

(No Model.)

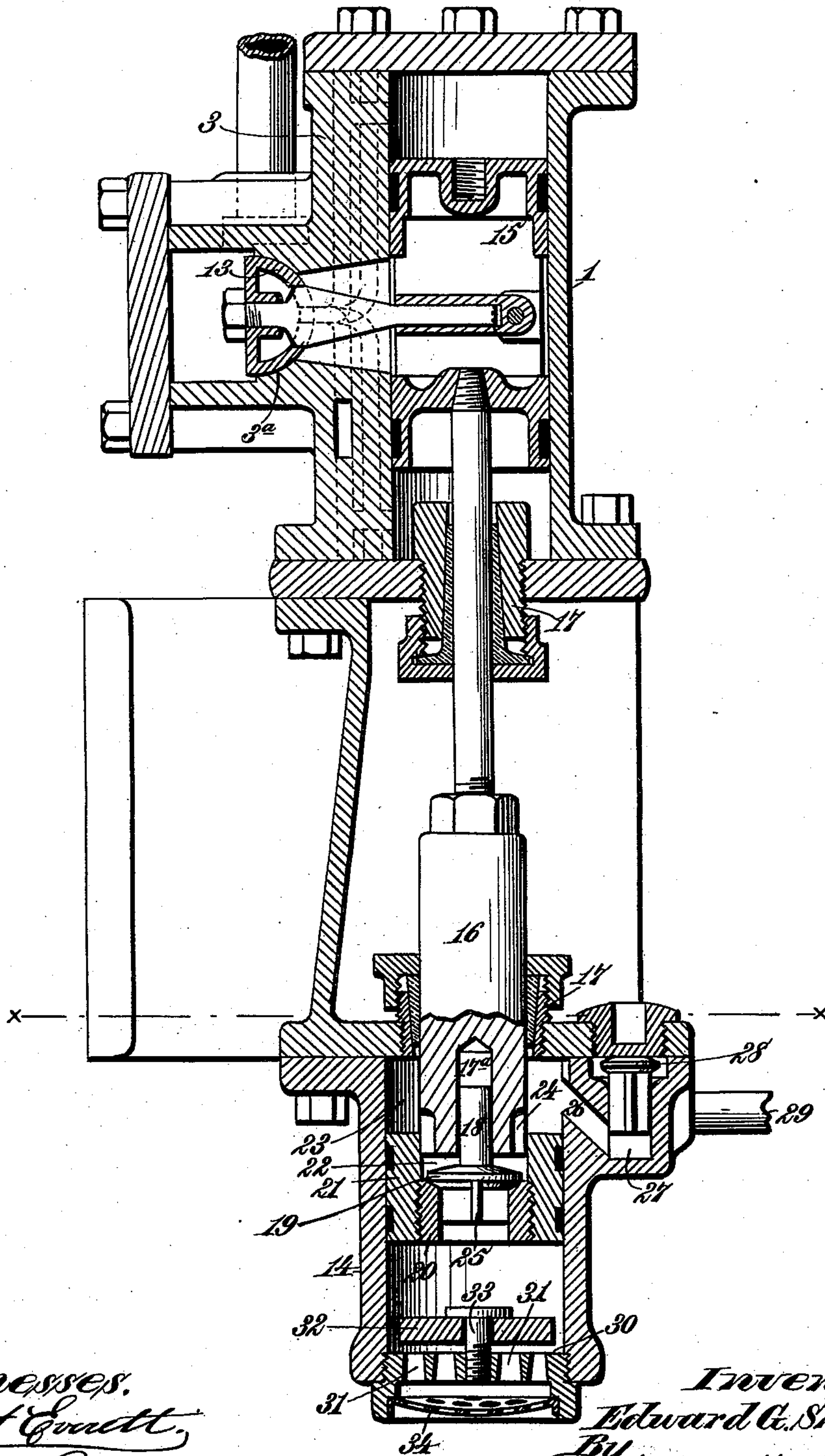
3 Sheets—Sheet 1.

E. G. SHORTT.
AIR OR GAS COMPRESSION PUMP.

No. 466,432.

Patented Jan. 5, 1892.

Fig. 1.



Witnesses.
Edw. G. Shortt.
J. A. Rutherford.

Inventor.
Edward G. Shortt.
By James L. Norris.
Atty.

(No Model.)

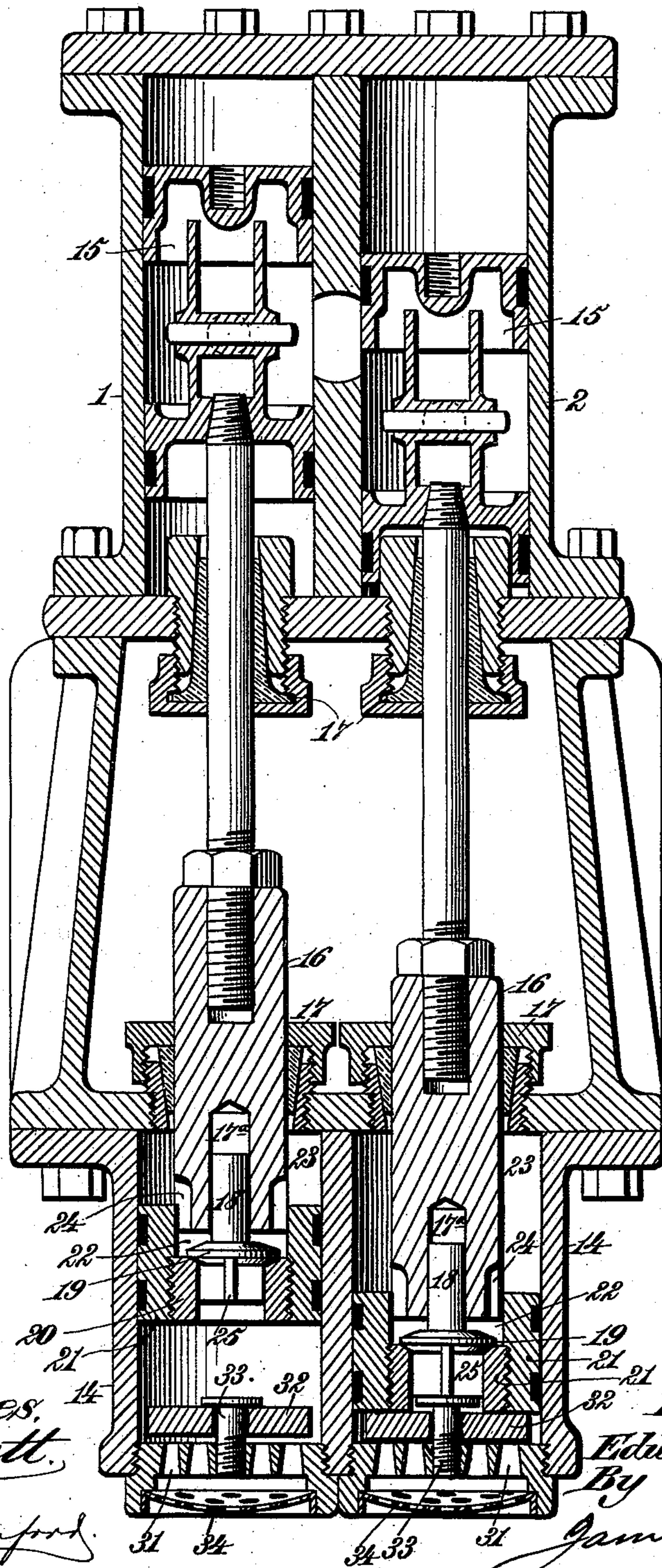
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E. G. SHORTT.
AIR OR GAS COMPRESSION PUMP.

No. 466,432.

Patented Jan. 5, 1892.

Fig. 2.



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(No Model.)

3 Sheets—Sheet 3.

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Fig. 3.

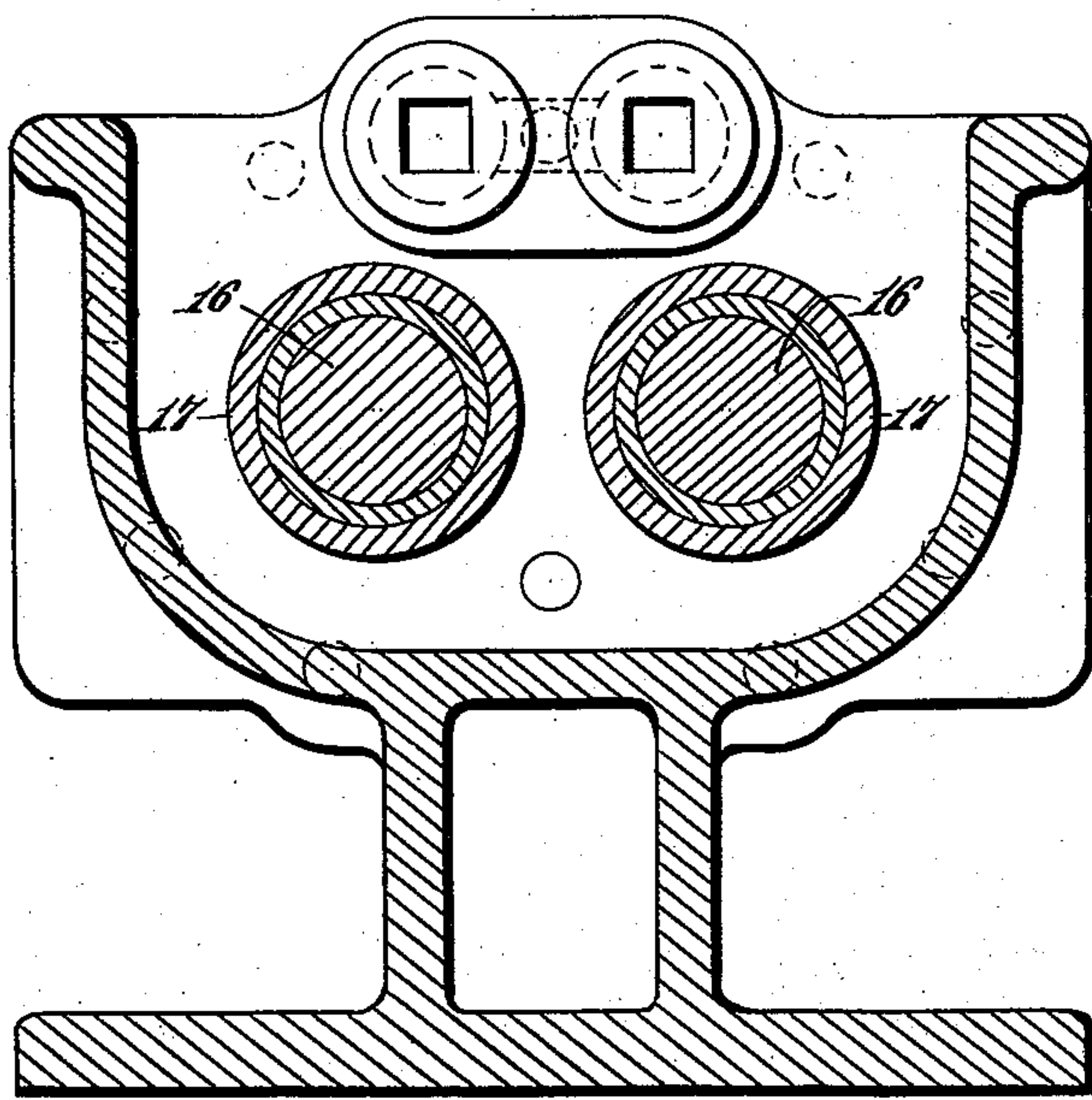


Fig. 4.

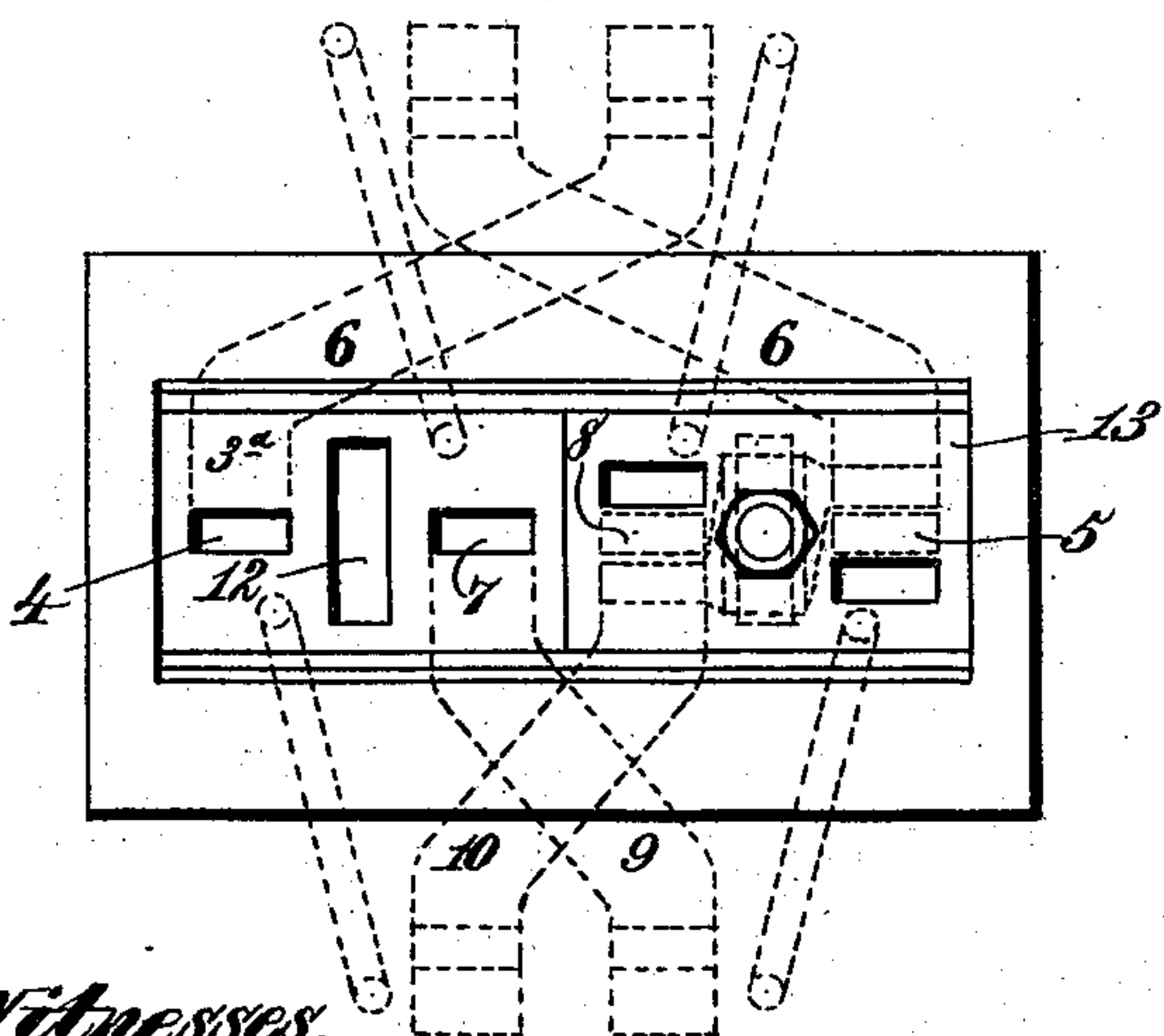
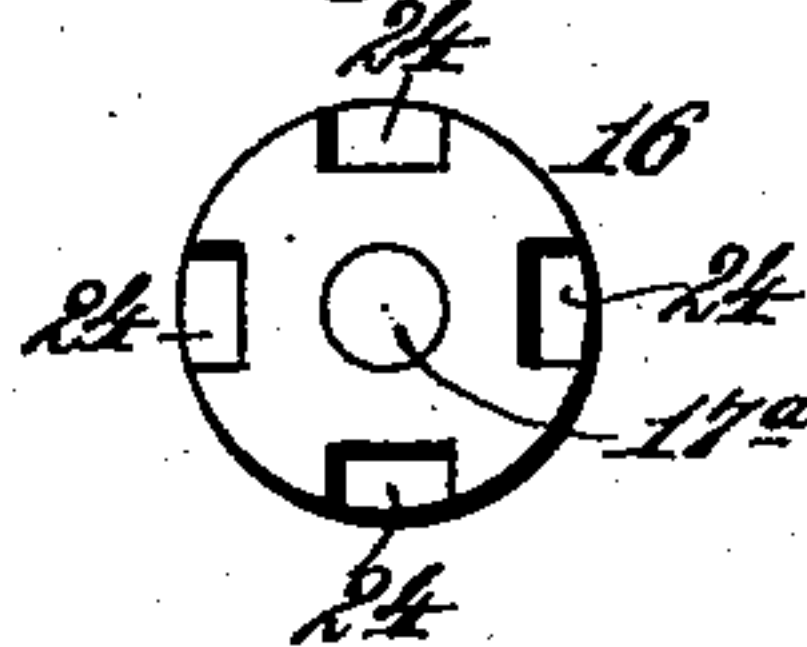


Fig. 5.



Witnesses.

Robert Emmett,

J. A. Rutherford.

Inventor.

Edward G. Shortt.

By James L. Norris.

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UNITED STATES PATENT OFFICE.

EDWARD G. SHORTT, OF CARTHAGE, ASSIGNOR OF ONE-HALF TO CHARLES G. EMERY, OF BROOKLYN, NEW YORK.

AIR OR GAS COMPRESSION PUMP.

SPECIFICATION forming part of Letters Patent No. 466,432, dated January 5, 1892.

Application filed February 12, 1891. Serial No. 381,223. (No model.)

To all whom it may concern:

Be it known that I, EDWARD G. SHORTT, a citizen of the United States, residing at Carthage, in the county of Jefferson and State of New York, have invented new and useful Improvements in Air or Gas Compression Pumps, of which the following is a specification.

My invention relates to certain improvements in engines for compressing air and gases of various kinds, and one purpose thereof is to provide a mechanism which is similar in some respects to the well-known bucket-plunger pump, but which possesses certain features of novelty whereby better results are obtained in pumping or compressing air or gases, and having a superiority in construction and an improved mode of operation which shall be superior to any of the air-pumps now in use.

To enable others skilled in the art to make, construct, and use my said invention, I will proceed to describe the same with reference to the drawings accompanying this specification, in which—

Figure 1 is a vertical section of an engine embodying my invention. Fig. 2 is a vertical section upon a plane at right angles with the section-plane in Fig. 1. Fig. 3 is a horizontal section taken upon the line $x x$, Fig. 1. Fig. 4 is a face view of the duplex-valve seats of the steam-engine. Fig. 5 is an end view of one of the enlarged compressing-pistons.

The present invention is in some respects an improvement upon the Letters Patent of the United States granted me upon the 18th day of September, 1888, for improvements in duplex pumping-engines, wherein I have shown and described in full the steam mechanism used in the present instance, the same consisting of duplex steam-cylinders 1 and 2, each having a wall 3, in which the steam-ports are arranged. These ports are all open in the same horizontal line drawn centrally across the face of a valve-seat 3^a, formed transversely in the wall 2 in front of the central portions of the cylinders and being semi-circular in cross-section. It may be divided

by a central vertical line into two independent valve-seats, one for each cylinder, and in said seats I form two openings or steam-ports 4 and 5, the former communicating with a channel 6, directed upward and then diagonally until it enters the upper end of cylinder 2. In like manner the port 5, opening from the channel 6, passes upward and then diagonally across the port 4 to the upper end of the other steam-cylinder 1. From the two remaining passages or openings 7 and 8 steam-ports 9 and 10 pass downward and then diagonally cross each other until their ends communicate with the lower ends of the steam-cylinders 1 and 2.

The face of the duplex-valve seat is shown in elevation and in section, and in addition to the construction already noted it has in the center of each seat and between the steam-ports an elongated transverse opening 12, extending through the valve-seat and wall into the cylinder.

The valves used in the steam mechanism consist of two substantially semi-cylindrical parts 13, each seating upon the similarly-formed concave seat. The construction of these valves, as well as their mode of operation, is so fully shown and described in my patent of September 18, 1888, No. 389,769, already referred to, that no further specific description thereof is necessary.

At a little distance below the steam-cylinders having pistons 15 are arranged the compressing-cylinders 14. Upon the lower ends of the rods carrying said pistons are attached much larger rods or heads 16, which pass through the packing or stuffing boxes 17 and project into the air-compressing cylinders proper 14. In the lower ends of these enlarged piston-rods 16 are formed central or axial openings or passages 17^a, receiving the stem 18 of a puppet-valve 19, which seats upon a ring 20, screwed into the lower end or portion of the piston-head 21, which is connected with the lower end of the enlarged piston-rod 16 by any suitable construction, the reduced upper ends of the piston-rods being screwed into and carried by the pistons 15 of the

steam-cylinders. The valve-chamber 22 lies between the upper edge of the valve-seating ring and the lower end of the enlarged piston-rod, and from said valve-chamber communication is effected with a compression-chamber 23 by means of channels 24, formed at suitable intervals in the lower end of the enlarged piston-rod 16. The puppet-valve 19 is provided with guides 25 upon its lower surface, which lie and move within a central opening in the valve-seat ring 20.

From the compression-chamber 23 a passage or channel 26, cut through the wall of the cylinder, leads to a second valve-chamber 27, formed in a lateral enlargement upon the compression end of each pump-cylinder and containing a puppet-valve 28, by which the air or gas compressed within the chamber 23 may pass to and through a pipe 29, and thence to a suitable chamber or receptacle.

The lower ends of the compression-cylinders are each provided with a removable valve-seat 30, having large openings 31, and backed by valves 32, having nearly the diameter of the cylinder, said valves rising and falling upon a stem 33. This valve-seat is usually screwed into the inlet end of the cylinder. By this construction an opening or series of openings of the largest possible capacity is provided for the inflow of air at atmospheric pressure to the lower end of the air-cylinders, thereby rendering it possible to employ a high piston speed and at the same time insure the filling of the lower portion of the air or gas cylinders upon the upward stroke of the pistons. By this stroke, also, the air previously received within the compression-chamber 23 passes the valve 28, and is forced through the tube 29 into the receptacle. The differential area of the lower end of the piston-head as compared with the annular area of the upper end of the same, produced by the large diameter of the piston-rod 16, causes a compression of the air to a density in the compression-chamber 23 proportioned to the said difference in area. By this construction the reservoir-pressure is prevented from returning and acting upon the valve in the piston-head, while at the same time the air-cylinders and piston-heads may be of uniform size, thus simplifying and cheapening the construction, rendering it possible to make the parts in duplicate, and rendering the operation much more rapid and effective with the same head of steam.

Beneath the valve-seats 30 are arranged convexed screens 34, for the purpose of preventing influx of dirt or other foreign matter which might pass into the pump and thence into the receiving-reservoirs.

The lower valve may be made of rubber, leather, or of any other suitable material, such as metal of any suitable kind or other substance. This lower valve at all times prevents the return of air to the outer atmosphere after it has been drawn therethrough.

The average pressure on the first or lower valve is about twenty pounds; but upon the downstroke the valve in the piston traps the pressure above the piston, which is about ninety pounds to the square inch, at the completion of the stroke. In air and steam cylinders of equal size this pressure may be produced with a steam-pressure of about forty-five pounds, while in a plain air-pump it would require a steam-pressure of at least ninety-five pounds to produce the same result. The average pressure on the first or lower valve is, under my invention, about twenty pounds; on the second valve, sixty pounds, and on the third valve about ninety-five pounds.

What I claim is—

1. In an air or gas compression pump, the combination, with a steam-cylinder and a pump-cylinder having their axes in the same straight line, of a piston-rod connected at one end to the piston in the steam-cylinder, an enlarged rod or head of less diameter than the interior of the pump-cylinder and packed through the end thereof, said rod having in its lower end a central bore, an annular piston-head, into the opening in which the end of the enlarged rod or head enters, a puppet-valve having its stem lying in the central opening in the enlarged rod and seating upon a ring in the annular piston-head, a valve-chamber being formed between said ring and the end of the enlarged rod, having communication by channels or slots, in the latter with a compression-chamber inclosed by the end of the annular piston-head, the exterior face of the enlarged rod, the inner face of the cylinder, and the end of the same, a second puppet-valve lying in a valve-chamber formed in a lateral enlargement on the compression end of the cylinder, said valve-chamber being connected with the compression-chamber by a channel through the wall of the cylinder, and a valve-disk mounted on a central stem within the inlet end of the cylinder and seating over openings formed in a valve-seat which is tapped into the end of the cylinder, substantially as described.

2. In an air or gas compression pump, the combination, with a pump-cylinder having a lateral enlargement upon its compression end, of an enlarged head or rod packed through the end of the cylinder, its end entering and engaging an annular piston-head fitting said cylinder, forming a compression-chamber between the end of the annular piston-head, the enlarged rod, and the inner face of the cylinder, a puppet-valve arranged in a chamber below the end of the enlarged rod, its stem entering a central bore therein and its seat being formed by a ring screwed into the annular piston-head, a second puppet-valve arranged in a valve-chamber in the lateral enlargement, communicating by a channel with the compression-chamber and with a pipe carrying the compressed gas, and a valve-disk

having nearly the diameter of the piston-head,
mounted on a central stem which is tapped
into a valve-seat screwed into the inlet end
of the cylinder and provided with a screen
5 arranged to cover inlet-openings formed in
the valve-seat, substantially as described.

In testimony whereof I have hereunto set

my hand and affixed my seal in presence of
two subscribing witnesses.

EDWARD G. SHORTT. [L. S.]

Witnesses:

JAMES H. DAWLEY,
HOWARD G. SHORTT.