 2, a vertical longitudinal central section, on an enlarged scale, through the cylinder, valve-chest, and valve-motor chamber; Fig. 4, a vertical transverse section through the same at the line 2 2 of Fig. 3; Fig. 5, an end view in elevation of the machine as seen from the right; and Figs. 6 and 7, horizontal sections at the lines 3 3 and 4 4, respectively, of Fig. 3.

My present invention relates to coal and ore mining machines of the class in which a pick or cutting-tool is operated by a piston reciprocated in a cylinder by fluid-pressure, an instance of which is illustrated in an application for Letters Patent of the United States filed by me under date of September 10, 1883, Serial No. 106,057.

My improvements are designed to simplify and economize the construction and increase the effectiveness in operation of the machine; and they consist in a novel construction and combination of a distribution-valve and mechanism for actuating the same independently of the movements of the main piston; also, in the combination, with the cylinder, of supplemental exhaust-openings serving for the release of pressure upon the main piston prior to the termination of its stroke; also, in locating and securing cushioning devices to prevent undue shocks upon the cylinder-heads; also, in an improved means for changing the position of the machine, so as to vary the direction of the point of the pick relatively to the material to be cut; also, in combining with the cylinder a chock and foot-rest for the operator.

The improvements claimed are hereinafter more fully set forth.

In the practice of my invention the cylinder A is mounted and supported upon front and rear bearing-wheels, B B and B′ B′, secured, respectively, upon axles *b* and *b′*, which are fitted to rotate in bearings cast upon the lower side of the cylinder A. As in my application No. 106,057, before referred to, the front wheels, B B, are concentric with and the rear wheels, B′ B′, eccentric to their axles; and to enable vertical and lateral adjustments of the machine to be more readily and conveniently effected by the operator, a hub or boss, b^2, having a series of radial recesses, is formed upon each of the rear wheels, B′, the recesses of the hubs b^2 being adapted to receive the forward ends of a pair of operating-handles, B^2, which project rearwardly for such distance as to be grasped by the operator when seated in position for governing the machine. The handles B^2 may be entered into whichever of the recesses that will serve to bring their ends into the most convenient position for the operator, and are made of such length as to obviate the necessity of his reaching forward or moving from his seat in changing the direction of the pick.

In lieu of supporting the rear end of the machine upon a pair of wheels, as shown in the drawings, a single wheel may be used, if preferred, and the rear wheel or wheels need not of necessity be made cylindrical on their peripheries, any form being adaptable which will enable them to serve for raising and lowering the rear end of the cylinder by being turned upon their axle. I prefer, however, to use a pair of cylindrical wheels, as affording better facilities for transporting the machine from place to place. The piston C is formed upon or secured to a piston-rod, C′, which passes through a suitably-packed guide, A′, in the front head of the cylinder A, and carries upon its outer end a pick-holder, D, to which is secured a pick or cutting-tool, D′. The piston and rod and the attached pick are reciprocated by the action of fluid-pressure, preferably that of compressed air, which is alternately supplied to and exhausted from the piston by a slide distribution-valve, E, governing supply-ports *c c′*, corek in the cylinder

A, and establishing communication between the opposite ends thereof and a valve-chest, E', and exhaust-ports c^2 c^3 communicate through valve E with opposite ends of the cylinder and with the atmosphere. The distribution-valve E is fitted to slide longitudinally in the valve-chest E' over a valve-face on the top of the cylinder A, and is reciprocated by an independent motor or valve engine, F, the movements of which are wholly independent of those of the main piston, so that the valve may be moved with a uniform travel and at any desired and regulated rate of speed, and is thus adapted to continuously impart uniform pressure to and effect the exhaust thereof from the piston, irrespective of variations in the stroke of the latter or interruptions to its movement which may from time to time occur in its operation. The actuation of a distribution-valve by an independent motor is not, *per se*, new, either in this or in other descriptions of fluid-pressure engines, and is not claimed by me as of my invention, which in this particular relates to the improved construction and combination of the valve-motor and its accessories with the distribution-valve and chest, as now to be described. The valve-motor F is in this instance a rotary engine, consisting of a series of radial blades connected to a central hub, which is secured upon a vertical shaft, *f*, fitting bearings in the cylinder and in the base and the cap of a chamber, *f'*, which is formed centrally in the upper portion of the valve-chest E', above the space therein in which the valve reciprocates, and is closed at top by the lid or cover *e* of the valve-chest. Motive fluid enters the valve-chest through either one of two supply-pipes, *e'*, governed by a cock or valve, e^2, which is operated by a handle, e^3, and is so arranged that either or both the supply-pipes may be shut off from the valve-chest, or either one of them, but not both simultaneously, may be put in communication therewith. A cock, e^4, located at the opposite end of the valve-chest, controls the admission of motive fluid therefrom to the chamber *f'* of the valve-motor by uncovering either one of two supply-ports, f^2 or f^3, according to the direction in which it is desired to rotate the valve-engine F. The latter thus receives its supply of operating-fluid directly from the main valve-chest, thus shortening the length of passages required, as well as avoiding the expense and inconvenience of exterior connections. The cock e^4 enables the speed of the valve-engine to be conveniently regulated as required, and also provides for the reversal of its movement, the latter operation being sometimes desirable to overcome a tendency to stick or to wear in one direction. The exhaust of the valve-engine is effected through openings f^4, leading into the atmosphere on each side of and at the bottom of the chamber *f'*. An eccentric cam or crank, f^5, secured upon the shaft *f* near its lower end, fits in a transverse slot, e^5, in the valve E, and imparts the required reciprocating movement thereto in the rotation of the shaft *f*. A balance-wheel, f^6, secured upon the outer end of the shaft, serves as a fly-wheel, and also enables the engine to be started, if stopped at any time in such position as to need an initial movement by the operator.

In order to quickly relieve the piston C of pressure prior to the completion of its stroke in each direction, and thereby to prevent injurious shocks resultant upon its contact with undue force against the cylinder-heads, supplemental exhaust-openings c^4 c^5 are formed in the metal of the cylinder, extending from its bore to the main exhaust-openings c^2 and c^3, respectively. Said supplemental openings are located in such position that one of them shall be uncovered by the piston just prior to the termination of its stroke in each direction, and the motive fluid which has effected such stroke thus finds an outlet, through which its pressure upon the piston may be quickly relieved independently of the opening of the main exhaust by the distribution-valve. As a further preventive of injurious effect from the contact of the piston with the cylinder-heads, elastic cushions, G G', are fitted into each of said heads, the cushion G at the forward end having a central opening for the passage of the piston-rod, and being sprung into a dovetailed recess in the forward head. The cushion G' of the rear end is sprung into a tapered socket, *a'*, formed centrally in the head *a*, and is held firmly in position by a screw-plug, *g*. Each of said cushions is adapted to relieve the head to which it is connected from undue shock, and can be readily inserted, removed, and replaced, as required.

In the operation of machines of this character the recoil or reaction after each blow of the pick tends to push the apparatus away from the face of the material on which it operates, to counteract which, as well as to provide an abutment for the feet of the operator, I provide a chock or abutment, H, the forward portion of which is recessed, as seen in Fig. 1, in correspondence with the curvature of the peripheries of the forward wheels, B B, of the machine, against which the abutment is applied, resting upon the ground immediately in rear thereof. The rear side of the abutment provides a bearing-surface against which the operator applies his feet, supplementing thereby the resistance presented by the abutment to the backward movement of the machine. A stirrup, *h*, is secured to each side of the abutment, to enable the operator to move the same in either direction when desiring to change the direction of the application of the pick, without requiring him to move from his working position.

I claim herein as my invention—

1. The combination, substantially as set forth, of a cylinder, a piston and rod adapted to reciprocate therein, a distribution-valve

governing the supply and exhaust passages of the cylinder, a valve-chest inclosing said valve, a motive-fluid-supply pipe opening into said chest, a valve-motor chamber formed in said chest above the valve-space thereof, a pair of supply-passages cored in the walls of said chamber and extending in opposite directions therein, a cock or valve by which either of said passages may be opened, either wholly or partially, to the valve-chest, or both closed thereto, an exhaust-passage leading from the motor-chamber, and a valve engine or motor fitting in said chamber, said engine being coupled to the distribution-valve, and being adapted to be moved in one or the other direction, respectively, by the movement of the cock governing the two supply-passages of the motor-chamber.

2. The combination, substantially as set forth, of a distribution-valve chest adapted to be secured to a cylinder-valve face, a motor-chamber formed in the upper portion of said chest, a main-supply opening and valve seat or socket formed in the walls of the chest and communicating therewith, and a supply-opening cored in the wall of the motor-chamber and leading to a valve seat or socket communicating with the interior of the chest.

3. The combination, substantially as set forth, of a cylinder, a piston and rod adapted to reciprocate therein, a distribution-valve governing main supply and exhaust passages in the cylinder, and a pair of supplemental exhaust-passages, each leading from the bore of the cylinder to the main exhaust-passage, and being so located as to be alternately uncovered, and thereby opened to the atmosphere by the piston prior to the termination of its forward and backward strokes, respectively.

4. In a mining-machine, the combination, substantially as set forth, of a cylinder, a piston and rod working therein and adapted to reciprocate a pick or cutting-tool, a pair of supporting-wheels mounted concentrically on the cylinder near its forward end, a supporting wheel or wheels mounted eccentrically on the cylinder near its rear end, and one or a pair of operating-handles fitting sockets in the hubs of the rear supporting-wheels.

5. In a mining-machine, the combination, substantially as set forth, of a cylinder, a piston and rod working therein and adapted to reciprocate a pick or cutting-tool, supporting-wheels mounted on said cylinder adjacent to its front and its rear ends, respectively, and a transverse chock or abutment, which is recessed on its forward side in conformity with the curvature of the supporting-wheels, so as to bear against the same when resting on the ground, and which presents a rear bearing-surface for the feet of the operator.

6. In a mining-machine, the combination of a cylinder supported on front and rear wheels, a piston and rod working in said cylinder and adapted to reciprocate a pick or cutting-tool, a transverse chock or abutment recessed to receive the front supporting-wheels, and a pair of stirrups connected to said abutment and adapted to receive the feet of an operator when seated in working position in rear of the machine.

In testimony whereof I have hereunto set my hand.

SEBASTIAN STUTZ.

Witnesses:
R. H. WHITTLESEY,
J. SNOWDEN BELL.