

(No Model.)

3 Sheets—Sheet 1.

S. STUTZ.
MINING MACHINE.

No. 302,958.

Patented Aug. 5, 1884.

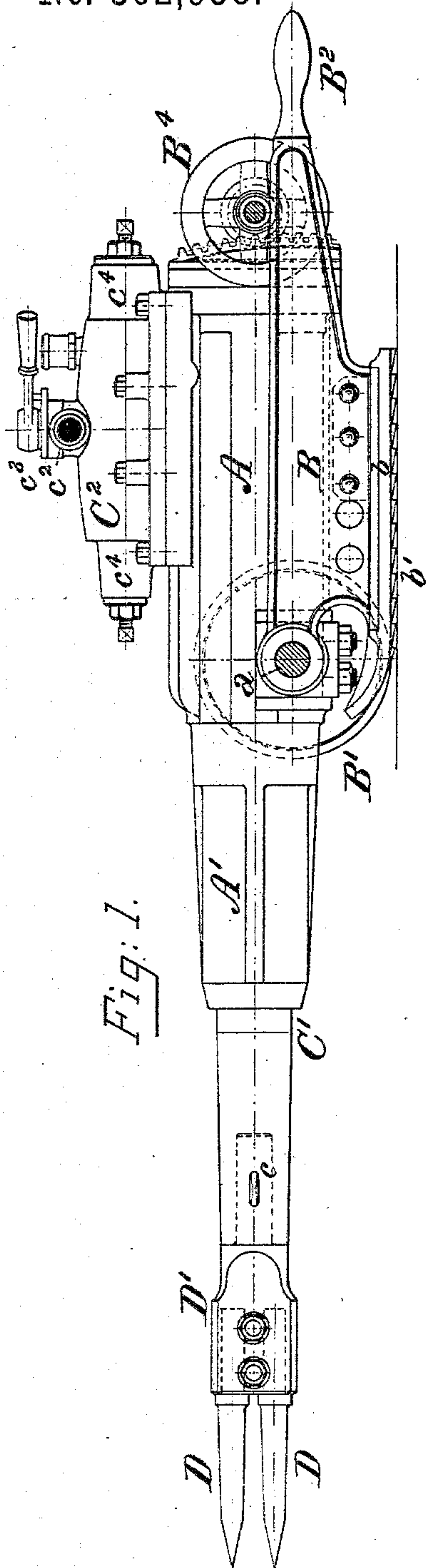


Fig. 1.

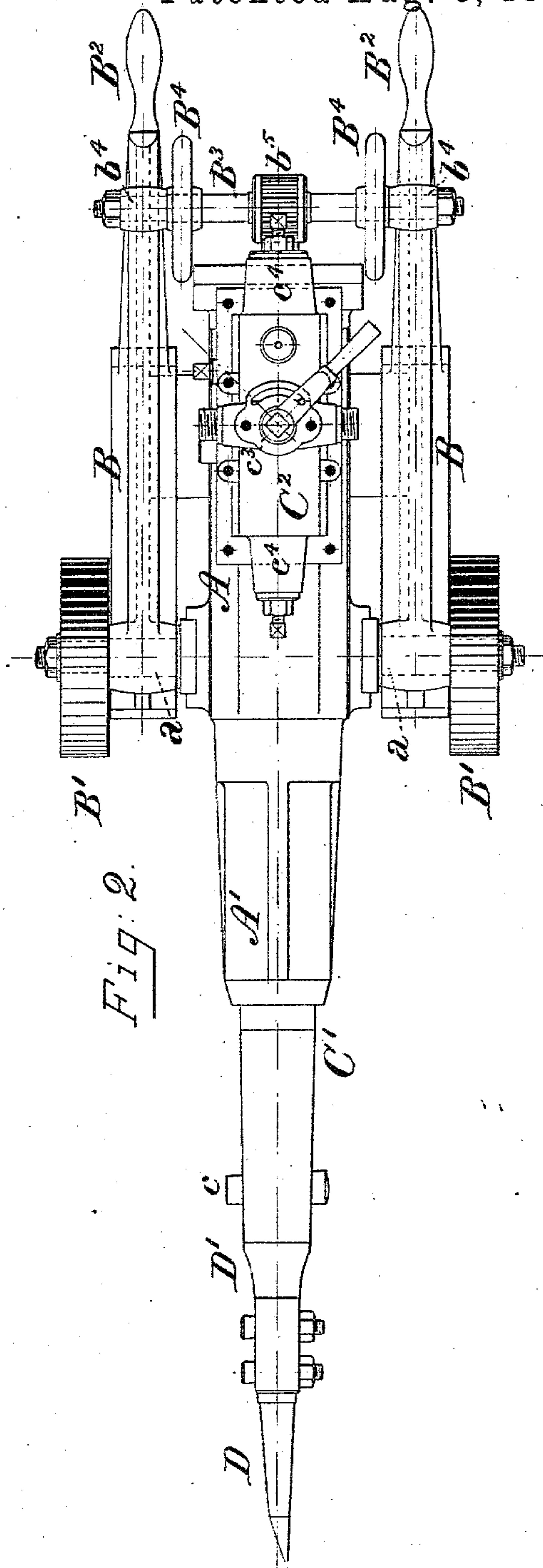


Fig. 2.

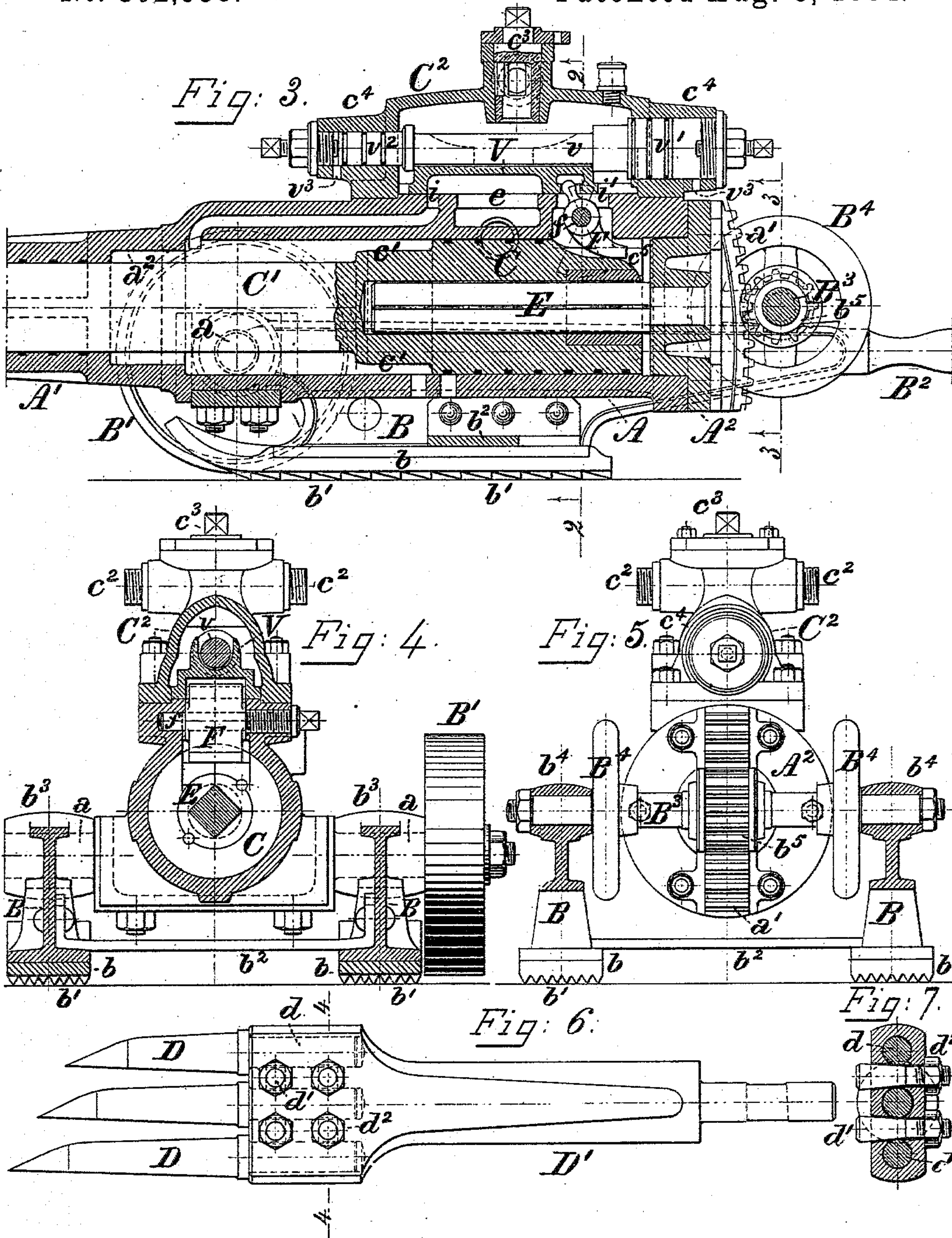
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INVENTOR:
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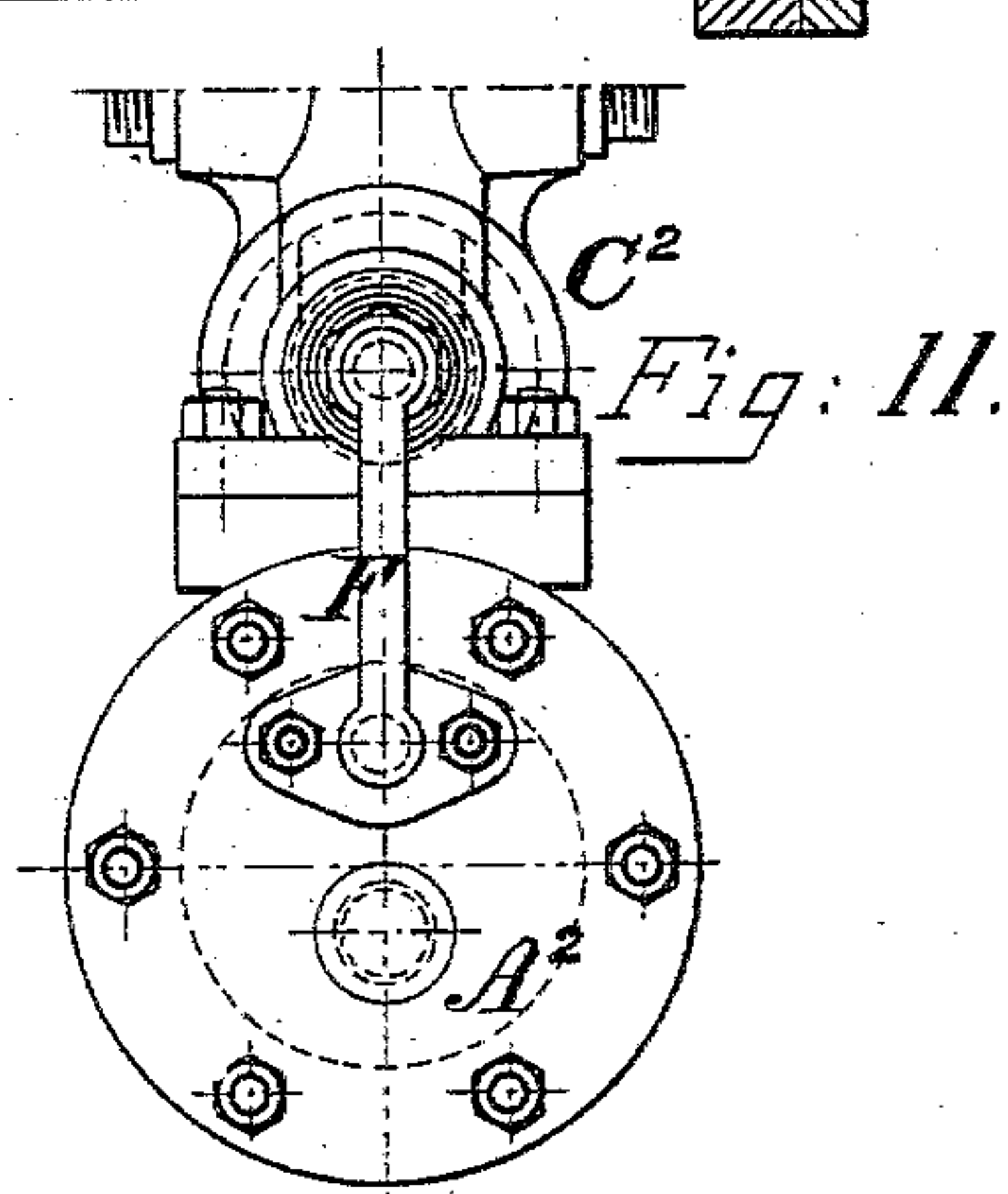
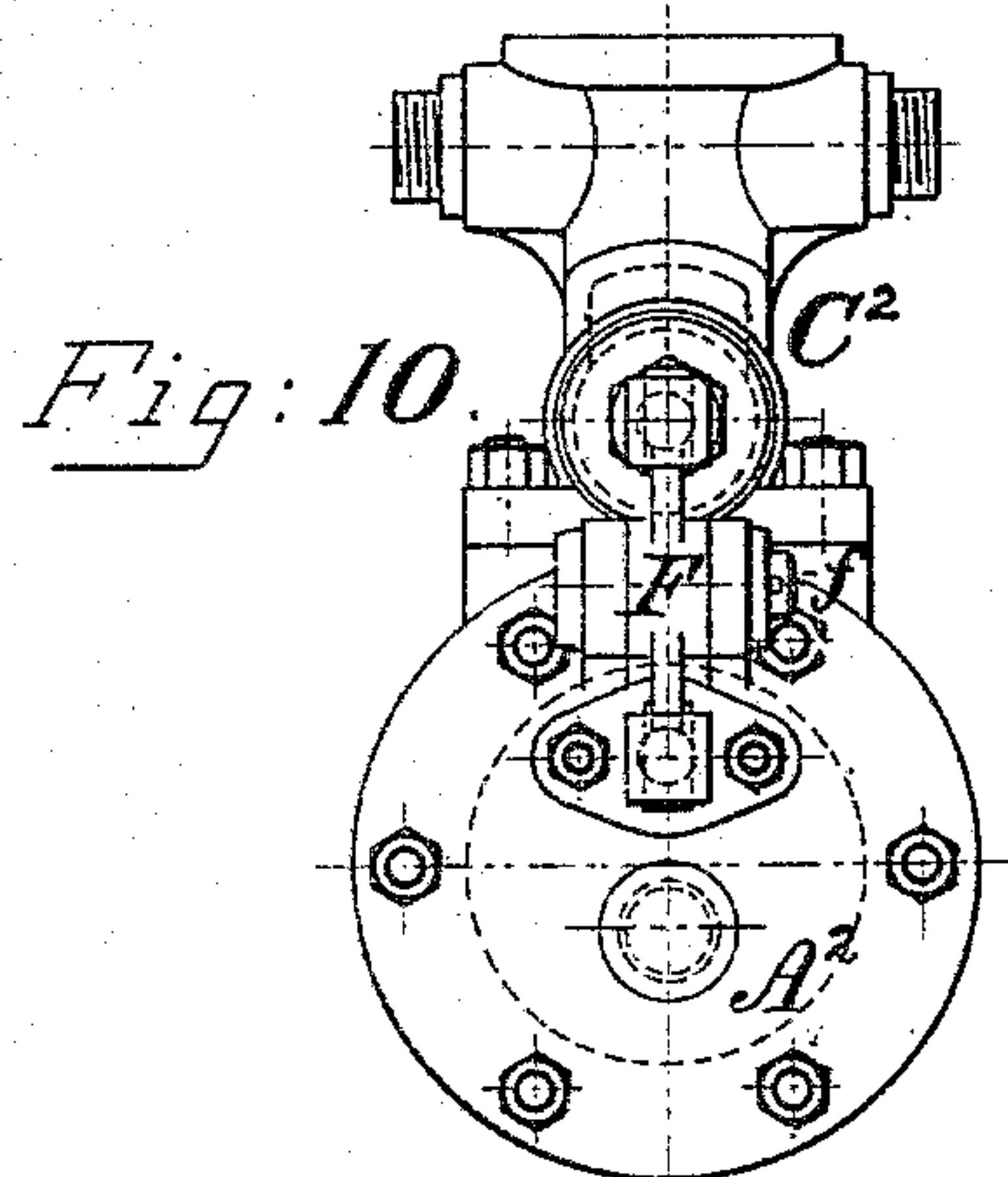
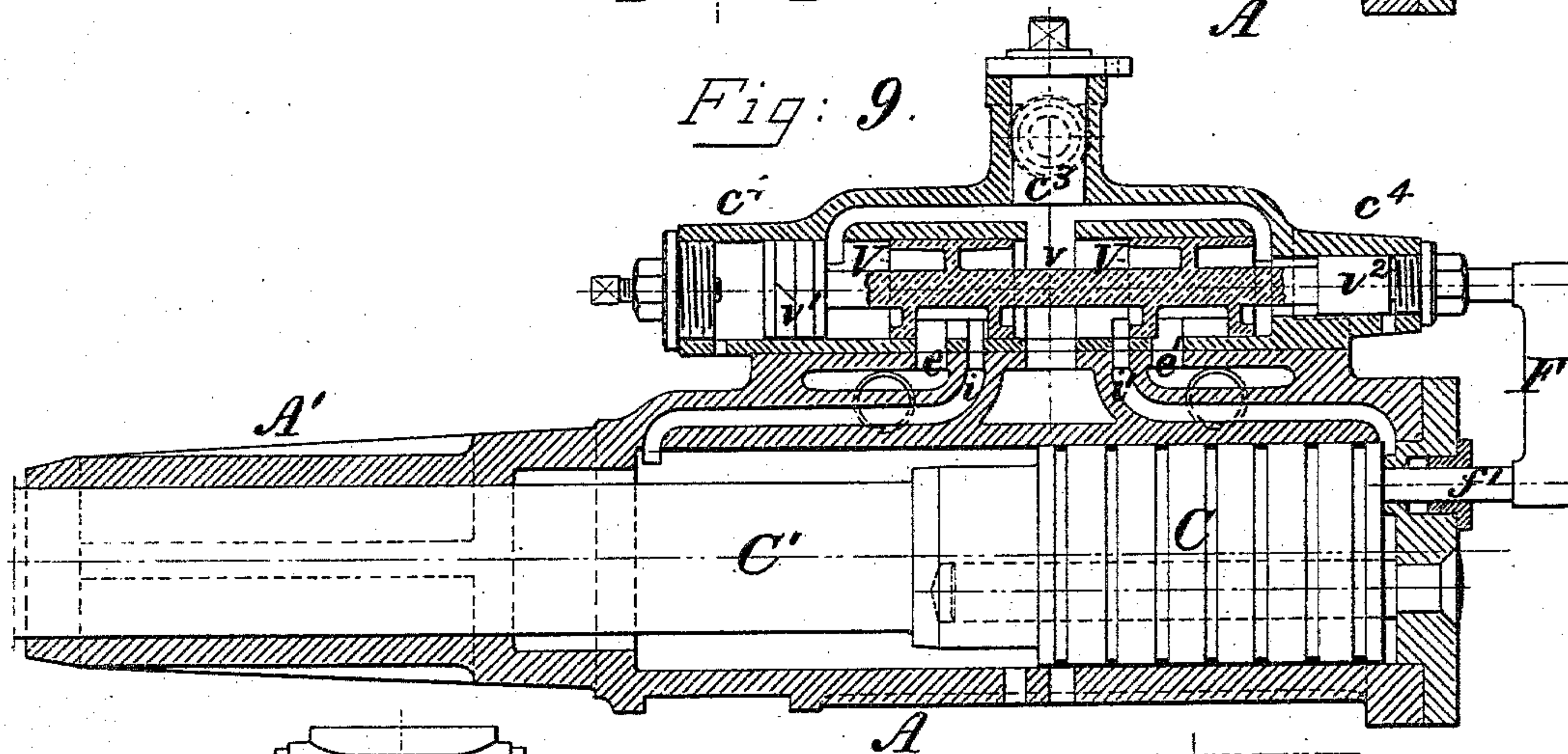
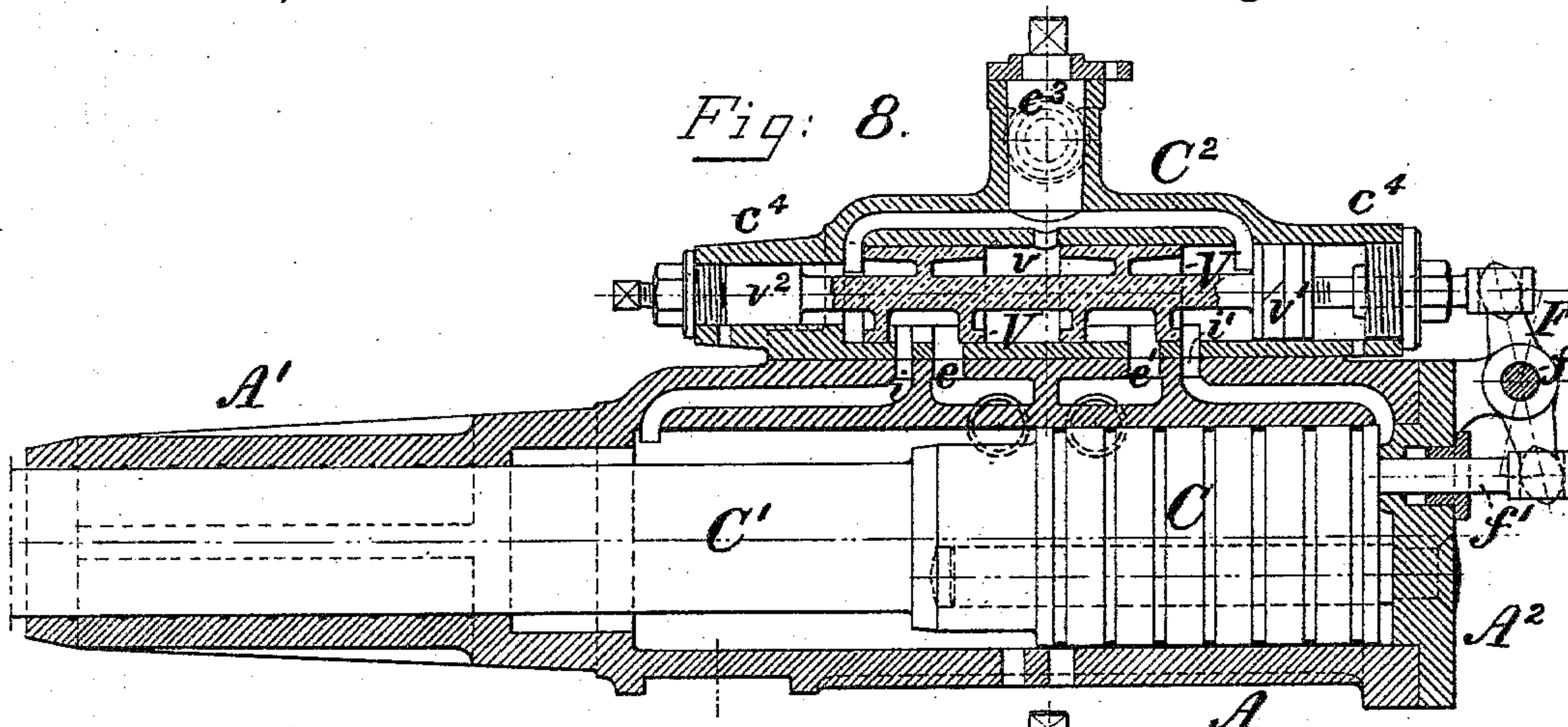
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3 Sheets—Sheet 3.

S. STUTZ.
MINING MACHINE.

No. 302,958.

Patented Aug. 5, 1884.



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UNITED STATES PATENT OFFICE.

SEBASTIAN STUTZ, OF PITTSBURG, PENNSYLVANIA.

MINING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 302,958, dated August 5, 1884.

Application filed January 18, 1884. (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 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 guide; Fig. 4, a vertical transverse section through the cylinder and valve-chest at the line 2 2 of Fig. 3; Fig. 5, a similar section through the bearings of the adjusting-shaft at the line 3 3 of Fig. 3; Fig. 6, a plan or top view of a pick-holder detached; Fig. 7, a transverse section through the same at the line 4 4 of Fig. 6; Figs. 8 and 9, Sheet 3, vertical longitudinal central sections through the cylinder, valve-chest, and guide, illustrating modifications in the valve and its operating mechanism; and Figs. 10 and 11 end views in elevation of the constructions shown in Figs. 8 and 9, respectively.

My present invention relates to coal and ore mining machines having a reciprocating pick or cutting-tool operated by the movements of a piston of a fluid-pressure cylinder; and its objects are specially to afford improved facilities for the support and convenient adjustment of the machine when in operation, and for rendering the same readily portable, and, further, to provide simple and effective means for operating the distribution-valve governing the movements of the main piston.

My improvements consist in certain novel devices and combinations, including a cylinder journaled on a pair of lateral supporting-frames carrying wheels mounted on the journals of the cylinder, means for adjusting the cylinder vertically about its journals, a piston and rod working in the cylinder and actuating one or more picks or cutting-tools secured in a holder of a special construction, and a distribution-valve moved in one direction by

a connection with the main piston and in the other by fluid-pressure upon an operating-piston.

The improvements claimed are hereinafter fully set forth.

To carry out my invention I provide a cylinder, A, having a long guide, A', for a piston-rod formed upon or secured to its front head, and closed at its opposite end by a rear head, A². The cylinder A is supported at or near its front end, or in advance of its center of gravity when fitted with its working connections, upon a pair of lateral sled-frames, B, whose lower sides are horizontal, and are provided with shoes or faces *b*, which are roughened or serrated by a series of backwardly-extending teeth or projections, *b'*, to prevent recoil of the machine in operation. The frames B are connected by a transverse brace, *b²*, and carry at their forward ends bearings *b³*, in which are fitted a pair of side trunnions, *a*, connected to or cast upon the cylinder A, which is thus adapted to be swung in a vertical plane about the axis of the trunnions.

The forward ends of the frames are curved upwardly eccentrically to a pair of carrying-wheels, B', which are mounted upon the trunnions *a* exterior to the bearings *b³* thereof, the diameter of the carrying-wheels being such that when the frames are swung either into a horizontal position or one in which their rear ends are downwardly inclined the carrying-wheels shall be entirely clear of the ground, and the frames B will then act as the support of the machine, while by elevating the rear end of the cylinder the carrying-wheels B' may be brought into contact with the ground and the frames B raised therefrom, to enable the machine to be transported from place to place upon the carrying-wheels, as may be desired. The movement of the cylinder about the axis of its trunnions serves to enable the vertical position of the points of the picks to be varied as may from time to time become necessary or desirable while the machine rests upon the supporting-frames B, as well as to raise the same from the ground in order to transport the machine upon its carrying-wheels, as above stated. Such movement is imparted to the cylinder, when required, by means of a transverse ad-

justing-shaft, B^3 , mounted in bearings b^4 on the rear ends of the frames B , and carrying a pair of hand-wheels, B^4 , by which it may be rotated. A spur-pinion, b^5 , on the adjusting-shaft B^3 meshes with a segmental gear, a' , on the rear cylinder-head, A^2 , said gear being concentric with the trunnions a , and by the rotation of the adjusting-shaft A^3 in one or the other direction, upward or downward movement, as required, may be imparted to the rear end of the cylinder A , to correspondingly lower or raise its front end and the points of the picks carried by its piston-rod. A pair of operating-handles, B^2 , project rearwardly from the frames B , said handles serving to enable the operator to resist tendency to upward movement of the machine in operation, as well as to change the position of the points of the picks laterally, and also to sustain the rear end of the frames in the movement of the machine from place to place.

The main piston C , which fits accurately in the cylinder A , is formed in one piece with or properly secured to a piston-rod, C' , which passes through the long front guide, A' , of the cylinder, and carries at its outer end a pick-holder, D' , which is connected to the piston-rod in such manner as to be readily attached to and detached from the same—in this instance by a transverse key, c . One or more picks or cutting-tools D may be connected to the outer end of the pick-holder D' , and where more than one is employed the several picks may be located either in a vertical series, as in Fig. 1, or a horizontal series, as in Fig. 6, so as to act simultaneously upon the face of the material to be operated on in a plane coinciding with the axis of the piston-rod, and may be either of uniform or of different lengths, as shown in said figures respectively. In the instance illustrated, cylindrical shanks d , formed upon the inner ends of the picks D , are inserted in corresponding sockets in the pick-holder D' , and are clamped therein by transverse wedge-bolts d' , having threads upon their smaller ends, engaging nuts d^2 , which may be screwed to a tight bearing against the side of the pick-holder. Each wedge-bolt may, as shown, act at opposite sides to secure two of the picks, and it will be seen that while the picks are firmly held in the sockets they may, by the slackening of the nuts, be readily detached and removed as required.

The main piston C is guided longitudinally, as well as held against axial rotation, by a rear guide-bar, E , which, in transverse section, is polygonal or otherwise different from circular, said bar entering a socket of corresponding form in the piston, and being secured to the rear head, A^2 , of the cylinder. A bar of circular section may be employed, if so located that its axis shall not coincide with the axis of the cylinder; but I consider a central guide of section as described to be preferable. To prevent shocks of the piston by contact with the front head of the cylinder, I form therein

a cylindrical cushion-chamber, a^2 , and provide the piston at its forward end with a corresponding cylindrical projection, c' . The compression of motive fluid induced in the chamber a^2 by the entrance of the projection c' as the piston nears the end of its forward stroke acts as a spring to resist its movement and prevent the shock that would otherwise be liable to ensue from its contact with the head.

The admission of motive fluid to and its exhaust from the cylinder A to impart reciprocating movement to the main piston C are effected by a slide distribution-valve, V , which is adapted to reciprocate on a valve-face on the upper side of the cylinder within a valve-chest, C^2 , secured thereto, and to govern the opening and closure of supply and exhaust ports i i' e therein, fluid being admitted to the valve-chest through either of two lateral supply-pipes, c^2 , controlled by a cock or valve, c^3 . The distribution-valve V is moved in the direction proper for the admission of motive fluid to the right-hand side of the main piston, in order to effect the outward or left-hand stroke thereof, by means of a valve-operating lever, F , which is coupled at its upper end to the distribution-valve, and is actuated by the contact of the main piston during its right-hand stroke with the lower end of the lever F , or with a rod or projection thereon. The opposite traverse of the distribution-valve—that is to say, that which supplies motive fluid for the right-hand or inward stroke—is effected by the pressure of the fluid within the chest upon the larger of two valve-operating pistons, v' v^2 , fixed upon a rod, v , which is coupled to or formed in one piece with the distribution-valve V .

Referring to Figs. 3 and 4, the distribution-valve V is shown as of the ordinary short D type, having a central exhaust-cavity, and as coupled to the rod v of the operating-pistons v' v^2 by being fitted between collars or shoulders thereon. The valve-operating lever F is journaled upon a transverse shaft, f , fixed in the metal of the cylinder, between the bore thereof and the valve-face, and is adapted to vibrate on said shaft within one of the supply-ports i' , which is enlarged for that purpose. The upper arm of the lever F engages a recess in the lower side of the valve V , and its lower arm, which is curved in the direction of the rear cylinder-head, A^2 , is so located as to be moved to the right by the contact of an upwardly-curved or inclined face, c^4 , formed on the upper side of the main piston C at the right-hand end thereof. The larger and the smaller valve-operating pistons v' v^2 , which are fixed upon opposite ends of the rod v , fit accurately in chambers c^4 at the ends of the valve-chest, which chambers communicate by ports v^3 with the atmosphere beyond the outer ends of the pistons, the inner ends of which are exposed to the pressure within the chest.

The main piston C is shown in Fig. 3 as at the commencement of its left-hand or outer

stroke, motive fluid to effect the same being admitted through the rear supply-port, i' . Upon the traverse of the piston for such distance as to permit its inclined face c' to clear the lower end of the valve-operating lever F, the preponderance of pressure upon the larger valve-operating piston v' forces the pistons $v'v^2$ and the connected distribution-valve V to the right, opening the front supply-port, i , and establishing communication between the right-hand side of the piston and the exhaust-port e . The admission of motive fluid through the front supply-port, i , effects the right-hand stroke of the piston C, toward the termination of which the contact of the face c' with the valve-operating lever F moves the valve V to the left and admits motive fluid for the next left-hand stroke. It will thus be seen that the movement of the valve toward the rear end of the cylinder, being effected by fluid-pressure in the valve-chest, is independent of the length of stroke of the main piston, and that, irrespective of the variable stroke of the piston induced by variations in the distance between the cutting-tool and the face of the material to be worked, the distribution-valve will be shifted from left to right to admit pressure for the return-stroke of the piston.

In the modifications illustrated in Figs. 8 to 11 the distribution-valve V is a piston-valve in lieu of a D-slide, as above described, and is cast in one piece with the rod v of the valve-operating pistons $v'v^2$. The valve-operating lever F is, further, located upon the outside of the cylinder-head, and is provided with a stem, f' , passing through a stuffing-box therein, said stem transmitting the movement of the main piston to the lower end of the lever, the upper end of which is coupled to the rod of the valve-operating pistons. In Figs. 8 and 10 the lever is double-armed and journaled to vibrate upon a transverse shaft, as in Figs. 3 and 4, while in Figs. 9 and 11 a journal is dispensed with, and a reciprocating in lieu of a vibrating lever is employed. It will be obvious that in such case the movements of the distribution-valve must be in reverse direction to those of the valve of Figs. 3, 4, 8, and 10; and to enable such movements to be effected, the exhaust-ports $e e'$ are located exteriorly to the supply-ports $i i'$ —that is to say, between said supply-ports and the ends of the cylinder—such location being similar to that employed in steam-hammers and other apparatus in which a movement of the valve and piston in the same direction is required to be effected. In each instance, however, the distribution-valve is moved in one direction by the contact of the main piston with the valve-operating lever, and in the other by the preponderance of pressure upon the larger valve-operating piston, as first above described.

I claim herein as my invention—

1. In a mining-machine, the combination, substantially as set forth, of a cylinder, a pis-

ton and rod working therein and adapted to reciprocate a pick or cutting-tool, and a pair of lateral truck-frames, upon and between which the cylinder is journaled, and which are adapted to serve as the supports of the machine when in operation.

2. In a mining-machine, the combination, substantially as set forth, of a cylinder provided with lateral trunnions, a pair of supporting truck-frames having bearings adapted to receive said trunnions, and a pair of carrying-wheels mounted upon the trunnions.

3. In a mining-machine, the combination, substantially as set forth, of a pair of supporting truck-frames adapted to support the machine when in operation, having bearings at or near their front ends, a cylinder provided with lateral trunnions which are journaled in said bearings, a segmental gear secured to the rear head of the cylinder and concentric with the trunnions, and an adjusting-shaft mounted in bearings at the rear of the supporting-frames, and carrying a pinion which meshes with said segmental gear.

4. In a mining-machine, the combination, substantially as set forth, of a pair of supporting-frames, a cylinder provided with lateral trunnions journaled in bearings at or near the front of said frames, a pair of carrying-wheels mounted on said trunnions, and a pair of operating-handles projecting rearwardly from the supporting-frames.

5. In a mining-machine, the combination, substantially as set forth, of a pair of supporting-frames, a cylinder journaled in bearings on the upper sides of said frames, and horizontal shoes connected to the lower sides of the supporting-frames, and provided with a series of rearwardly-inclined teeth or projections.

6. In a mining-machine, the combination, substantially as set forth, of a steam or air cylinder, a piston and rod adapted to reciprocate therein, and a series of two or more picks or cutting-tools connected to the outer end of a pick-holder secured directly to the piston-rod, so as to act simultaneously upon the face of the material to be operated on in a plane coinciding with the axis of the piston-rod.

7. The combination, substantially as set forth, of a distribution-valve adapted to govern the supply and exhaust passages of a steam or air cylinder, a valve-operating lever coupled to said valve and adapted to be moved in one direction by the contact of the piston of said cylinder, and a pair of valve-operating pistons of different diameters, said pistons being fixed upon a common rod connected to the distribution-valve, and being open on their inner sides to the pressure within the valve-chest and on their outer sides to the pressure of the atmosphere.

8. The combination, substantially as set forth, of a cylinder, a main piston and rod working therein, a valve-chest, a distribution-valve moving therein and governing the

supply and exhaust passages of the cylinder, a valve-operating lever coupled at its upper end to the distribution-valve, and adapted to be moved in one direction by the action of
5 the main piston upon its lower end, a pair of valve-operating pistons fixed upon a common rod connected to the distribution-valve, a pair of sockets or chambers fitting said pistons and communicating with the valve-chest, and ports or passages connecting said chambers with the atmosphere on the outer sides of their pistons.

In testimony whereof I have hereunto set my hand.

SEBASTIAN STUTZ.

Witnesses:

J. SNOWDEN BELL,
R. H. WHITTLESEY.