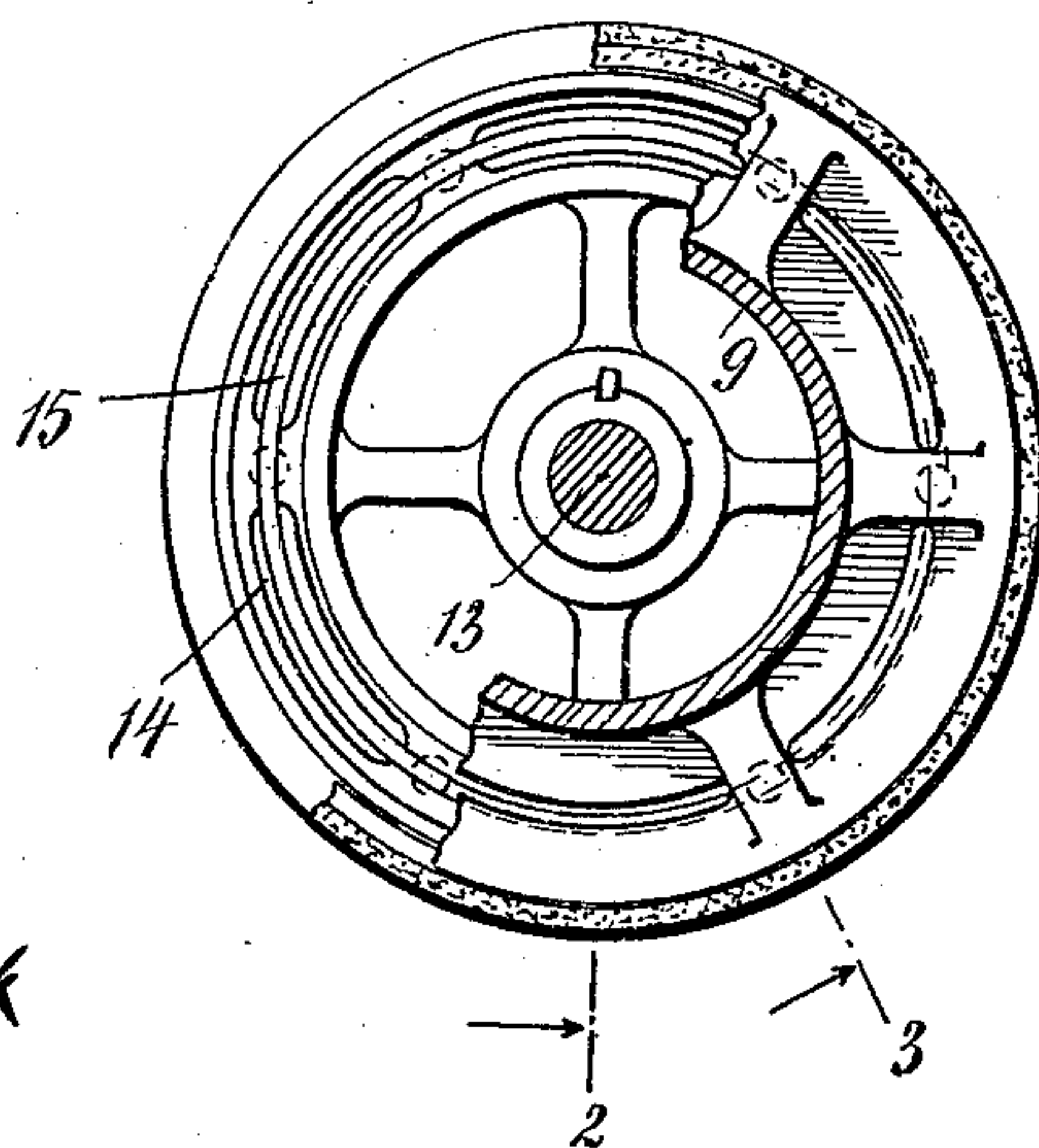
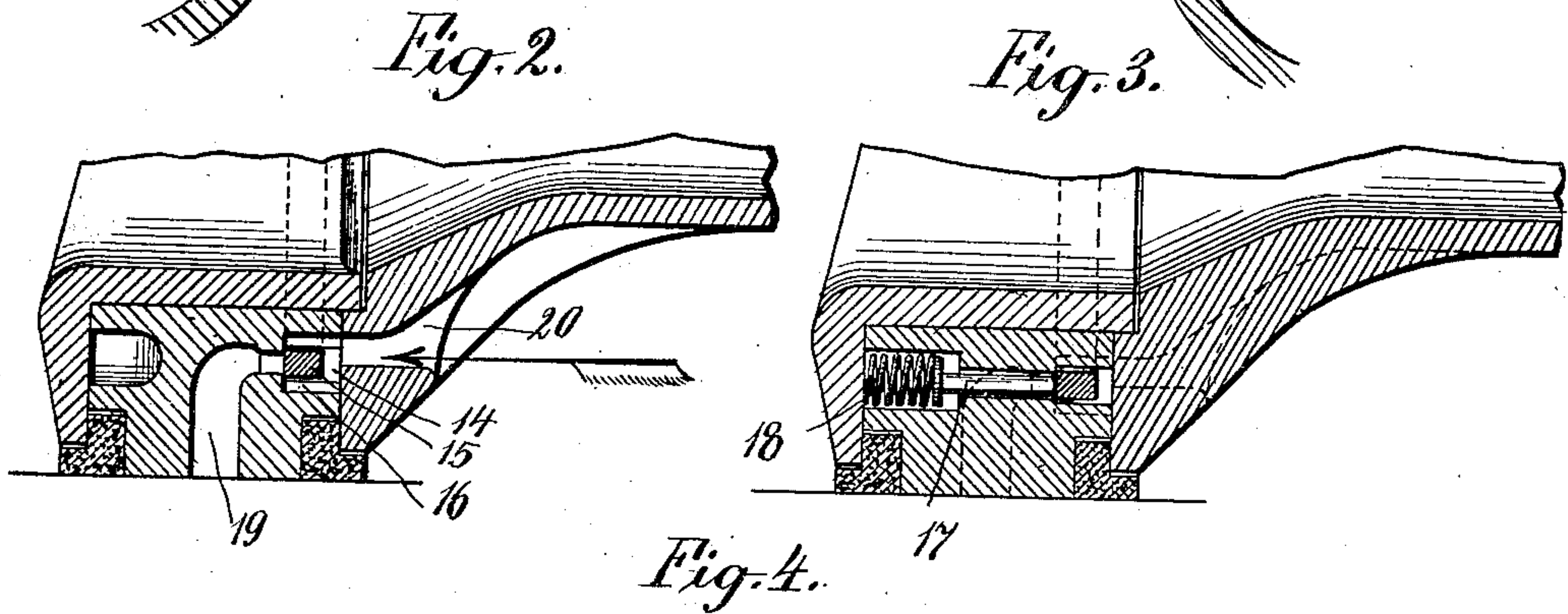
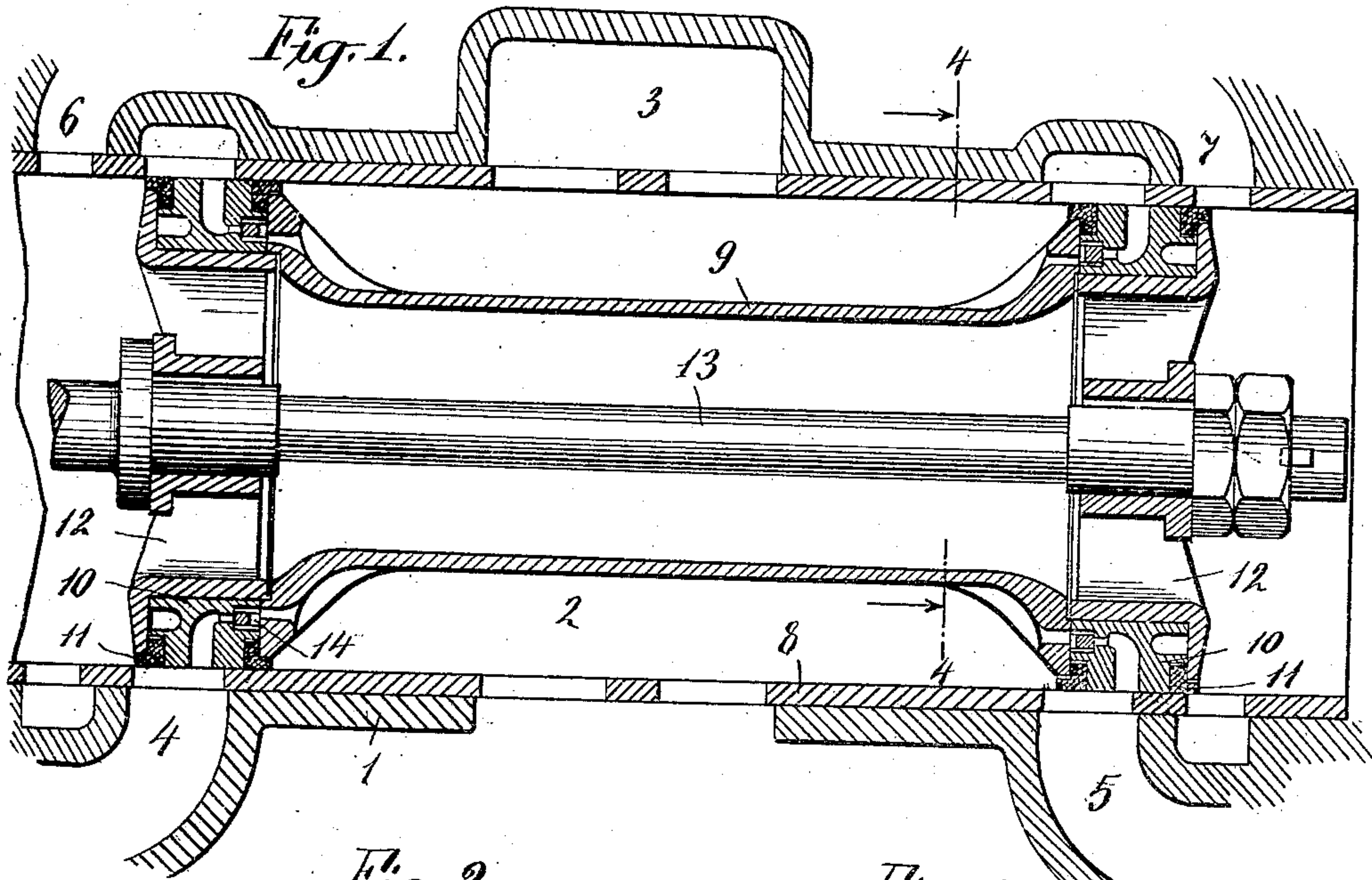


J. A. PFEIFFER.
RELIEF MECHANISM FOR PISTON VALVES.
APPLICATION FILED APR. 24, 1907.

910,851.

Patented Jan. 26, 1909.



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UNITED STATES PATENT OFFICE.

JOHN A. PFEIFFER, OF SCHENECTADY, NEW YORK.

RELIEF MECHANISM FOR PISTON-VALVES.

No. 910,851.

Specification of Letters Patent.

Patented Jan. 26, 1909.

Application filed April 24, 1907. Serial No. 369,891.

To all whom it may concern:

Be it known that I, JOHN A. PFEIFFER, a citizen of the United States, residing at Schenectady, in the county of Schenectady and State of New York, have invented certain new and useful Improvements in Relief Mechanism for Piston-Valves, of which the following is a specification.

This invention relates to valve structures for steam engines of various types and particularly for locomotives.

The invention is directed to the provision of a valve mechanism for automatically relieving excessive back-pressure resulting from compression of steam or water in the cylinder of an engine by the movement of the piston therein.

The object of the invention is to provide a relief mechanism of an improved type for this purpose, the improvements including the arrangement of the parts of the relief mechanism upon the piston-valve itself, thus avoiding the necessity of providing a special form of cylinder casting, so constructing the piston-valve that with little change it can be used on engines of the internal or external admission type, and the provision of a very simple construction such that the employment of the relief mechanism adds but little to the cost of construction of the engine.

The preferred embodiment of the invention is illustrated in the accompanying drawings in which—

Figure 1 is a longitudinal section of the piston-valve and valve cylinder of a locomotive, Figs. 2 and 3 are enlarged sectional views of portions of the valve, the sections being on lines 2 and 3, respectively, of Fig. 4, and Fig. 4 is a transverse view of the valve partly in section on line 4—4 of Fig. 1 and partly in elevation of the bull-ring of the valve.

Referring to these drawings, 1 indicates the cylinder casting having the valve-chamber 2 formed therein in which the piston-valve reciprocates. Also formed in the cylinder casting are a steam-inlet passage 3, passages 4 and 5 leading from the valve-chamber one to one end of the cylinder and the other to the opposite end, and exhaust-passages 6 and 7 leading from suitable ports in the valve-chamber. The chamber 2 may be provided with a bushing 8 in the usual manner.

The valve consists of the body 9, bull-rings 10, packing rings 11 and followers

12 secured together upon the shaft 13 and is adapted to be reciprocated in the valve casing to admit steam from inlet passage 3 through passages 4 and 5 alternately to opposite ends of the cylinder and from passages 4 and 5 to the exhaust-passages 6 and 7 to exhaust steam from the cylinder. The opposite ends of the piston-valve are alike in construction. The bull-ring 10 has an annular groove 14 therein to receive and permit movement of a valve-ring 15, the latter being preferably of drawn bronze to secure ample strength and to preclude the possibility of the ring rusting to its seat. Integral projections 16 are provided upon the walls of groove 14 to guide the ring in its movement axially of the valve and prevent lateral movement thereof. Suitable openings are provided in the bull-ring to receive a plurality of pins 17, each of which bears at one end upon ring 15 and at the other has a head against which a spiral spring 18 presses, this spring being held in place by the follower 12. A number of these spring-pressed pins 17 bearing on ring 15 and tending to force it from its seat are employed spaced apart equally around the ring, as shown in Fig. 4. In the bull-ring 10 are a plurality of openings 19 leading from the bottom of the groove for the valve-ring to the cylindrical surface of the bull-ring, the inner ends of these passages being of somewhat less width than of the ring 15. In the body 9 of the valve are a plurality of openings 20 leading to the groove for ring 15. With the valve thus constructed, when the throttle of the engine is open, steam is admitted from the boiler to the inlet-passage 3 and about the body 9 of this piston-valve and the pressure of the steam upon the valve-ring 15 in the direction of the arrow in Fig. 2, holds the latter upon its seat against the tension of springs 18, since under usual conditions the pressure in the cylinder and the passages 4 and 5 is less than that in the inlet-passage 3. However, if the pressure in one of the passages 4 or 5 should be so increased as to exceed the pressure within the steam-inlet passage, the valve-ring 15 at that end of the valve will be immediately raised from its seat and the excessive pressure will be relieved. Such abnormal increase in the back-pressure may result from imperfect adjustment of the parts of the valve mechanism, from the presence of water in the cylinder and from other causes and unless relieved

may cause breakage of or damage to the cylinder or piston.

In addition to relieving excessive back-pressure, the relief-valves are of value when the engine is drifting for the reason that when steam is cut off, the rings are forced from their seats and air can be forced from one end of the cylinder to the other through the passages 19 and 20, thus preventing the formation of a vacuum in the steam passage and the suction of cinders from the smoke-box. The springs 18 for holding the ring-valves open, though not essential, are considered of importance as they prevent the ring-valves from being drawn against their seats by the cylinder suction and also prevent hammering of the ring-valves.

As the parts of the relief mechanism are located wholly upon the piston-valve, no special form of cylinder casting is required. The construction here illustrated is of the internal admission type, the steam inlet 3 being at the center and the exhaust outlets 6 and 7 at the ends of the valve-chamber. The piston-valve can, however, be readily changed for use with engines of the external admission type, it being only necessary for this purpose to turn the bull-rings around so that the opposite faces thereof bear against the ends of the body of the valve and to provide openings in the followers 12 corresponding to the openings 20 in the body 9 of the valve.

While the preferred positions of the ring-valves 15 upon the piston-valve are those which I have shown, the construction may be changed in this respect with equally good results. Thus, the annular grooves in which the rings 15 move to and from their seats may be formed in the portion of the valve to which I have referred as the body 9, the seat for each ring being one face of the bull-ring 10 adjacent thereto.

I do not wish to be understood as limited to the exact construction I have herein dis-

closed, though it is that which I prefer to employ, as various modifications can be made therein without departing from the spirit of my invention and all such modifications I aim to cover by the terms of the claims appended hereto.

Having described my invention what I claim as new and desire to secure by Letters Patent of the United States is:

1. In an engine, a valve-casing, a piston valve therein, passages for carrying steam to the valve-casing and from the casing to the cylinder of the engine, an annular valve-chamber in each end of said piston-valve, a ring-valve movable in each of said chambers, springs pressing on said ring-valves to raise them from their seats, and passages in said piston-valve leading from opposite sides of each of said ring-valves, said ring-valves being normally held against their seats by steam-pressure thereon, substantially as described.

2. In an engine, a valve-casing, passages for carrying steam to the casing and from the casing to the cylinder of the engine, and a piston-valve in said casing consisting of a body, a bull-ring and a follower secured together, said bull-ring having an annular chamber in one face thereof, an annular valve-member in said chamber, and springs mounted in openings in said bull-ring and exerting a tension on said annular valve-member to raise the latter from its seat, said piston-valve being provided with openings therethrough to opposite sides of said valve-member and said valve-member being normally held against its seat by steam-pressure thereon, substantially as described.

This specification signed and witnessed this 13th day of April, 1907.

JOHN A. PFEIFFER.

Witnesses:

HAL. R. STAFFORD,
MARCUS E. FRANCE.