

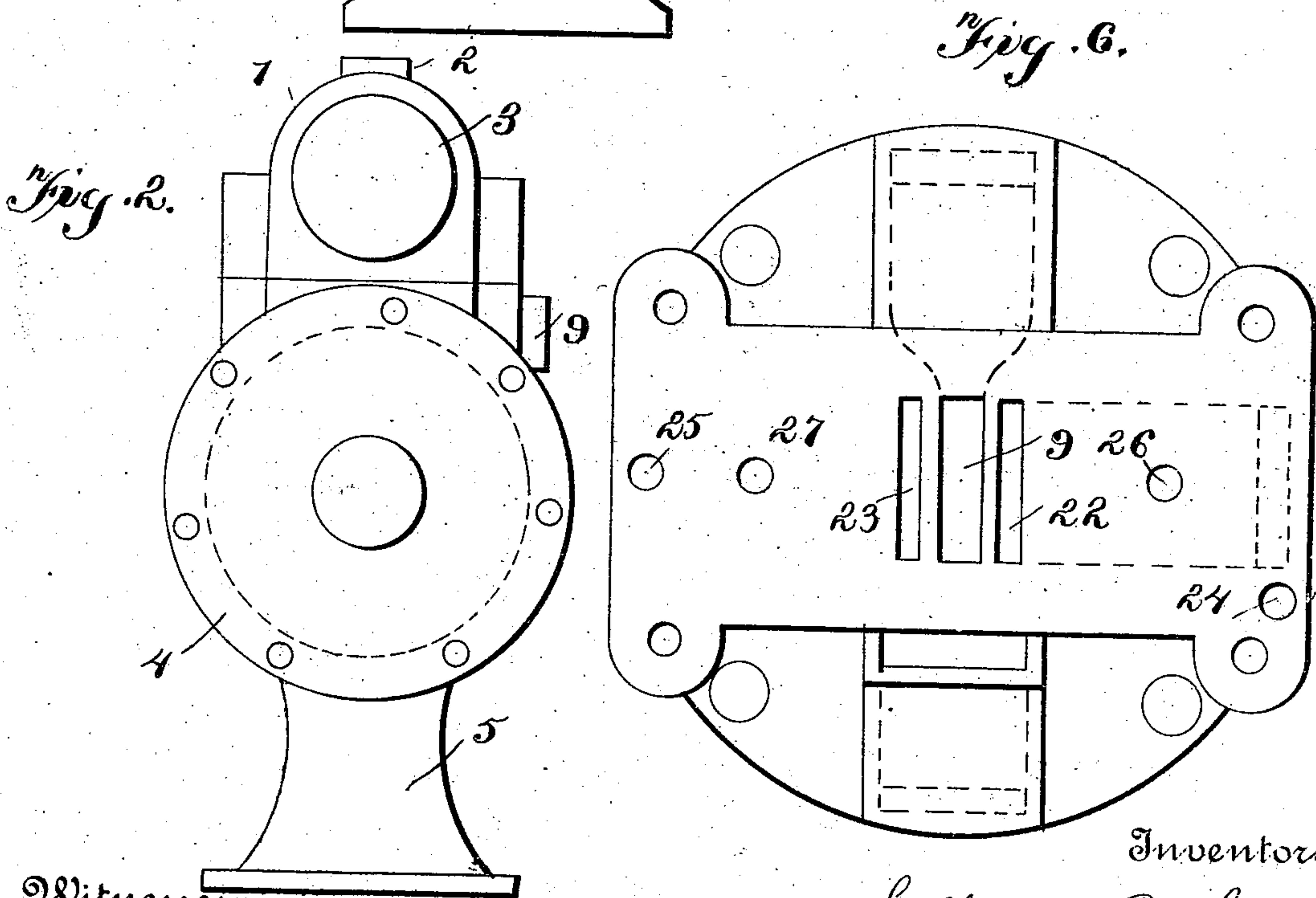
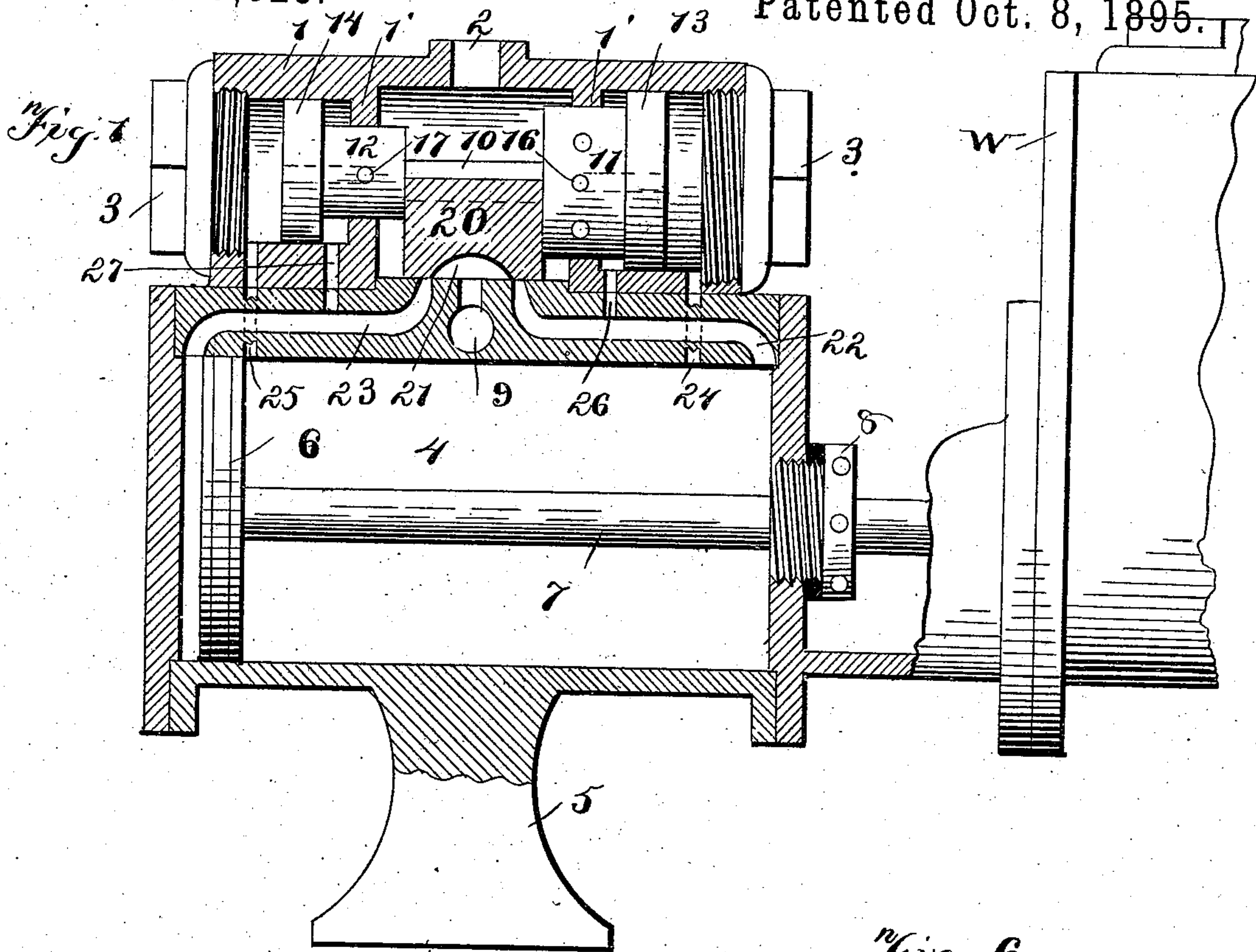
(No Model.)

G. A. & E. BARTHOLOMEW.
STEAM ACTUATED VALVE.

2 Sheets—Sheet 1.

No. 547,623.

Patented Oct. 8, 1895.



Witnesses:
Geo. E. Trech,
E. B. Collamer,

Inventors:
Gilbert A. Bartholomew,
Ellis Bartholomew,
Collamer & Co., Attorneys

(No. Model)

2 Sheets—Sheet 2.

G. A. & E. BARTHOLOMEW.
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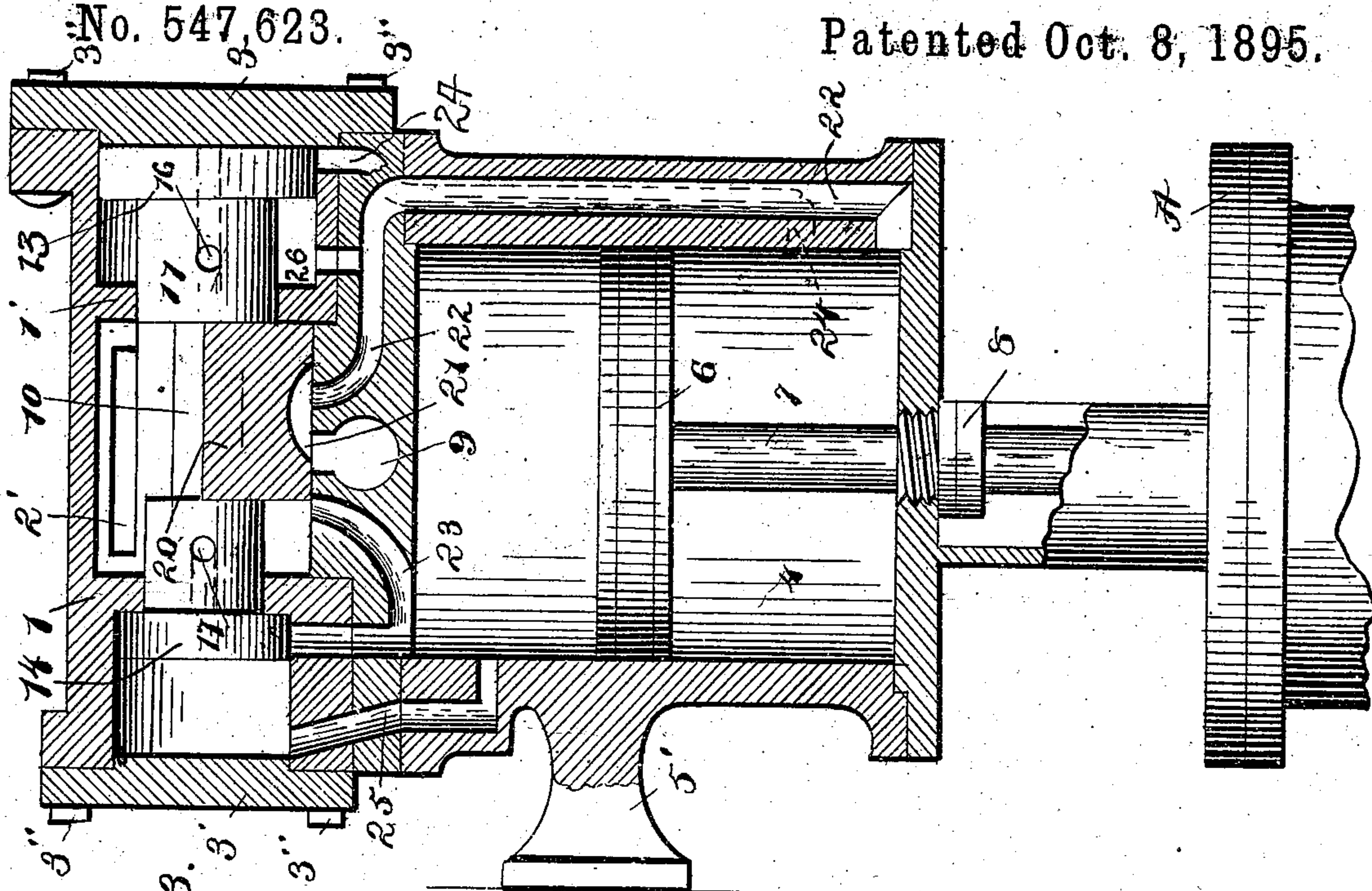


Fig. 3.

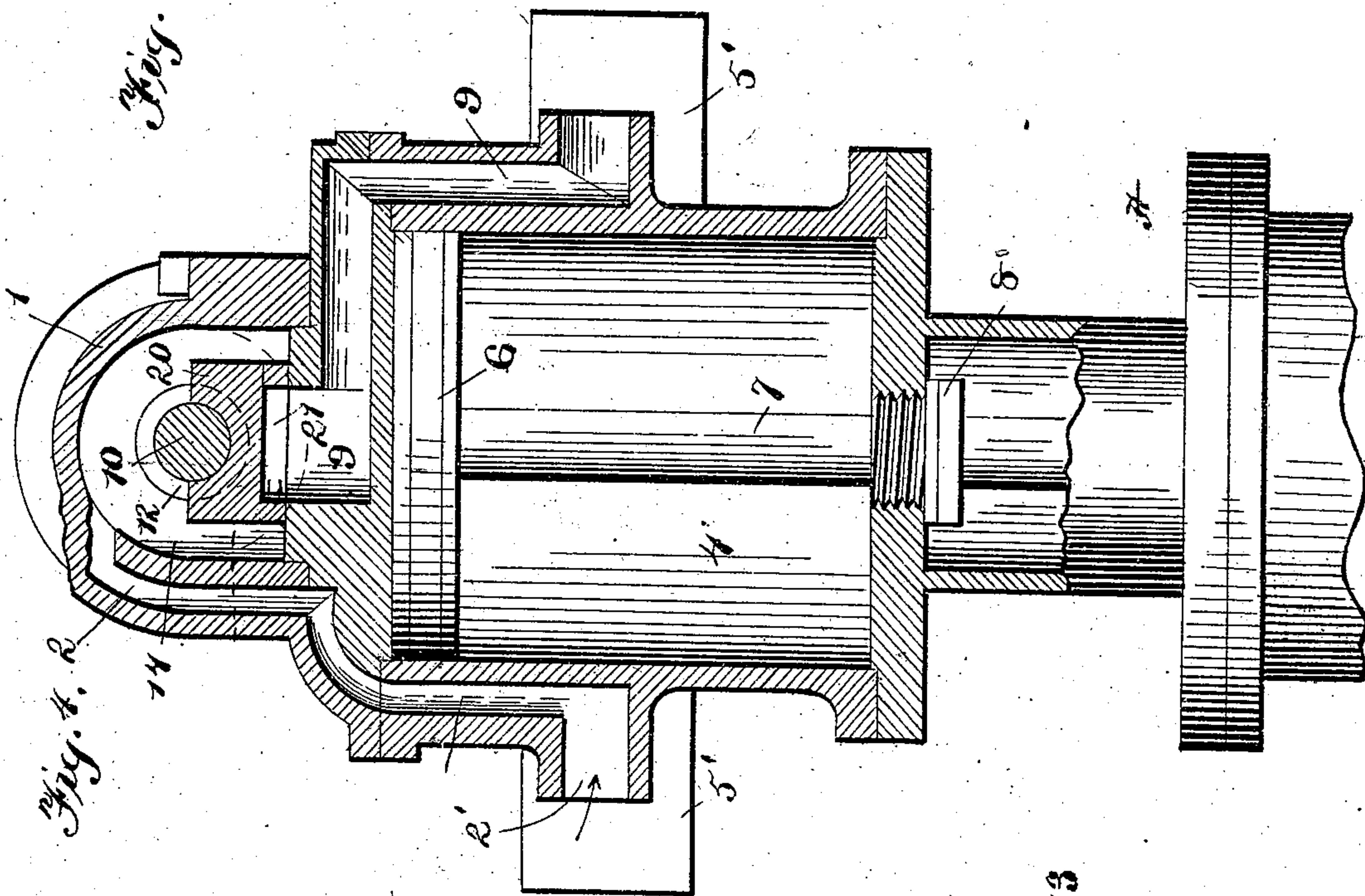
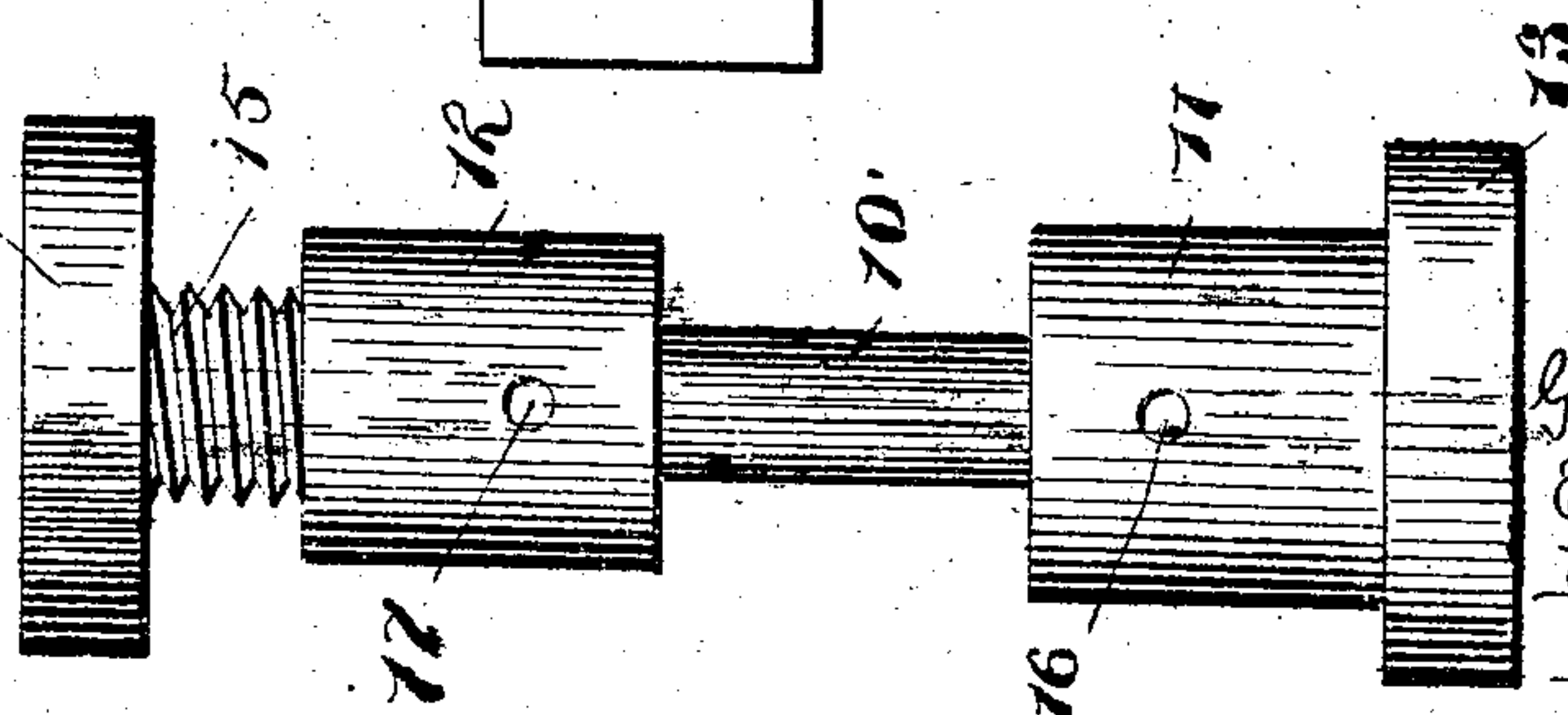


Fig. 4.

Fig. 5.

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UNITED STATES PATENT OFFICE.

GILBERT A. BARTHOLOMEW, OF MAUMEE, AND ELLIS BARTHOLOMEW,
OF LIMA, OHIO.

STEAM-ACTUATED VALVE.

SPECIFICATION forming part of Letters Patent No. 547,623, dated October 8, 1895.

Application filed August 10, 1895. Serial No. 558,880. (No model.)

To all whom it may concern:

Be it known that we, GILBERT A. BARTHOLOMEW, residing at Maumee, in the county of Lucas, and ELLIS BARTHOLOMEW, residing at Lima, in the county of Allen, State of Ohio, citizens of the United States, have invented certain new and useful Improvements in Steam-Actuated Valves; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to steam-engine valves, and more especially to that class thereof which are steam-actuated; and the object of the same is to produce certain improvements in such valves.

To this end the invention consists in a valve constructed substantially as hereinafter described, and as illustrated in the drawings, wherein—

Figure 1 is a central longitudinal section of this device as constructed for connection with a water-pump, showing the slide-valve at the center. Fig. 2 is an elevation of the left end of the device. Fig. 3 is a section similar to Fig. 1, showing the device as constructed for connection with an air-pump and with the slide-valves at the right end of its stroke. Fig. 4 is a section of the device in Fig. 3, taken on a line at right angles thereto. Fig. 5 is a detail in side elevation of the valve-piston in one of several shapes with its several heads, the left one thereof being partly removed. Fig. 6 is a horizontal section through Fig. 3 on the line of the bottom of the slide-valve chamber and partly broken away to better show the ports.

Referring to the said drawings, the numeral 1 designates the valve-piston cylinder, having a steam-inlet 2, preferably at the top, as shown in Fig. 1, although it may be at the side, as at 2' in Figs. 3 and 4, and the ends of this cylinder are closed by heads 3, which screw thereinto, or by heads 3', connected therewith by bolts 3'', as may be preferred.

4 is the main cylinder, mounted on a support 5 or sustained by a bracket 5', and 6 is the main piston, connected with a rod 7 and leading through suitable packing 8 to a water-

pump W, as in Fig. 1, or an air-pump A, as in Figs. 3 and 4, or to any other suitable work which it is desired to perform.

9 is the exhaust-port, as will be understood.

Within the cylinder 1 is located the valve-piston (best seen in Fig. 5) and comprising a centrally-disposed stem 10, at opposite ends of which are supplementary heads 11 and 12, beyond which are the main heads 13 14. In this view the last-mentioned head is screwed on, as at 15, and as the other heads are smaller toward the left the right cylinder-head can be removed and this piston inserted, after which the left cylinder-head 3' is removed and the left piston-head 14 put on. However, we do not limit ourselves to this precise construction, as any suitable means may be employed for putting the piston in place. It will be noticed that in Fig. 1 the diameters of the piston-heads 11 and 14 are equal, while 12 is smaller and 13 is larger. In Fig. 5 the two main heads 13 14 are equal in size, while 11 is smaller and 12 is still smaller, and in Fig. 3 all the heads differ in size. Considerable latitude is permitted the builder in this direction, so long as the right supplementary head 11 is larger than the left one 12, as will appear below.

16 is what we will call a "piston-port," opening through the side of the supplementary head 11 and leading thence outward through the main head 13 to the right end of cylinder 1, and 17 is a similar port located in the left heads of the valve-piston.

Within the cylinder is also located the slide-valve 20, having in its lower face the cavity 21, which is always in communication with the exhaust 9, and at each side of the latter is a main port, numbered 22 and 23, leading, respectively, to the right and left extremities of the main cylinder 4, as seen in Fig. 1, or to the lower and upper extremities thereof, as in Fig. 3. In fact the two constructions illustrated in these views are practical duplicates of each other, except that the main cylinders are differently located as to position, and we will not hereinafter refer to the slight resultant difference, the numbering being sufficient to show the respective constructions of parts. From the outer extremities of the valve, cyl-

5 inder two ports 24 and 25 lead to the main
 cylinder near the corresponding ends of the
 latter, and these we will call the "connecting
 ports," as they connect the two cylinders. At
 10 each side of the chamber within which the
 slide-valve 20 moves is a partition 1' within
 the valve-cylinder 1, having an aperture of a
 size to admit its supplementary head, and
 just outside these partitions are the valve-
 15 ports 26 and 27, communicating with the main
 ports 22 23, respectively, as shown. The rel-
 ative sizes of these ports are about as best
 seen in Fig. 1, which also correctly shows the
 lead and lap. The parts standing as seen in
 20 Fig. 1, live steam enters at 2 between the par-
 titions 1', and as the supplementary head 11
 is larger than 12 it moves the entire valve
 slightly to the right, the exhaust being but
 slight and passing down through connecting-
 25 port 24 into the main cylinder 4. This move-
 ment of the valve uncovers the inner end of
 piston-port 17 and permits live steam to pass
 behind head 14, whereby the movement to
 the right is facilitated and the entire valve
 30 then takes the position seen in Fig. 3. Such
 movement carries the slide-valve 20 to the
 right and admits live steam to the left of
 main piston 6 through main port 23. This
 piston then commences its movement to the
 35 right, the exhaust being at the right through
 main port 22, cavity 21, and exhaust-port 9.
 As the main piston 6 passes the connecting-
 port 24, live steam is admitted outside the
 valve-head 13 (the exhaust at the inside be-
 40 ing through valve-port 26) with a tendency to
 move the valve to the left, and the live steam,
 pressing on the inner face of left head 12 and,
 through valve-port 27, on the inner face of
 head 14, will be equalized by the live steam
 45 on the outer face of head 14, which flows
 thereto both through the piston-port 17 and
 the main port 23, cylinder 4, and connect-
 ing-port 25. The preponderance of press-
 ure at the right of head 13 will therefore
 50 move the valve to the left, and as it moves
 piston-port 17 is closed and 16 is opened to
 assist this movement, as above. This move-
 ment also carries the slide-valve 20 to the left,
 and hence reverses the flow of live steam and
 the exhaust. In this manner the valve will
 55 cause the main piston to reciprocate within
 the cylinder 4, and any work that is connected
 with the main rod 7 will be performed. It
 will be obvious that the main cylinder may
 be upright, horizontal, or at any desired an-
 60 gle to the valve-cylinder so long as the ports
 are led to proper points; in fact the two cyl-
 inders could be quite remote, if desired, or
 one valve-cylinder could be connected with
 several main cylinders, all without depart-
 ing from the principle of our invention. A
 valve of this character is simple in construc-
 tion, cheap of manufacture, easy and quick
 65 of action, and subject to but little wear. It
 will work with clear steam or with steam
 mixed with considerable condensation, will

not stop on a center, and serves as a governor to the engine.

What we claim as new is—

1. In an engine, the combination with the 75
 main cylinder and piston, the inlet, exhaust,
 and main ports, and the slide valve; of the
 valve piston cylinder having two partitions
 with openings of different sizes, two heads
 moving in said openings and connected with 75
 each other, the slide valve being moved by
 these heads, and for each head a valve port
 and connecting port, as and for the purpose
 set forth.

2. In an engine, the combination with the 80
 main cylinder and piston, the inlet, exhaust,
 and main ports, and the controlling valve
 therefor; of the valve piston cylinder, two
 heads of different sizes moving therein, a pis-
 ton port through each head from its outer face 85
 to a point in its side, a valve port connecting
 each part of this cylinder with the space be-
 tween the heads, and a rod connecting said
 heads and by which the controlling valve is
 operated, as and for the purpose set forth. 90

3. In an engine, the combination with the
 main cylinder and piston, the inlet, exhaust,
 and main ports therefor, and a controlling
 valve; of the valve piston cylinder having a
 compartment at each end, a piston head and 95
 supplementary piston head in each compart-
 ment, one supplementary head being of
 smaller area than the other, a rod connecting
 said heads and by which the controlling valve
 is operated, and a valve port and connecting 100
 port leading from the extremities of each com-
 partment on opposite sides of the main head
 therein to the chamber for the controlling
 valve, as and for the purpose set forth.

4. In an engine, the combination with the 105
 main cylinder and piston, the valve piston cyl-
 inder having two end compartments of differ-
 ent sizes and an interposed chamber, the inlet
 and outlet ports opening into this chamber,
 and the two main ports leading from this 110
 chamber to the ends of the main cylinder; of
 a slide valve in said chamber, two valve heads
 of different sizes moving respectively in said
 compartments, a rod connecting the heads
 and by which the controlling valve is oper- 115
 ated, and for each compartment a valve port
 opening from its inner end into the main port
 and a connecting port leading from its outer
 end to a point near the outer end of the main
 cylinder, as and for the purpose set forth. 120

5. In an engine, the combination with the
 main cylinder and piston, the valve piston cyl-
 inder having two end compartments of differ-
 ent sizes and partitions next inside them form- 125
 ing an intermediate chamber, said partitions
 having openings of different sizes, the larger
 opening being adjacent the larger compart-
 ment, inlet and exhaust ports opening into
 said chamber, two main ports leading from
 the chamber to the ends of the main cylinder, 130
 and a controlling valve within said chamber;
 of a valve head fitting each compartment, a

smaller supplementary valve head fitting each opening in the partitions, a rod connecting all said heads and by which the controlling valve is operated, and ports leading from said chamber to each compartment and opening thereinto on opposite sides of the main valve head therein, as and for the purpose set forth.

6. In an engine, the combination with the main cylinder, the piston therein, the valve piston cylinder having two end compartments of different sizes and a chamber between them, the inlet and exhaust ports opening into this chamber, and the two main ports leading from this chamber to the ends of the main cylinder; of a slide valve in said chamber, two valve heads of different sizes moving in said compartments and having supplementary heads at their inner sides, a rod connecting the supplementary heads and by which said slide valve is operated, a piston port opening from the rear of each valve head through the side of its supplementary head, and for each compartment a valve port and a connecting port communicating with said chamber, as and for the purpose set forth.

7. In an engine, the combination with the main cylinder, the piston therein, the valve piston cylinder having two partitions with openings of different sizes and an interposed

chamber, the inlet and exhaust ports opening into this chamber, the two main ports leading from opposite sides of the exhaust port to opposite ends of the main cylinder, and the slide valve for alternately connecting the main ports with the exhaust; of two valve piston heads of different sizes in said compartments, two supplementary heads also of different sizes connected with the main heads and sliding in said openings, a rod connecting the four heads and by which said slide valve is operated, a piston port opening from the outer side of each main head through the side of its supplementary head, a valve port connecting the inner end of each compartment with said main port at that side of the chamber, and a connecting port connecting the outer end of each compartment with the main cylinder at a point near its corresponding end but remote therefrom the thickness of the main piston, all as and for the purpose set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

GILBERT A. BARTHOLOMEW.

ELLIS BARTHOLOMEW.

Witnesses:

L. M. MURPHY,

M. J. MURPHY.