

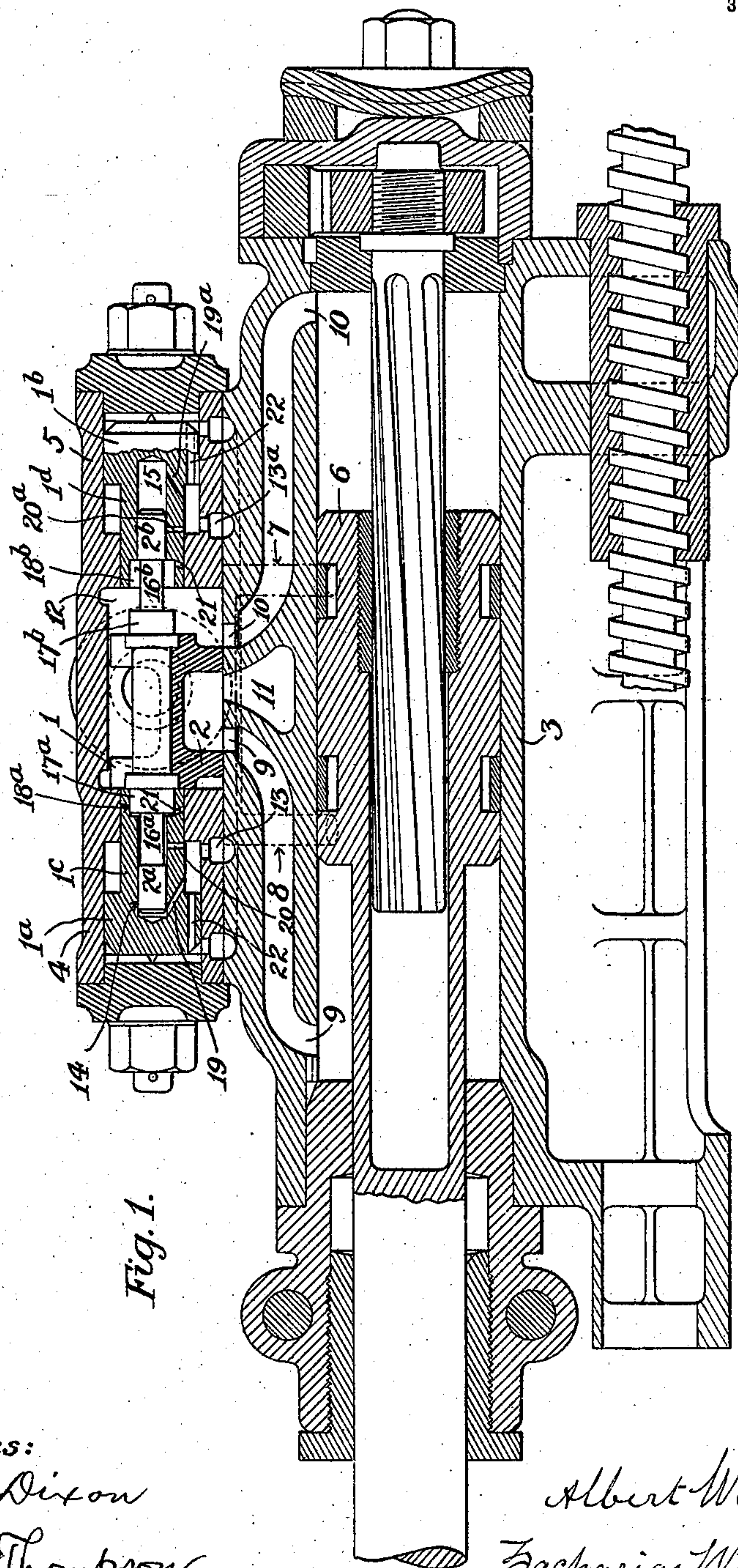
No. 847,739.

PATENTED MAR. 19, 1907.

A. W. & Z. W. DAW.
VALVE FOR PERCUSSIVE ROCK DRILLS.

APPLICATION FILED AUG. 30, 1906.

3 SHEETS—SHEET 1.



Witnesses:

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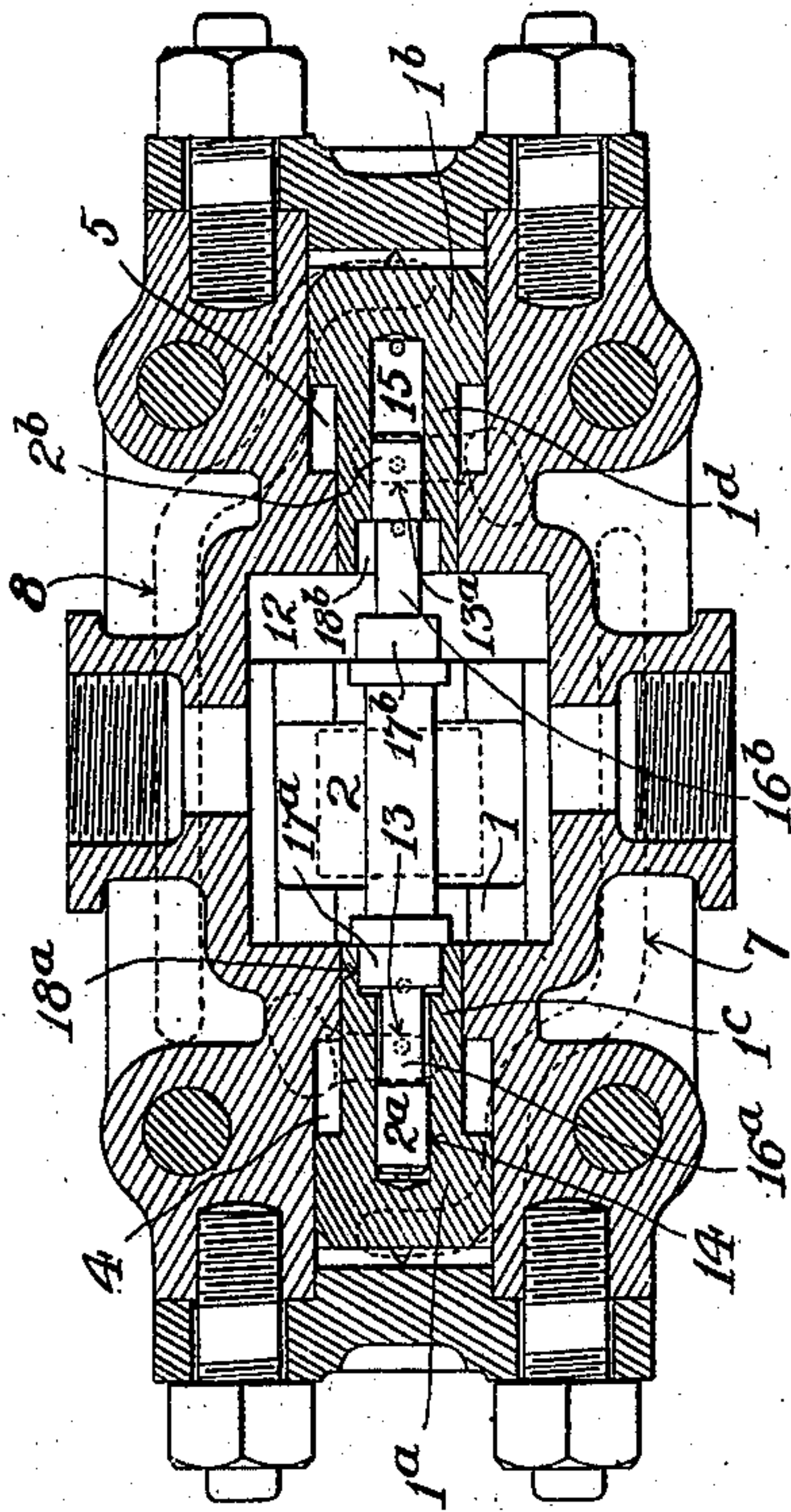


Fig. 2.

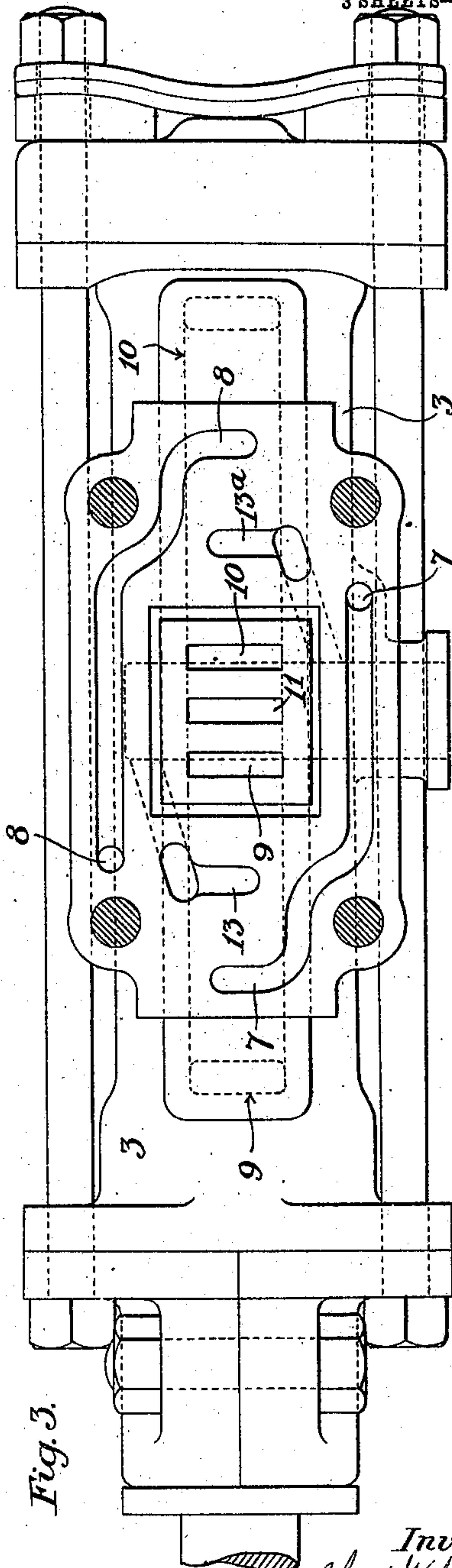


Fig. 3.

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Fig. 4.

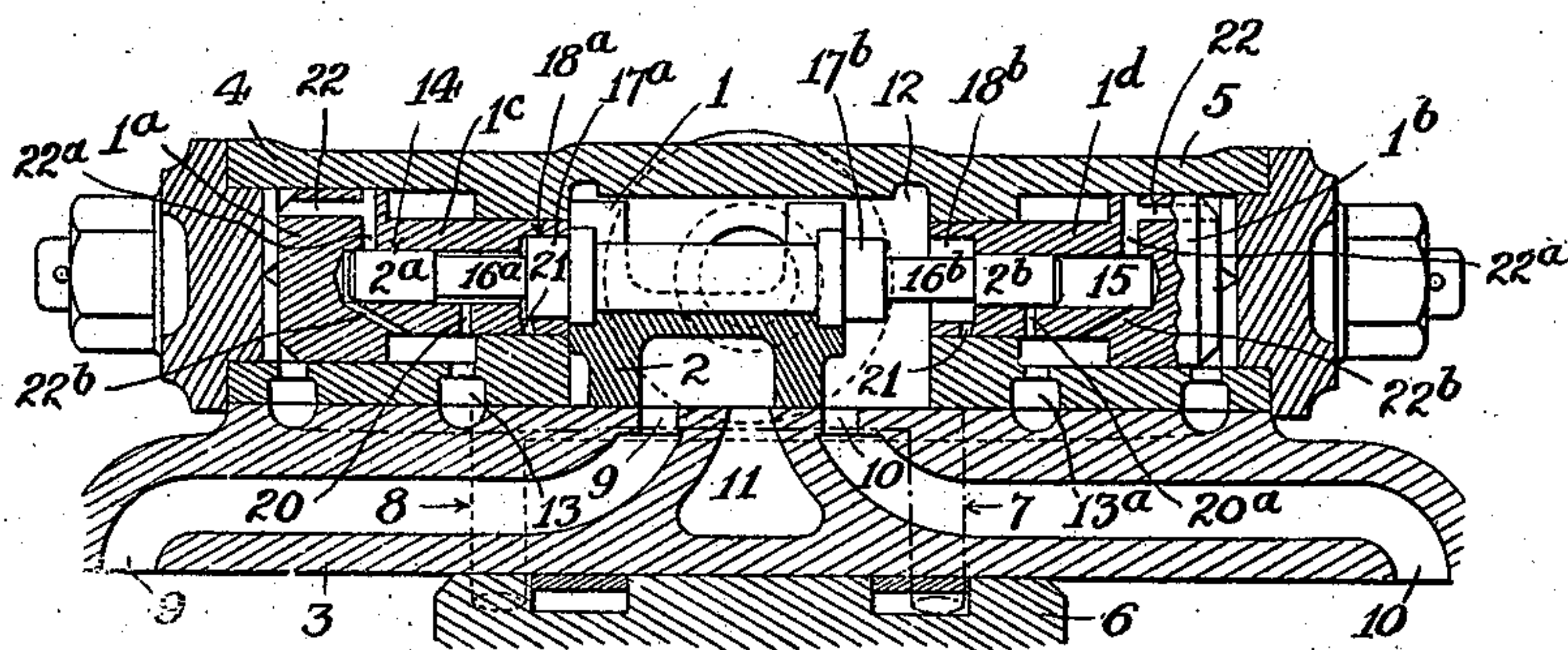
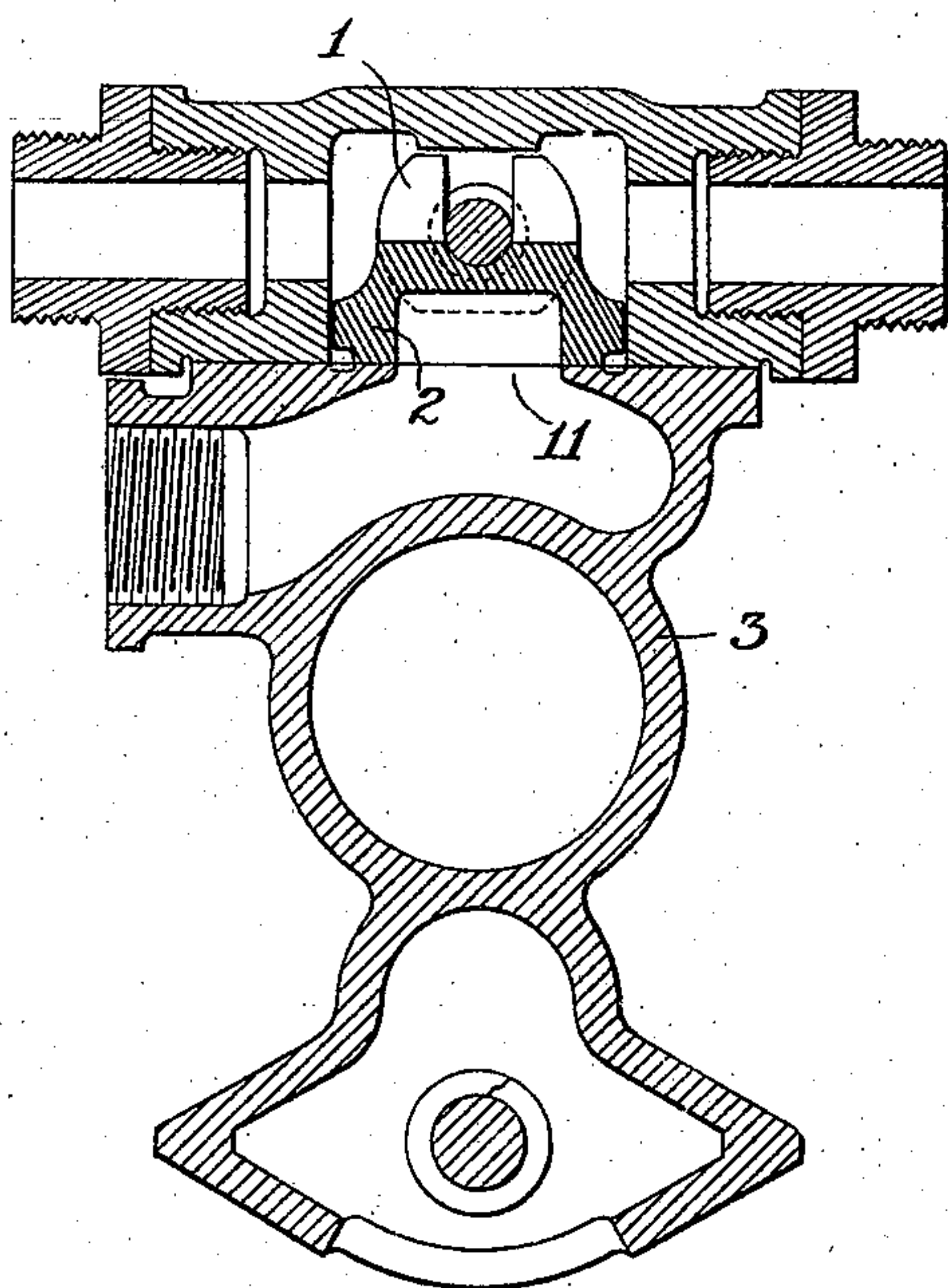


Fig. 5.

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UNITED STATES PATENT OFFICE.

ALBERT WILLIAMS DAW AND ZACHARIAS WILLIAMS DAW, OF
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VALVE FOR PERCUSSIVE ROCK-DRILLS.

No. 847,739.

Specification of Letters Patent.

Patented March 19, 1907.

Application filed August 30, 1906. Serial No. 332,695.

To all whom it may concern:

Be it known that we, ALBERT WILLIAMS DAW and ZACHARIAS WILLIAMS DAW, both subjects of the King of Great Britain, residing at Mansion House Chambers, 11 Queen Victoria street, in the city of London, England, have invented new and useful Improvements in and Connected with Valves for Percussive Rock-Drills, Direct-Acting Pumps, and Engines, of which the following is a specification.

This invention relates to improvements in and connected with that class of percussive rock-drills, direct-acting pumps and engines in which a slide or piston valve is employed, acting in conjunction with passages leading to the opposite ends of the main-piston cylinder and serving to place same alternately open to supply and exhaust, while the main piston in its travel governs passages leading to the opposite ends of cylinders containing pistons which actuate said slide or piston valve.

The present invention is illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal section through the drill-cylinder and valve-chest; Fig. 2, a horizontal section through the valve-chest; Fig. 3, a plan view of the drill with the valve-chest removed; and Fig. 4, a transverse section of the drill-cylinder and valve-chest, taken through the main exhaust-passage of the former and the supply-passage to the latter. Fig. 5 is a longitudinal section through the valve-chest, showing a modification of the passage through the piston actuating the valve.

According to the present invention we make the valve in three distinct parts 1 1^a 1^b, the central part 1 carrying the valve proper, 2, to control the supply and exhaust to the main-piston cylinder 3, and on each side of which valve 2 a separate part or piston 1^a 1^b is mounted in suitable cylinders 4 5 and so as to be capable of independent movement in relation to the slide-valve itself.

The action is that when the main piston 6 in its travel opens the outer end of one of the cylinders 4 5 of the valve-pistons 1^a 1^b to the live pressure by uncovering either the passage 7 or 8 in the main cylinder 3, leading, respectively, thereto, the valve 2 will be moved over so as to reverse the supply and exhaust to the main piston through the usual ports and passages 9, 10, and 11. The abutting surfaces of the piston 1^a or 1^b, which has actuated the valve 2, and the end of such valve

are open to the live pressure of the actuating fluid in the valve-chest 12, so that such pressure exerting itself between same will, as shown on the right-hand side of Fig. 1, move the valve-piston 1^a or 1^b, as the case may be, back to its rear position in relation to the valve 2 after same has been shot over, leaving the valve itself in the position to which it has been moved. Meanwhile the main piston 6 on its return stroke will have opened the passage 7 or 8 leading to the rear of the other valve-piston cylinder 4 or 5, and the valve 2 will consequently be again reversed.

The inward portion 1^c 1^d of each valve-piston 1^a 1^b is of reduced diameter, and the space in which such reduced portion works has a passage 13 13^a permanently open to exhaust 11, so that when the rear of such piston is, through passage 9 or 10, open to pressure the front thereof is open to exhaust.

In order to insure a perfect locking of the valve 2 in the different positions to which it is moved, instead of forming the valve-pistons 1^a 1^b solid and simply causing same to abut against said valve, we preferably core out such pistons and provide the valve with an extension 2^a 2^b on each side to work in the cylinder or cored-out portion 14 15. The extreme outer end of such extensions 2^a 2^b constitute pistons working in the cylinders 14 15, formed by the bore made in the valve-pistons 1^a 1^b, after which there is a portion 16^a 16^b, of reduced diameter, and then an inner piston 17^a 17^b, adjacent to the valve 2, and which also works in an enlarged portion 18^a 18^b of the bore 14 15 of said valve-piston 1^a 1^b.

At the rear of the bore 14 15 of the valve-pistons is a passage 19 19^a and at an intermediate point in its length is another passage 20 20^a, both communicating with the permanent exhaust-passages 13 13^a, above referred to, while the enlargement at the inner end of the bore of such valve-piston has a passage 21, which when the latter has traveled a certain distance is open to the live pressure in the valve-chest 12, and so permits the latter to enter the enlargement, and consequently assist the pressure acting between the abutting surfaces of the valve-piston 1^a and 1^b, as the case may be, and the valve 2 in forcing back the valve-piston in relation to the extension 2^a or 2^b of the latter.

The two exhaust-passages 19 19^a in the bore of the valve-pistons 1^a 1^b respectively

serve to place the rear piston of the valve extension 2^a 2^b open to the permanent exhaust 11, while the intermediate passage 20 20^a serves to place the space between the reduced portion 16^a 16^b of the extension and the enlarged piston 17^a 17^b at its inner end open to the permanent exhaust 11 when the latter piston has entered its cylinder 18^a 18^b in the valve-piston bore.

It will be readily understood that the reverse movements occurring simultaneously at the opposite ends of the slide-valve 2 the latter will be effectually locked in any position to which it has been moved by the valve-pistons 1^a 1^b.

A small bore 22 may also, if found necessary, be pierced from the front to the rear of each valve-piston 1^a 1^b, so as to place the rear thereof open to the permanent exhaust 11, and so serve as an auxiliary exhaust, and also to avoid all detrimental effect from any slight leakage which might occur between the main piston 6 and its cylinder 3; but in order to prevent loss of air by the passage 22 to exhaust at the moment when the passage 7 or 8 in the main cylinder 3 is uncovered by the travel of the main piston 6 we prefer to make such passage in two portions, as shown in Fig. 5, one portion thereof leading from the rear of the piston to a point 22^a near the rear end of the cylinder 14 15, in which pistons 2^a 2^b work and from the rear of which the second part 22^b of said passage leads to the front of pistons 1^a 1^b, and so through passage 13 13^a to permanent exhaust 11. The result is that the pressure in the valve-chest 12, acting on the part 1^a 1^b, moves same backward, as shown on the right-hand side of the Fig. 5, and the exhaust is open through passages 22 22^a 22^b to 13 13^a, and so to permanent exhaust 11; but at the moment of reversal of the valve 2 said passages will be cut off from exhaust, as shown on the left-hand side of said figure, the passage 22^a being closed by piston 2^a.

In the special construction above described the main piston 6 is of uniform diameter throughout and no longer requires a central depression or portion of reduced diameter, and by such construction we are enabled to make the drill of considerably-reduced length, and consequently of greatly-reduced weight and at less cost.

What we claim as our invention, and desire to secure by Letters Patent, in percussive rock-drills, direct-acting pumps, and engines of the class hereinbefore described, is—

1. In combination, a main cylinder and piston, a valve-chest, a main supply and exhaust valve, separate cylinders with pistons abutting against each side of said main valve, the abutting ends of said separate pistons being of reduced diameter and always open to the live pressure in said valve-chest, so as to be returned to position, intermittently-open

passages from said main cylinder to the rear of said separate pistons, and permanently-open passages from the front of said separate cylinders to the main exhaust-passage, substantially as specified.

2. In combination, a main cylinder and piston, a valve-chest, a main supply and exhaust valve, separate pistons abutting against each side of said main valve, being of reduced diameter at their abutting ends, the outer ends of the cylinders of said separate pistons and the main cylinder connected by passages, said separate pistons being cylindrically cored, the anterior portions with enlarged bore, opening into the valve-chest, piston-like extensions on said main valve on each side, to work in said cored cylinders, said extensions having an enlarged portion to work in the enlarged bore, and a reduced intermediate portion, the valve-chest and said enlarged bore being connected by passages to intermittently admit live pressure to the latter, substantially as specified.

3. In combination, a main cylinder, a piston therein, a valve-chest, a main supply and exhaust valve, separate pistons abutting against each side of said main valve, being of reduced diameter at their abutting ends, the outer ends of the cylinders of said separate pistons and the main cylinder connected by passages, said separate pistons being cylindrically cored, the anterior portions with enlarged bore, opening into the valve-chest, piston-like extensions on said main valve on each side, to work in said cored cylinders, said extensions having an enlarged portion to work in the enlarged bore, and a reduced intermediate portion, the valve-chest and said enlarged bore being connected by passages to intermittently admit live pressure to the latter, said cored cylinder being open permanently at the rear to exhaust by-passages, and open intermittently to main exhaust by intermediate passages opposite said reduced portions of the piston extensions, substantially as specified.

4. The combination of a valve made in three parts and with the central portion or valve proper carrying an extension working in cylinders bored in the outer parts thereof, of a passage made in two portions one leading from the rear of the valve-piston to a point near the end of the cylinder in which said extension works, and the other from the rear of said cylinder to the front of said piston and opening to permanent exhaust, substantially as specified.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

ALBERT WILLIAMS DAW.

ZACHARIAS WILLIAMS DAW.

Witnesses:

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W. J. FERRY.