

(No Model.)

2 Sheets—Sheet 1.

C. M. FARRAR.

BALANCED VALVE.

No. 396,737.

Patented Jan. 29, 1889.

Fig.1.

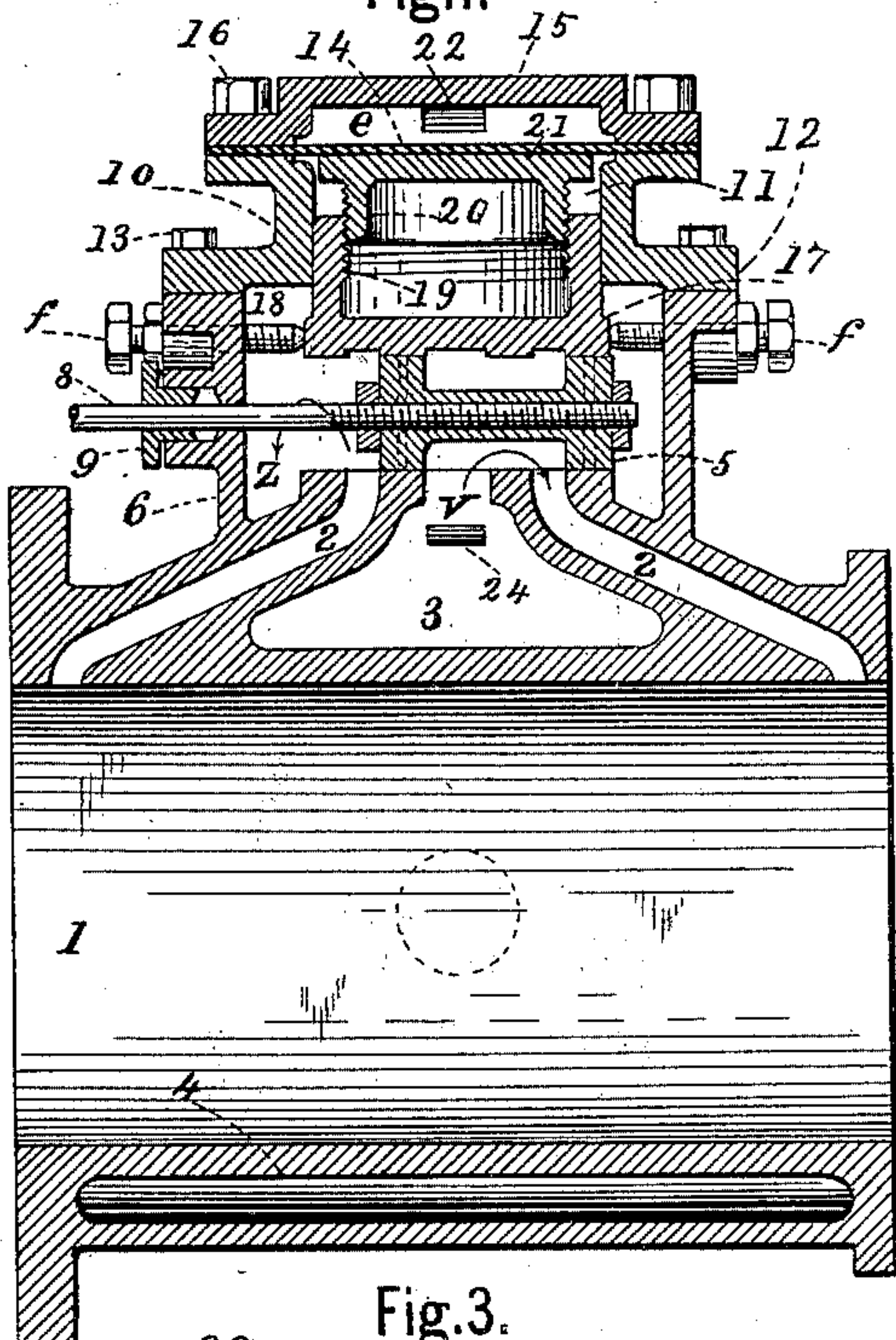


Fig.2.

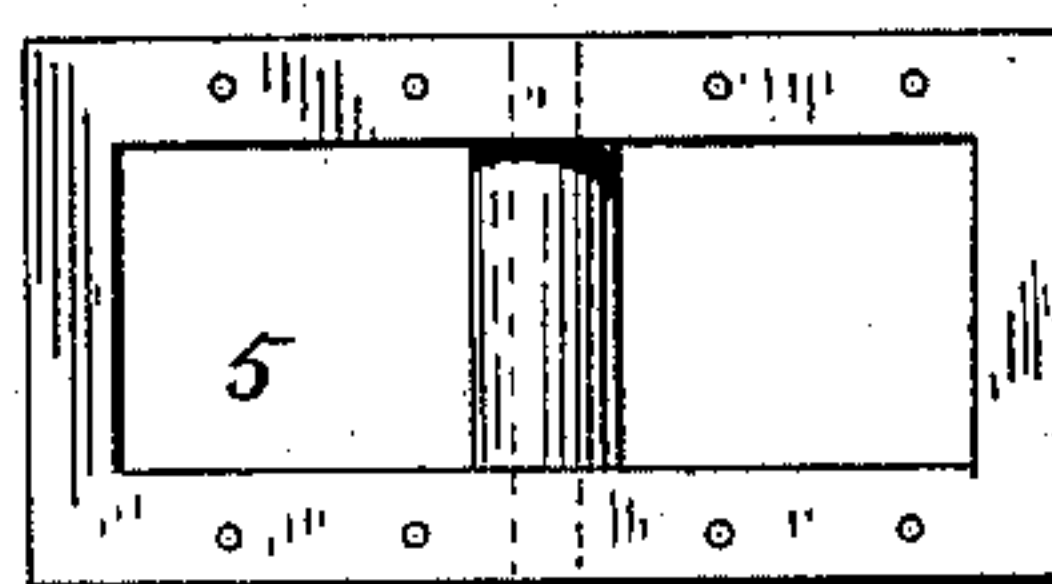


Fig.4.

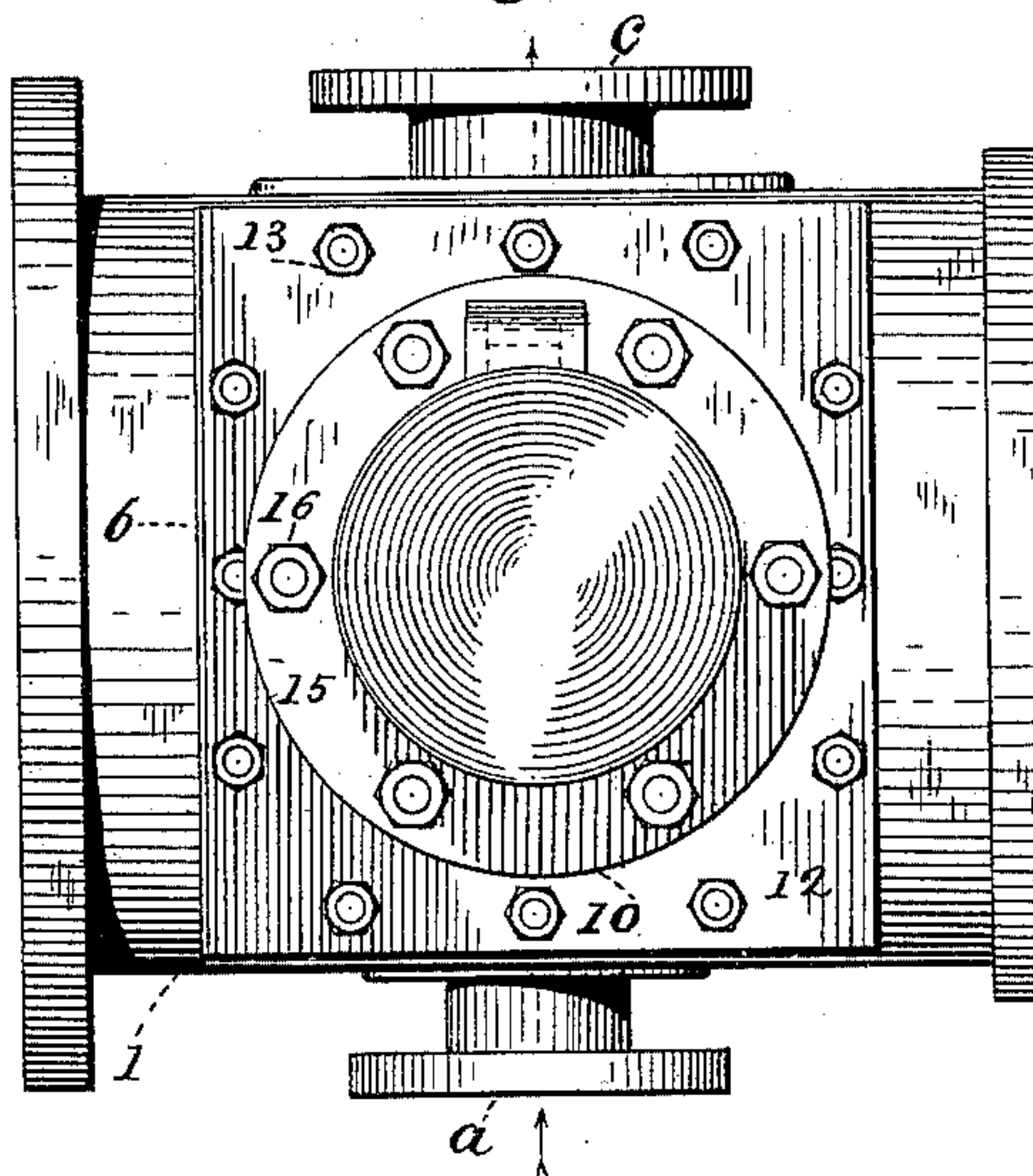


Fig.3.

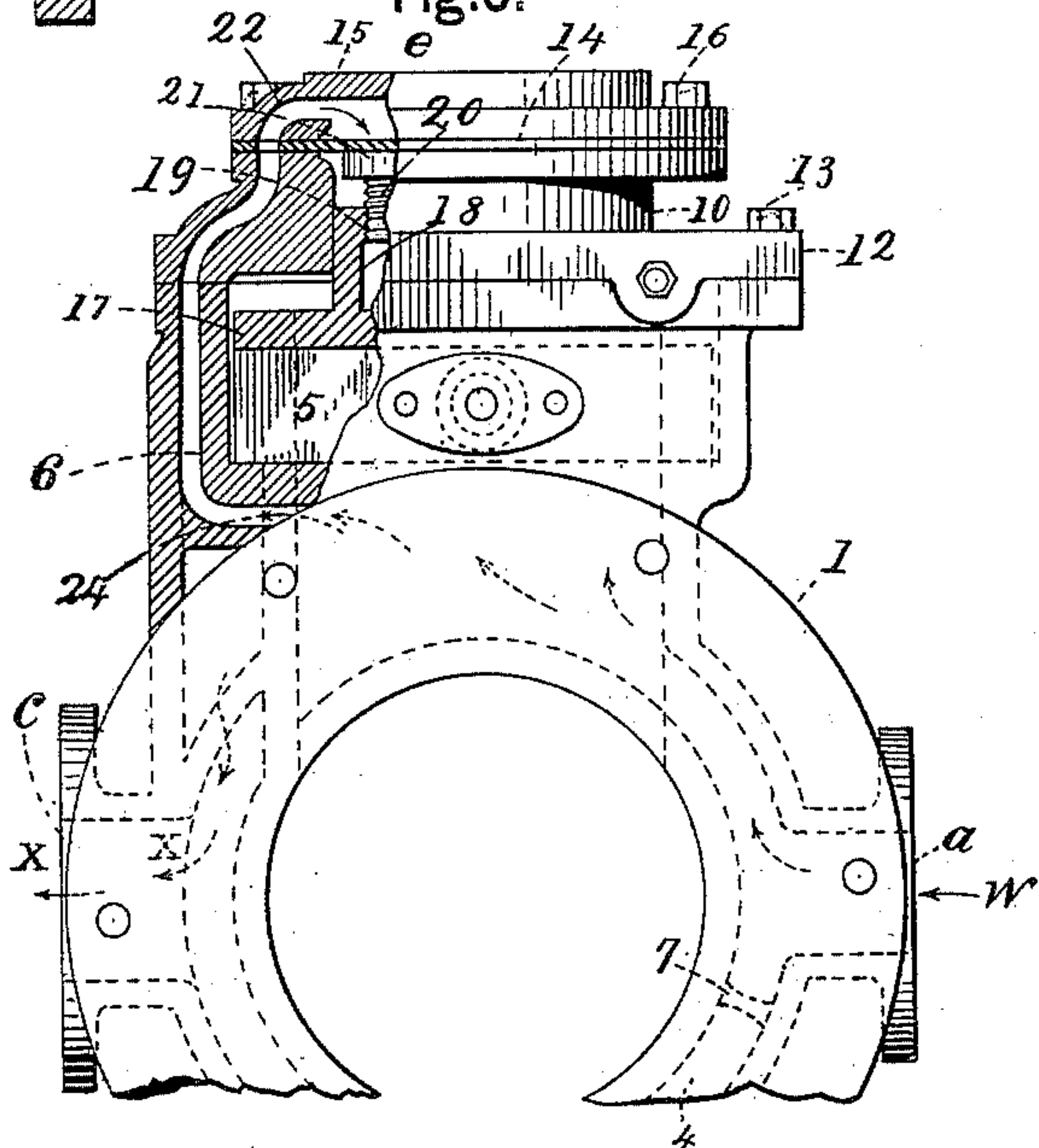
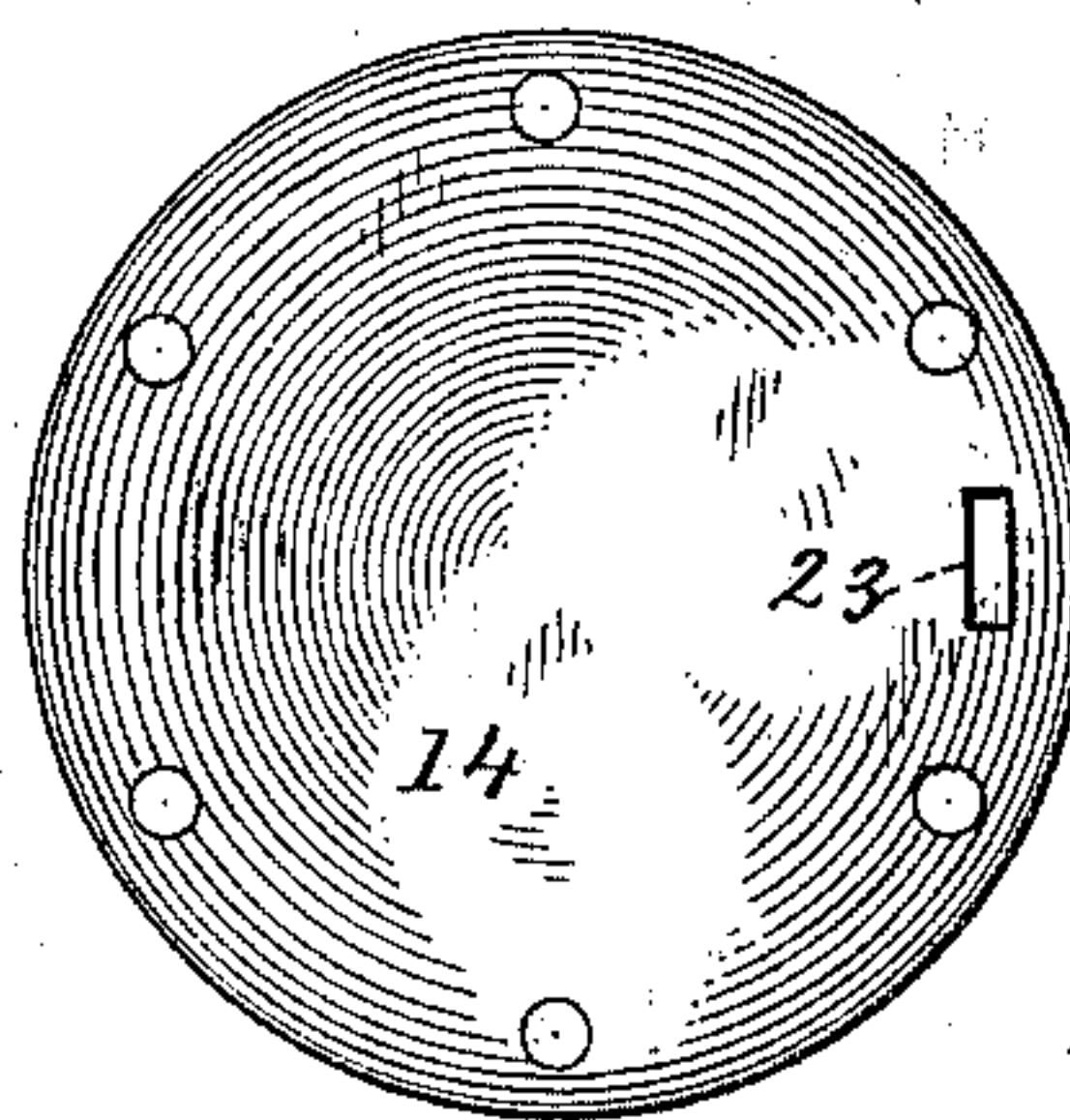


Fig.5.



Witnesses.

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Luke Fisher.

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By James Sangster
Attorney.

(No Model.)

2 Sheets—Sheet 2.

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BALANCED VALVE.

No. 396,737.

Patented Jan. 29, 1889.

Fig. 7.

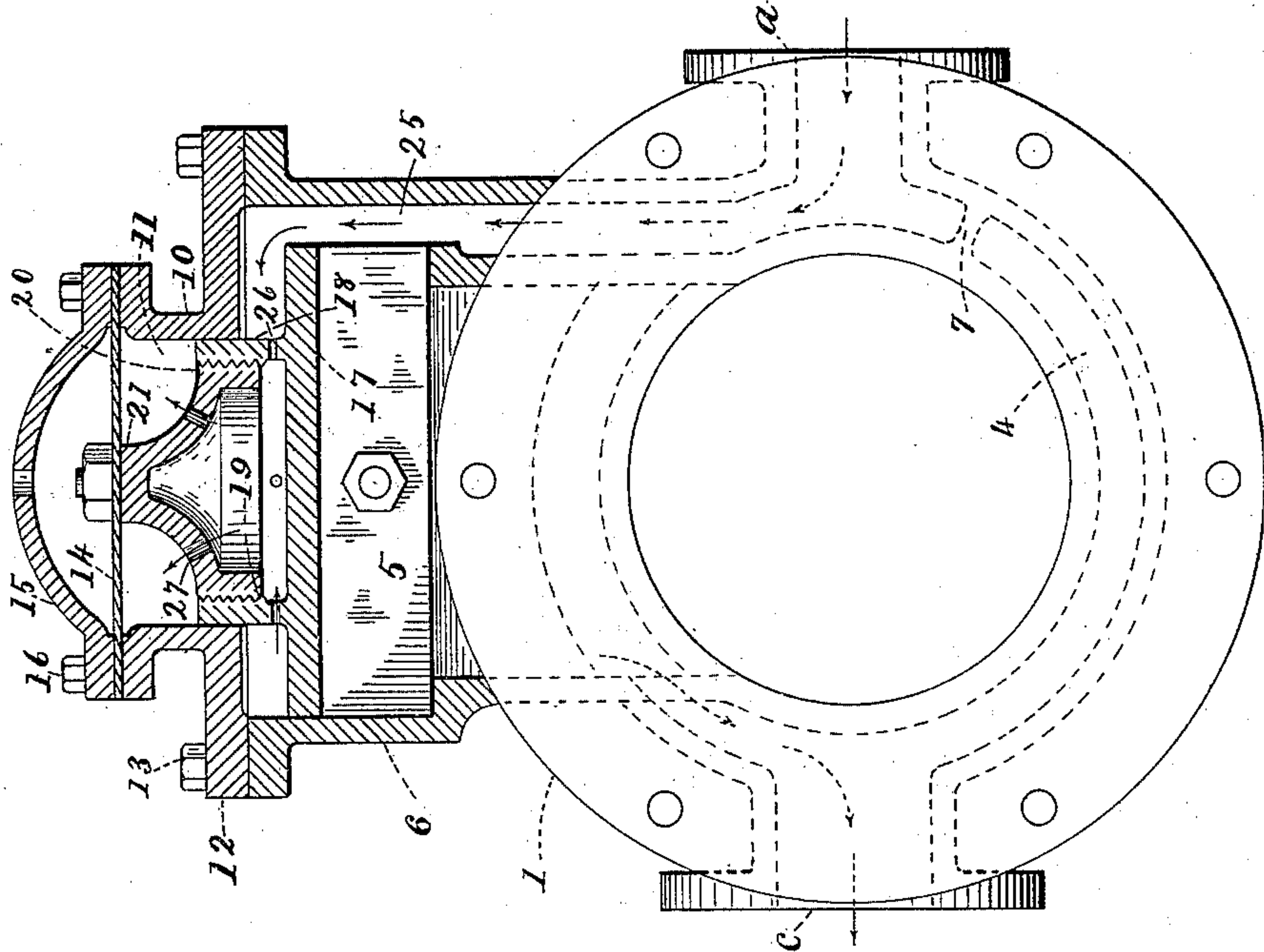
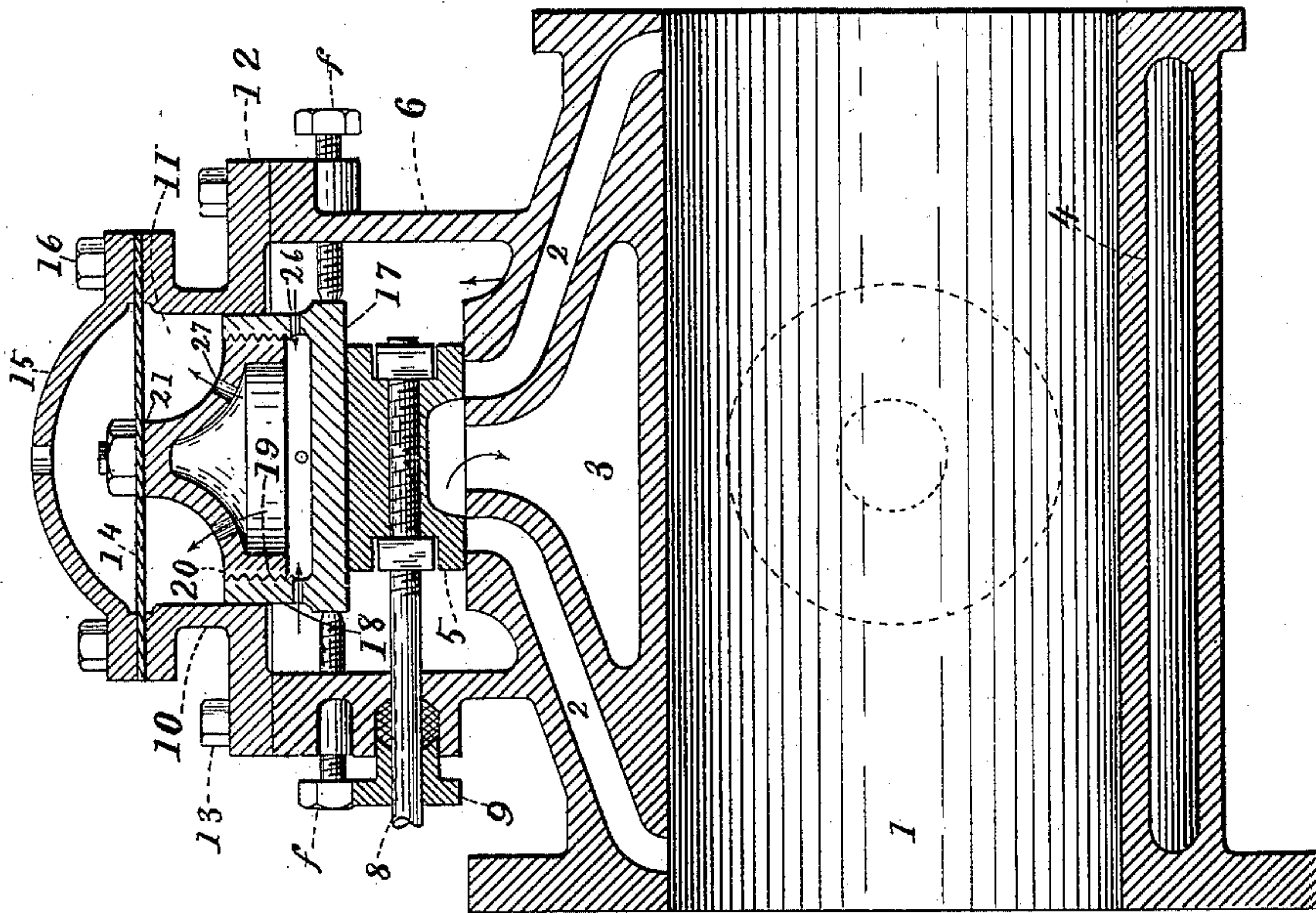


Fig. 6.



Witnesses.

Arthur Sangster,
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Attorney.

UNITED STATES PATENT OFFICE.

CHILION M. FARRAR, OF BUFFALO, NEW YORK.

BALANCED VALVE.

SPECIFICATION forming part of Letters Patent No. 396,737, dated January 29, 1889.

Application filed July 21, 1888. Serial No. 280,648. (No model.)

To all whom it may concern:

Be it known that I, CHILION M. FARRAR, a citizen of the United States, residing in Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Balanced Valves for Steam-Engines, of which the following is a specification.

My invention relates to certain new and useful improvements in balanced valves for steam-engines, and will be fully and clearly hereinafter described and claimed, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical longitudinal central section. Fig. 2 is an enlarged detached top view of the valve. Fig. 3 is an end elevation in partial section. Fig. 4 is a top plan view of a steam-engine cylinder, showing the outside portion of the upper case forming a part of my invention and connected therewith. Fig. 5 is a face view of the metallic diaphragm forming a portion of the invention. Fig. 6 is a vertical longitudinal central section, and Fig. 7 an end elevation, in partial section, showing a modification of my invention.

1 represents the cylinder of an ordinary engine.

2 represents the usual steam-inlet ports, and 3 is the ordinary exhaust-port; but in this construction it is the port for the live steam, which passes into the cylinder side opening, *a*, in the direction of the arrow *w*, Fig. 3, and from thence through the opening 4 into the passage 3, and then under the valve 5 in the direction of the arrow *v*, Fig. 1, into the ports 2, for operating the engine.

The steam exhausts into the steam-chest 6, and from thence passes, in the direction of the arrow *z*, Fig. 1, down through the passage 4 on the opposite side of the cylinder, into and out of the outlet-passage *c* in the direction of the arrows *x*. It will be noticed that this passage 4 is divided by a diaphragm, 7, so that the live steam passes on one side of the cylinder and the exhaust-steam on the other side.

The valve 5 is provided with a valve-rod, 8, passing through a stuffing-box, 9, so as to be operated in the usual way; but as these passages and the valve and connections, as far

as described, are old and well known and in common use a further description of either of them is not required here.

The steam-chest is made in the usual square or rectangular form, and the upper case, 10, is made round, (see Figs. 1 and 4,) so as to provide an interior cylindrical chamber, 11. At its base is a square or flanged portion, 12, which is secured (steam-tight by the usual means) by bolts 13.

At the top of the case 10 is a sheet-metal diaphragm, 14, and above the diaphragm is a cover, 15. The whole is rigidly secured steam-tight by means of the usual packing and the bolts 16.

Resting on the valve 5 is a plate, 17, having an upwardly-projecting hollow cylindrical portion, 18, provided with an interior screw portion, 19. Into this screw portion is fitted a corresponding screw portion, 20, adapted to screw up or down within it, and having a flat top, 21, to rest up against the lower side of the diaphragm. The plate 17 is adjusted and kept from moving laterally by means of the set-screws or bolts *f*, while it has a very slight vertical movement up or down.

Above the diaphragm, within the chamber *e*, is a small isolated chamber or steam-passage, 22, which passes down through an opening, 23, in the diaphragm and through the side of the steam-chest and through a portion of the exhaust-opening, terminating at the inlet-opening 24 in the live-steam passage 3. By this construction it will be seen that as the steam passes under the valve 5 it tends to force the valve and the plate 17 upward in proportion to the pressure of the steam and the area of the valve and plate 17 exposed to such action; but as the steam also at the same time passes into the small steam-passage 22 at the inlet 24, and from it into the chamber *e*, and pressing on the diaphragm, (which exposes a slightly-greater area than the valve and plate 17,) consequently counterbalancing the upward pressure against the valve with just force enough to hold it to its seat steam-tight, the diaphragm effectually prevents any leakage of steam from the chamber *e* to the chamber below it. In the modification, (Sheet 2,) Figs. 6 and 7, I have shown a construction in which the same diaphragm is used, but the passage 22 is dispensed with

and the action of the steam on the diaphragm is reversed. The parts 2 and 3, the diaphragm, and the parts 17, 18, and 19 are exactly the same in each; but the hole 23 in the diaphragm is dispensed with, and openings are provided for admitting steam to the under side of the diaphragm. The port 3 is now used in this instance as the exhaust-port. The live steam passes into the side inlet-opening, *a*, then upward through the passage 25 (see Fig. 7) into the steam-chest, and exerts a certain pressure downward on the valve, while the steam at the same time passes through the small openings 26 and 27 and produces only sufficient pressure upward against the diaphragm to relieve the valve from too great a pressure downward.

The area of the diaphragm may be made of any size to allow for any counterbalancing-pressure that may be desired.

If required, the holes 26 and 27 may be dispensed with. The steam would then press against the plate 17; but I prefer admitting steam also to the diaphragm; and the parts having the numbers 17, 18, 20, and 21 may be made all in one piece and made to fit exactly between the diaphragm and the top of the valve, as the diaphragm will spring and give under the pressure of the steam, and thereby allow for the wear of the valve and the other parts connected with it. The only object in making them adjustable by the screw portions 19 and 20 is to allow for the wearing of

the valve and other parts; but the diaphragm will allow at least for from one thirty-second to one-sixteenth of an inch for that purpose, and those parts would take a long time to wear that much.

I claim as my invention—

1. In a balanced steam-valve, the combination of a steam-chest having an upper and lower steam-chamber divided by a sheet-metal diaphragm, a valve located in the lower chamber, the usual mechanism for operating it, a plate seated on the top of the valve having an upward portion provided with a top piece adapted to screw up or down on the same, so as to adjust the two parts between the valve and the diaphragm, and a steam-passage connecting the upper and lower chambers, substantially as and for the purposes described.

2. In a balanced steam-valve, the combination, with the steam-chest, of a sheet-metal diaphragm secured steam-tight to the upper portion of the same, a valve having a plate seated thereon and provided with a cylindrical portion projecting upward, and a top piece adapted to screw on said portion, so that the two parts may be adjusted between the top of the valve and the under side of the diaphragm, for the purposes described.

CHILTON M. FARRAR.

Witnesses:

JAMES SANGSTER,
ARTHUR SANGSTER.