No. 834,974. PATENTED NOV. 6, 1906.

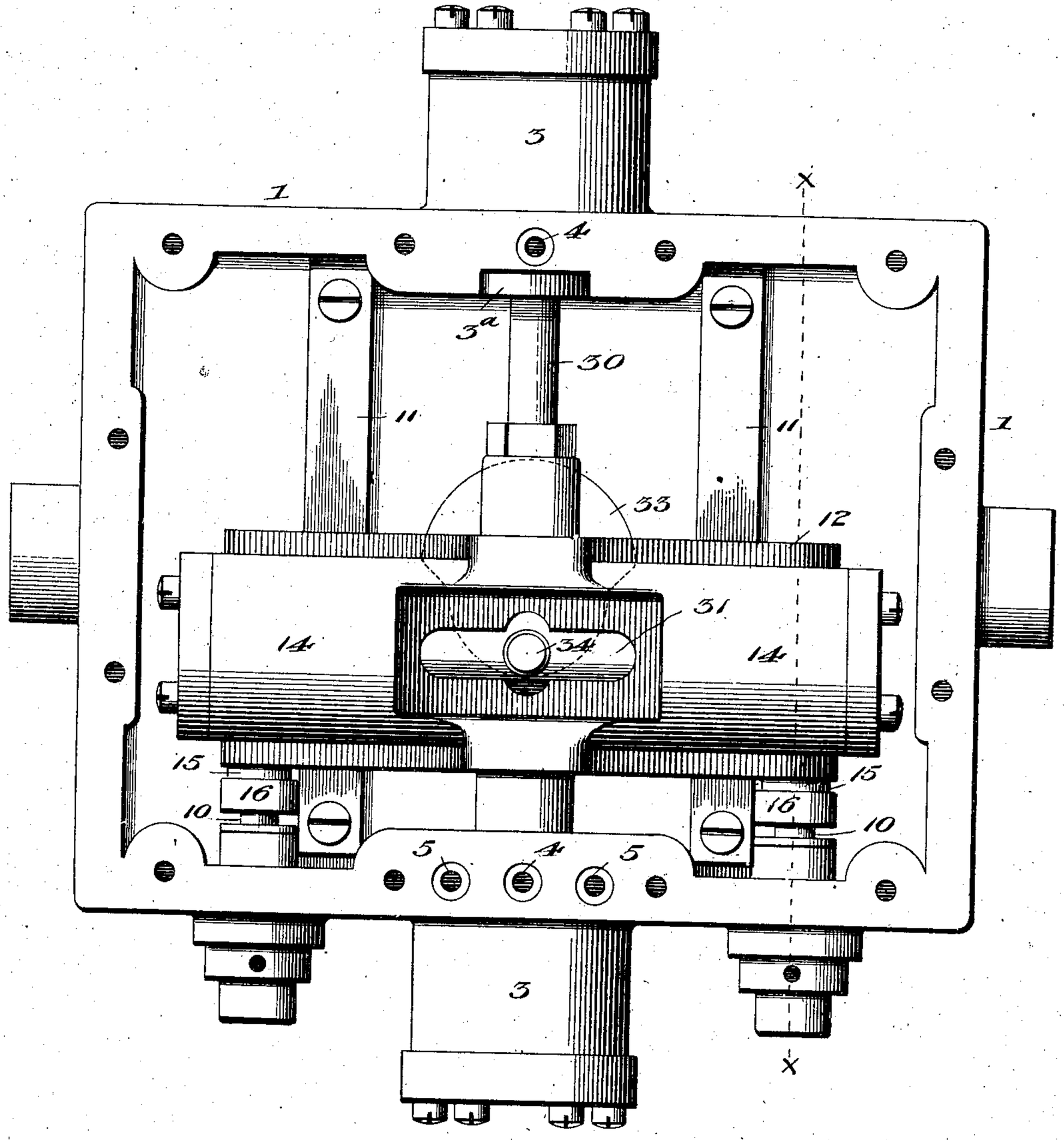
F. A. GENUNG & W. M. SPOOR.

ENGINE.

APPLICATION FILED DEC. 7, 1905.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses

Wm. C. Dashiell.

R. C. Braddock.

Inventors

Fred A. Genung and

William M. Spoor

By James Hamilton

Attorney

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4 SHEETS—SHEET 2.

Fig. 2.

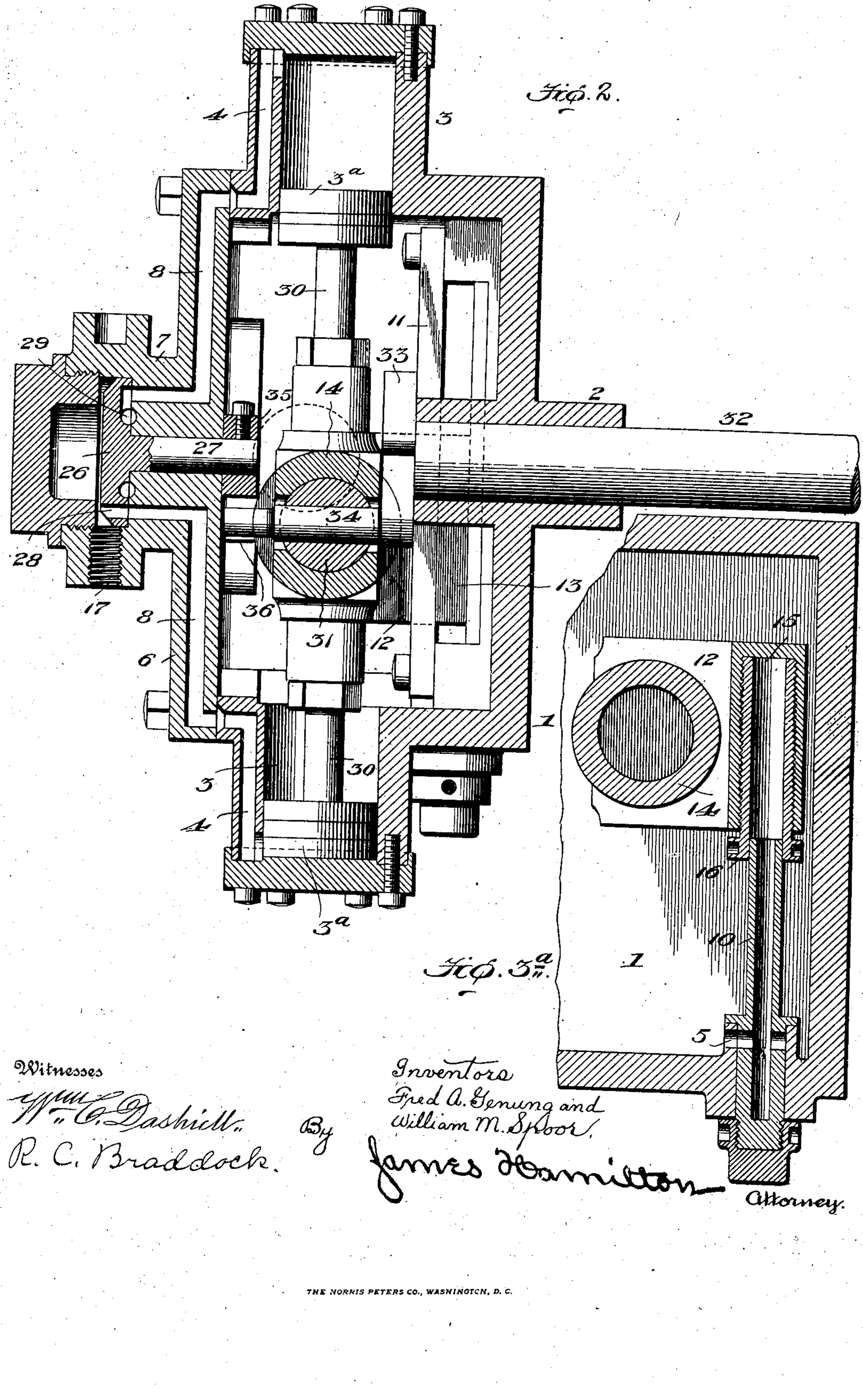

Fig. 3a.

Witnesses

Wm. C. Dashiell.

R. C. Braddock.

Inventors

Fred A. Genung and

William M. Spoor,

By James Hamilton

Attorney.

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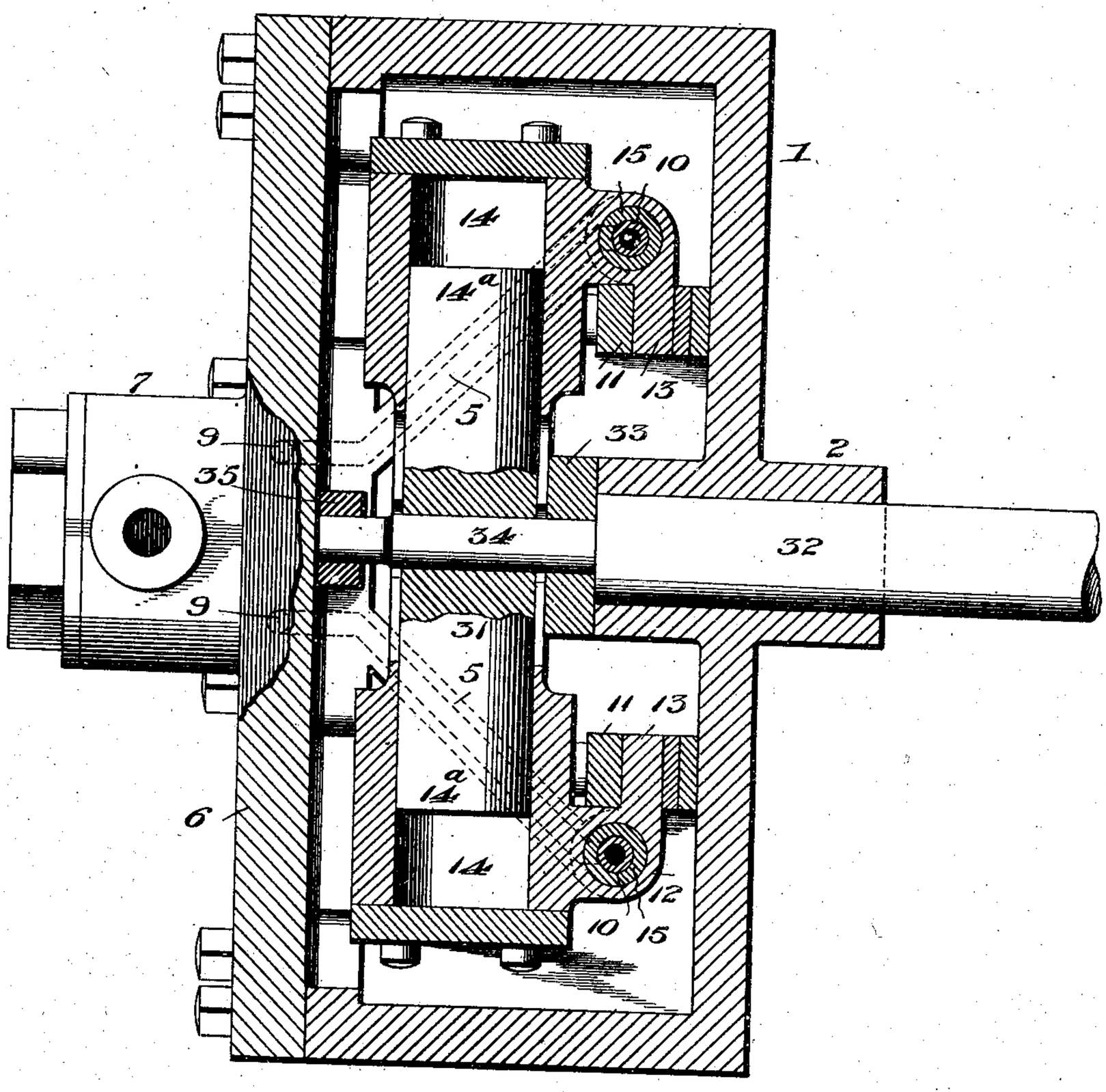
4 SHEETS—SHEET 3.

Fig. 3.



Witnesses

Wm. C. Daskiell.

R. C. Braddock.

Inventors

Fred A. Genung and

William M. Spoor.

By James Harrison

Attorney

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4 SHEETS—SHEET 4.

Fig. 4.

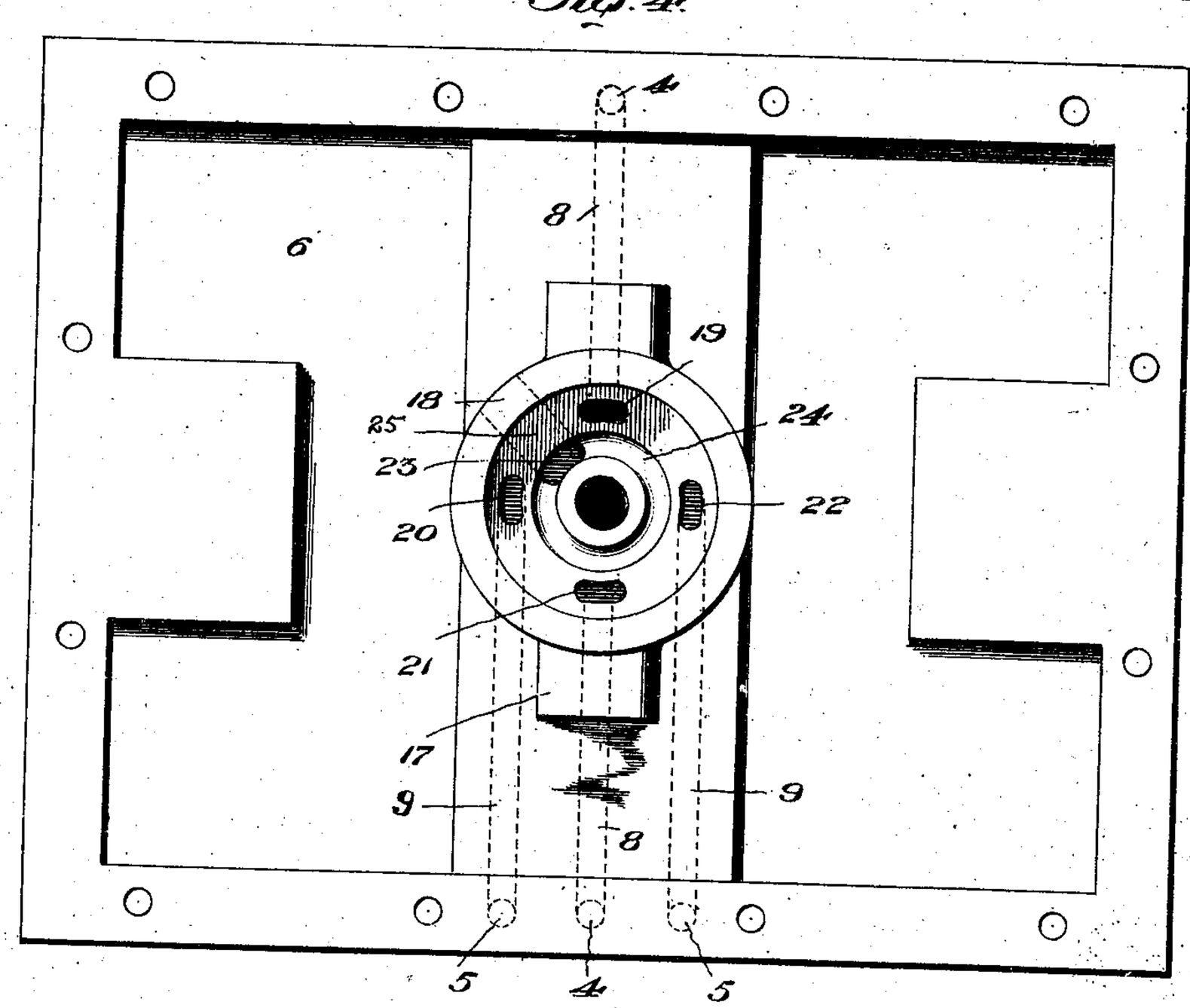
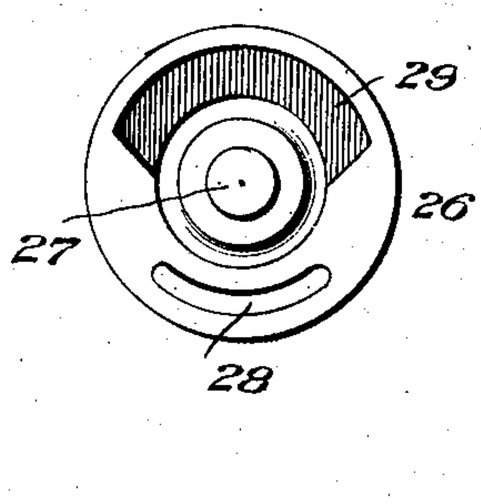


Fig. 5.



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Wm. C. Dashiell.

R. C. Braddock.

Inventors

Fred A. Genung and

William M. Spoor,

By James Hamilton

Attorney

UNITED STATES PATENT OFFICE.

FRED A. GENUNG AND WILLIAM M. SPOOR, OF PAINTED POST, NEW YORK.

ENGINE.

No. 834,974. Specification of Letters Patent. Patented Nov. 6, 1906.

Application filed December 7, 1905. Serial No. 290,802.

To all whom it may concern:

Be it known that we, FRED A. GENUNG and WILLIAM M. SPOOR, citizens of the United States, residing in Painted Post, in the county of Steuben and State of New York, have invented certain new and useful Improvements in Engines, of which the following is a specification, reference being had to the accompanying drawings.

Our invention relates to improvements in engines in which the pistons of a multiplicity of cylinders operate in conjunction with a crank-shaft; and it has for its object to provide an engine of the type stated in which one or more cylinders and their respective pistons are utilized to move a sliding cross-head in opposite directions and motion is taken from a piston or pistons carried in a cylinder or cylinders on said cross-head to rotate a shaft, whereby the engine is enabled to run at a high rate of speed with but a minimum amount of friction and the general efficiency of the engine is materially increased.

The invention will be fully understood from the following description, when taken in connection with the accompanying drawings, forming part of this specification, in which—

Figure 1 is a front elevation of our improvement in multiple-cylinder engines as the same appears with the face-plate of its casing removed; Fig. 2, a section taken through the vertical center of the engine and showing the face-plate of the casing in position; Fig. 3, a horizontal section taken through the sliding cross-head of the engine. Fig. 3^a is a sectional view through one of the telescopic conduits on the line x x of Fig. 1, showing the cylinders 14 raised; Fig. 4, a front elevation of the face-plate of the casing with the closure-cap of the valve-box removed, and Fig. 5 an elevation of the inner side of the rotary valve.

Similar numerals designate corresponding parts in all of the views of the drawings, referring to which—

1 is the body of the engine-casing, which is provided at the center of its back wall with a bearing 2 and on its lower and upper side walls with cylinders 3, having steam passages or conduits 4, and is also provided on its lower side wall with steam passages or conduits 5.

6 is the face-plate of the casing, which carries a valve-box 7 and is provided with steam-passages 8, registered with the steam-passages 4, and steam-passages 9, registered with the steam-passages 5.

10 10 are upright tubes or conduits fixed to and rising from the lower side wall of the casing-body 1 and communicating with the steam-passages 5.

11 11 are upright guides fixed to the back wall of the casing-body; 12, a sliding cross-head having lugs 13, engaging the guides, as best shown in Fig. 3, and 14 14 cylinders carried by said cross-head and having depending tubes 15, which telescopically receive the fixed tubes 10 and are provided at their lower ends with stuffing-glands 16.

The valve-box 7 is provided with an inlet-port 17 for steam or other suitable fluid under pressure and an exhaust-port 18, and it is also provided, as best shown in Fig. 4, with ports 19, 20, 21, and 22, arranged in a common circle, and a port 23, arranged in a circular channel 24, smaller than the circle in which the four ports are arranged. The port 19 communicates with the upper passage 8. The port 21 communicates with the lower passage 8. The ports 20 and 22 communicate with the passages 9, and the port 23 communicates through a passage 25 with the exhaust-port 18.

In the box 7 is arranged the head 26 of a rotary valve the stem 27 of which extends through the face-plate of the casing into the casing and is designed to be rotated by the crank-shaft presently described. The said head 26 of the valve is provided with a transverse slot 28, which describes a part of a circle of the same diameter as that in which the ports 19, 20, 21, and 22 are arranged, and it is also provided in its inner side with a chamber 29, a part of which is arranged to register with the ports 19, 20, 21, and 22 and a part with the channel 24 and the port 23. From this it follows that as the head 26 of the valve rotates with the crank-shaft, presently described, the slot 28 of said valve will effect connection between the steam-inlet port 17 and the ports 21, 20, 19, and 22 in succession, or vice versa, according to the direction of rotation, while the chamber 29 will effect connection between the exhaust-port 18 and the ports 21, 20, 19, and 22 in succession, or vice versa, according to the direction of rotation. This will obviously assure steam being supplied to and exhausted from the outer ends of the four cylinders at the proper times, and it will also be observed that while steam is being supplied to one cylinder 3 steam is ex-

hausted from the other cylinder 3 and while steam is being supplied to one cylinder 14 steam is exhausted from the other cylinder 14.

3ª 3ª are pistons movable in the cylinders 3 and rigidly connected through rods 30 with the cross-head 12.

14ª 14ª are pistons movable in the cylinders 14 of the cross-head 12 and rigidly connected together through the medium of a rod 31.

32 is a shaft journaled in the bearing 2 of the casing-body and having a crank 33 at its inner end carrying a wrist-pin 34, which is journaled in the rod 31 intermediate the pistons 14ª, and 35 is an arm set on the stem of the rotary valve and having a bifurcation 36, receiving the wrist-pin, whereby the said rotary valve is turned synchronously with the shaft 32.

It will be apparent from the foregoing that when steam or other suitable fluid-pressure is supplied to and exhausted from the several cylinders in the manner described the cross-head 12 will be moved up and down and the rod 31 will be reciprocated, with the result that through the medium of the wrist-pin 34 the shaft 32 and the rotary valve will be continuously rotated in one direction or the other, and this with but a minimum amount of strain and friction on the working parts, even when a high rate of speed is maintained. It will also be apparent that the telescopic tubes appurtenant to the casing-body and the sliding cross-head, respectively, will maintain constant communication between the valve-box 7 and the cylinders 14, and thereby assure said cylinders 14 being supplied with and exhausted of steam or other fluid under pressure with the same regularity as the cylinders 3.

We claim—

1. An engine comprising the combination of a casing; a pair of coöperating cylinders and pistons, each piston being movable relatively to the cylinder with which it is complementary; a fluid-driven engine which is moved bodily by the movable members of said pair; a valve-box which is mounted in said casing and from which lead conduits to said cylinders and engine; a shaft connected with said engine; and a rotary valve driven by said shaft and interposed between said valve-box and said conduits; said valve being formed with an admission-port through which the fluid is admitted to each of said conduits and with an exhaust-port by which each of said conduits is connected with the exhaust.

2. An engine comprising the combination of a pair of coöperating cylinders and pistons, each piston being movable relatively to the cylinder with which it is complementary; a cylinder connected and moved bodily by the movable members of said pair; a piston mounted in the last-named cylinder; a shaft driven by the last-named piston; a casing provided with conduits leading to said cylinders; a valve-box from which said conduits lead; a rotary valve driven by said shaft and mounted in said valve-box; said valve being formed with a port through which the driving fluid is admitted successively to said conduits as said port is brought into register with each conduit by the rotation of said shaft, and a port through which the fluid is exhausted from said conduits.

3. An engine comprising the combination of a pair of coöperating cylinders and pistons, each piston being movable relatively to the cylinder with which it is complementary; a cylinder which is moved bodily by the movable members of said pair; a piston mounted in the last-named cylinder; a shaft driven by the last-named piston; a casing provided with conduits telescopically connected with the last-named cylinder and with conduits which lead to said pair of cylinders; a valve-box from which said conduits lead; a rotary valve driven by said shaft and mounted in said valve-box; said valve being formed with a port through which the driving fluid is admitted successively to said conduits as said port is brought into register with each conduit in succession by the rotation of said shaft, and a port through which the fluid is exhausted from said conduits.

In testimony whereof we hereunto set our hands, this 2d day of December, 1905, in the presence of two witnesses, at Elmira, New York.

FRED A. GENUNG.
WILLIAM M. SPOOR.

Witnesses:
FREDERIC H. FARR,
JAMES M. SULLIVAN.