

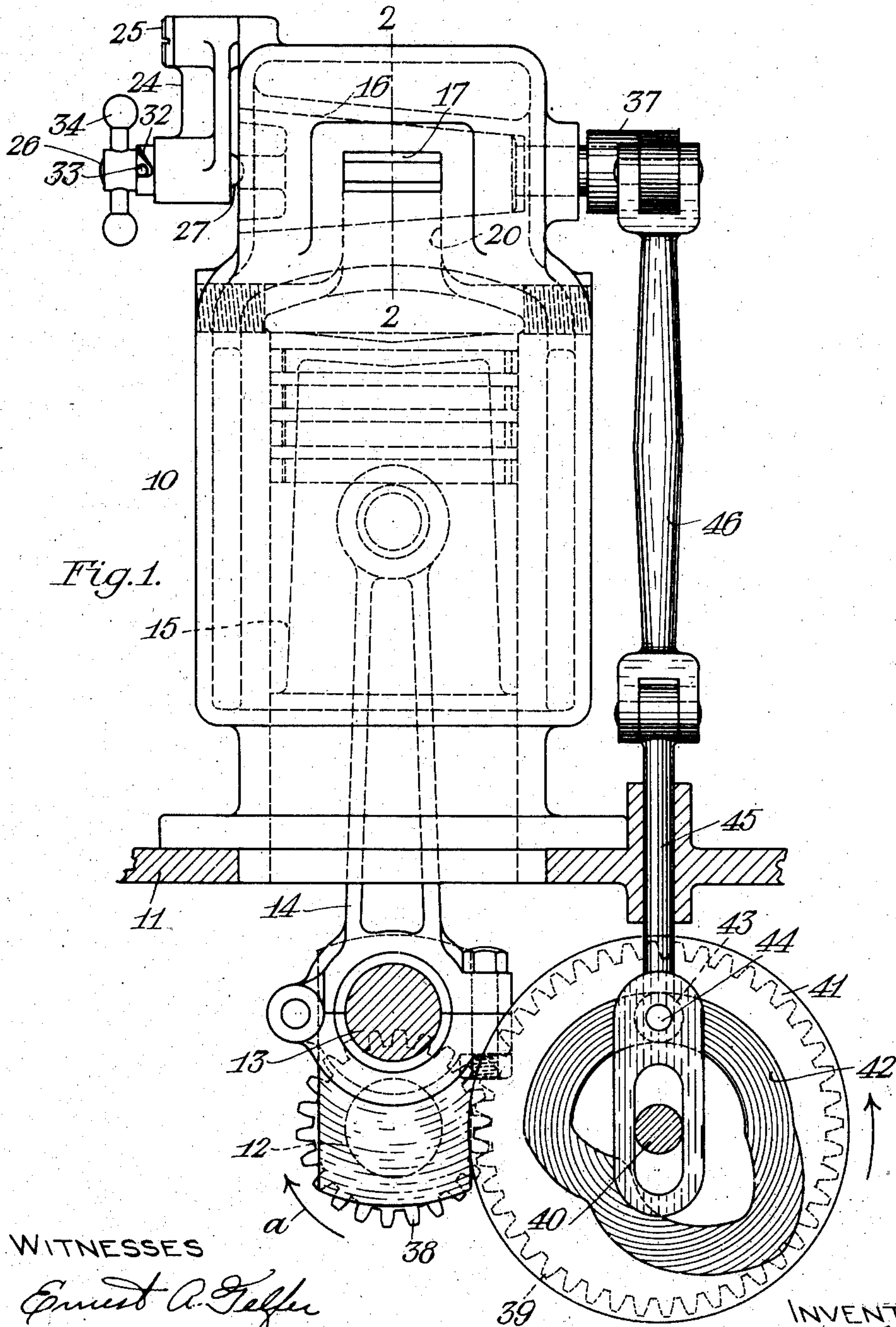
No. 873,963.

PATENTED DEC. 17, 1907.

B. A. SLOCUM.
INTERNAL COMBUSTION ENGINE.

APPLICATION FILED MAR. 1, 1907.

2 SHEETS—SHEET 1.



WITNESSES

Ernest A. Telfer

Sydney E. Taft.

INVENTOR

Benjamin A. Slocum,
by his attorney, Charles S. Gooding.

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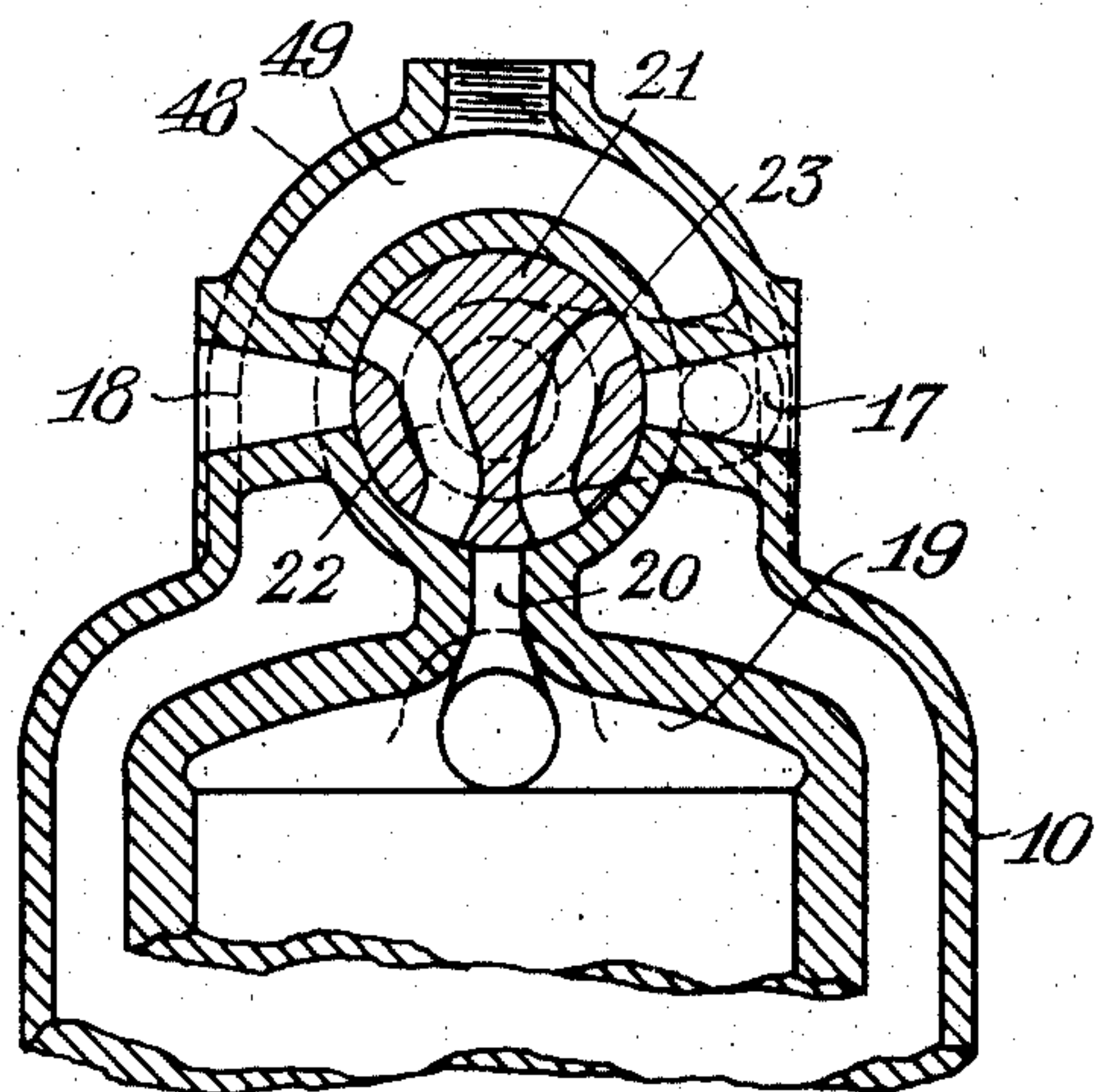


Fig. 2.

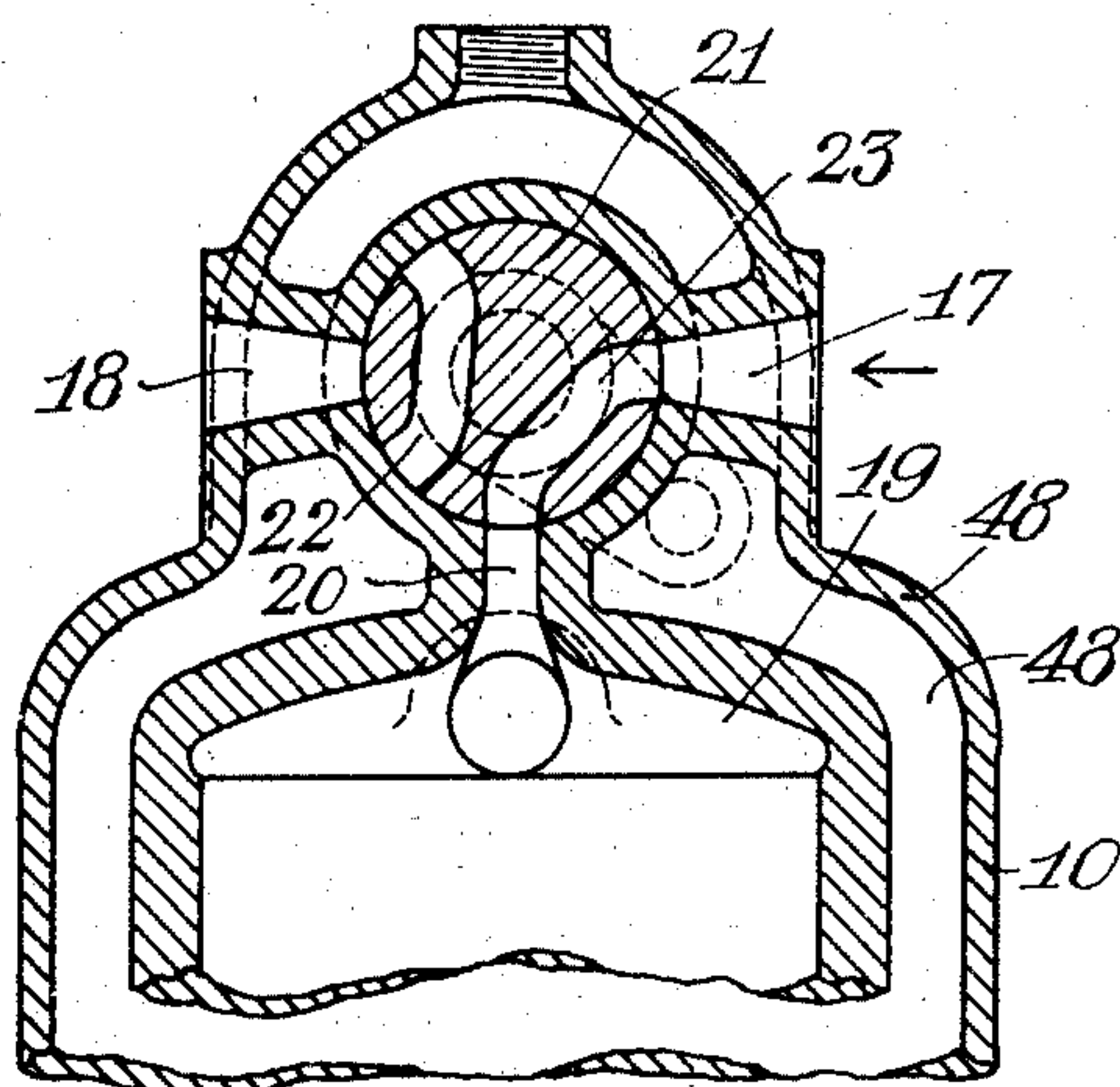


Fig. 3.

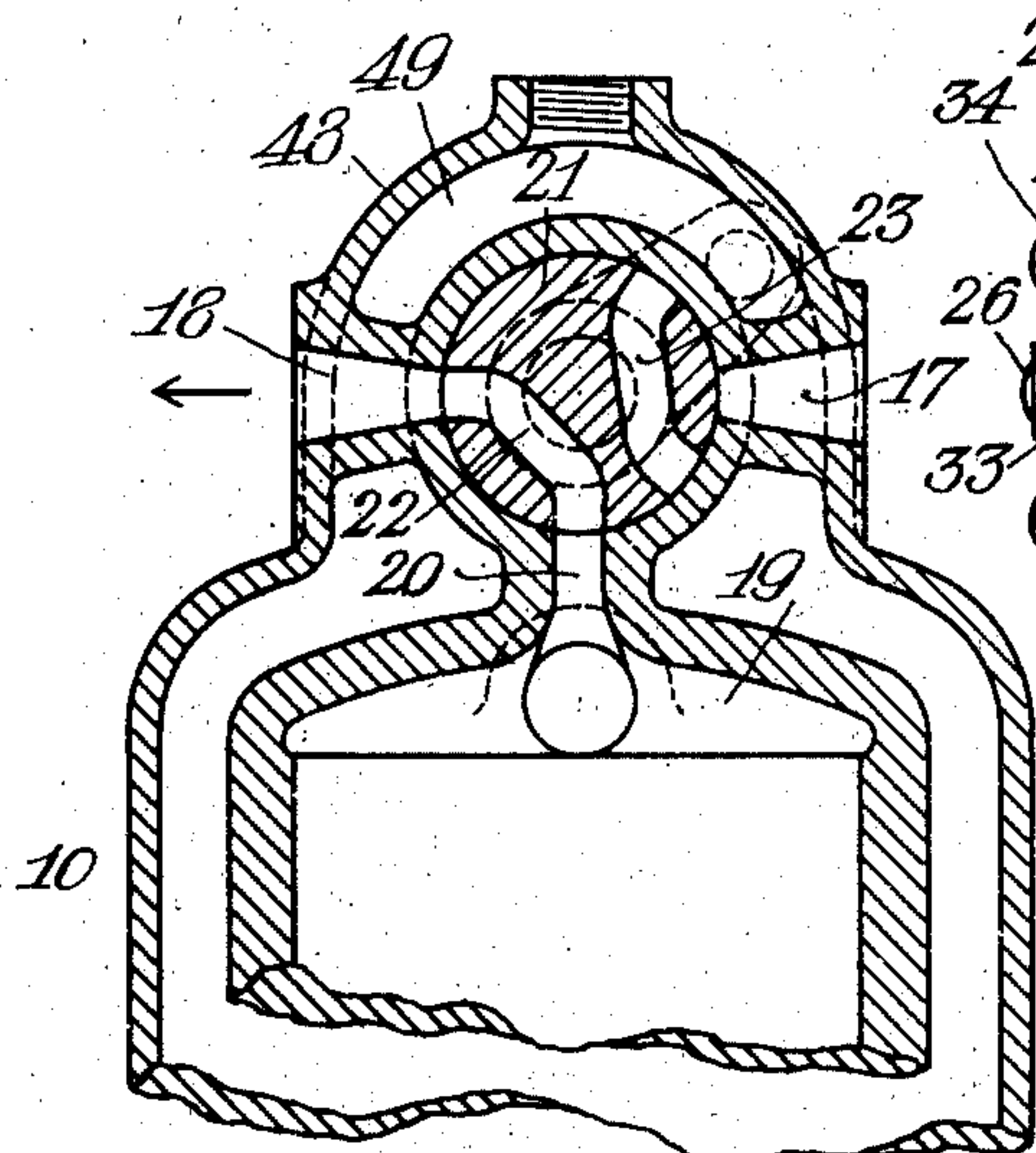


Fig. 4.

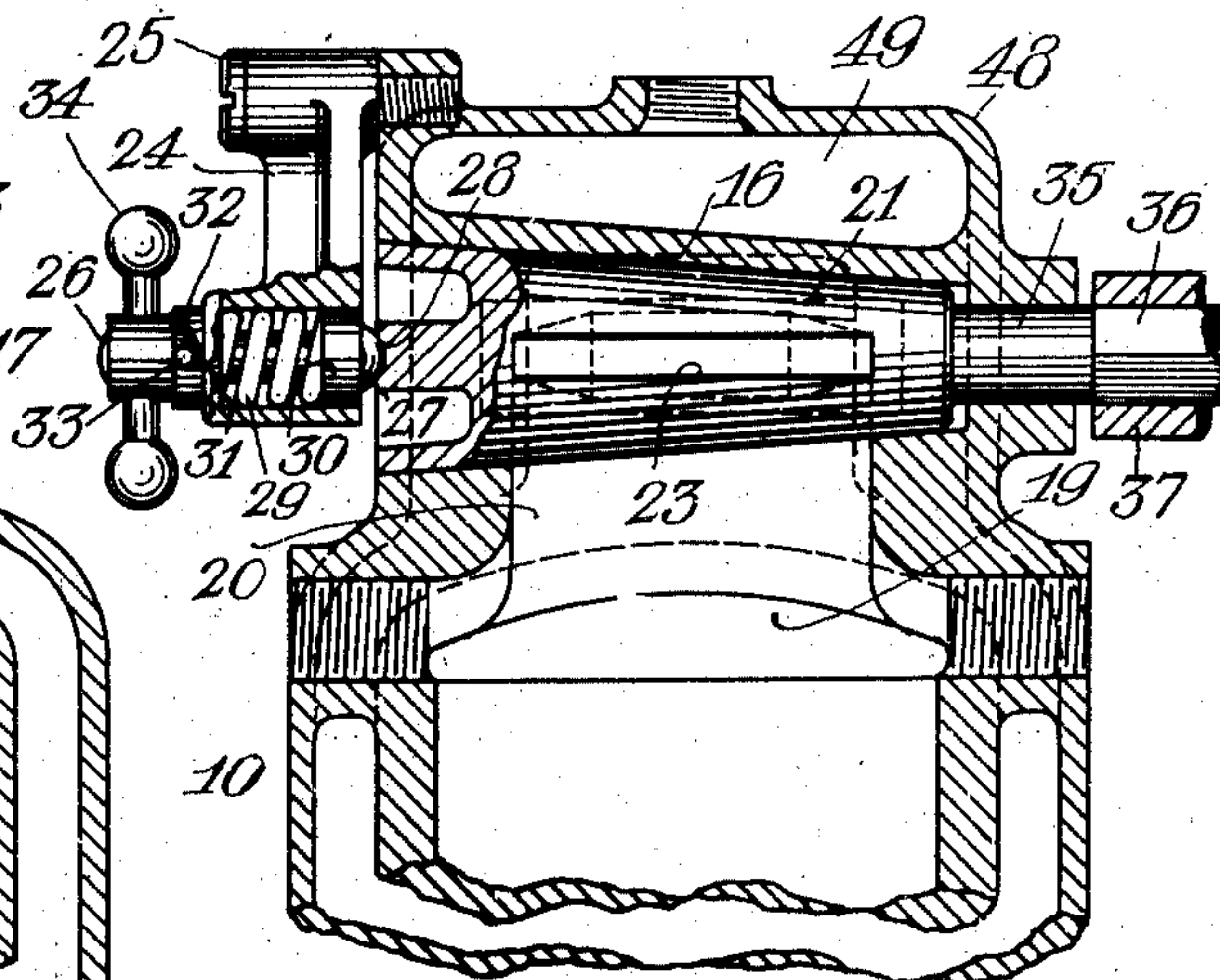


Fig. 5.

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UNITED STATES PATENT OFFICE.

BENJAMIN A. SLOCUM, OF LYNN, MASSACHUSETTS, ASSIGNOR TO JOHN R. VAUX, OF SWAMPSCOTT, MASSACHUSETTS.

INTERNAL-COMBUSTION ENGINE.

No. 873,963.

Specification of Letters Patent.

Patented Dec. 17, 1907.

Application filed March 1, 1907. Serial No. 359,951.

To all whom it may concern:

Be it known that I, BENJAMIN A. SLOCUM, a citizen of the United States, residing at Lynn, in the county of Essex and State of Massachusetts, have invented new and useful Improvements in Internal-Combustion Engines, of which the following is a specification.

This invention relates to improvements in internal combustion engines. In engines of this class the puppet valves which are now employed often become carbonized, *i. e.*, they become coated with soot or carbon deposit to such an extent that they do not close tightly and the efficiency of the engine is, therefore, greatly impaired. Furthermore, such puppet valves become warped by the heat of the gases and it becomes necessary to regrind them in their seats from time to time in order that there shall be no loss of compression.

The object of this invention is to overcome the faults above noted in connection with puppet valves, and to that end I employ a valve which in its operation wipes off the carbon deposit and also grinds itself in its seat.

The invention consists in the combination and arrangement of parts set forth in the following specification and particularly pointed out in the claims thereof.

Referring to the drawings: Figure 1 is an elevation of my improved internal combustion engine, the crank case being partly broken away and shown in section, the parts of the engine which are not essential to the illustration of my present invention being omitted. Fig. 2 is a section, partly broken away, taken on line 2—2 of Fig. 1 looking toward the right. Fig. 3 is a section similar to Fig. 2, but with the valve shown in the proper position to open communication from the inlet passage to the combustion space. Fig. 4 is a section similar to Fig. 3, except that the valve is shown in the proper position to open communication from the combustion space to the exhaust passage. Fig. 5 is a section, partly in elevation, taken in a vertical plane containing the axis of the valve.

Like numerals refer to like parts throughout the several views of the drawings.

In the drawings, referring now to Figs. 1 to 5, inclusive, 10 is a cylinder mounted on a suitable crank case 11 in which is journaled a crank-shaft 12 having a crank 13 connected by a connecting rod 14 to a piston 15. The

cylinder 10 is provided with a valve recess 16, which is preferably conical in form, while an inlet passage 17 and an exhaust passage 18 lead into said valve recess from opposite sides thereof, respectively. A combustion space or chamber 19 is connected to the valve recess 16 by a passage 20 which forms a part of said combustion space. A valve 21 is rotatably mounted in the valve recess 16, said valve being provided with two passages 22 and 23 which are adapted to open communication from the combustion chamber 19 to the inlet passage 17 and the exhaust passage 18 alternately. The usual inlet and exhaust pipes are not shown in the drawings.

A bracket or arm 24 is pivotally mounted on the cylinder 10 by means of a stud 25. A plunger 26 is both rotatably and slidably mounted in the arm 24, said plunger having a hemispherical end 27 which is adapted to be normally held in place in a depression 28 formed in the valve 21 by means of a helical compression spring 29. One end of said spring bears against a shoulder 30 formed on the plunger 26 and the other end of said spring bears against the end 31 of the recess in which said plunger is arranged. The arm 24 has formed thereon a helical cam 32. A pin or other suitable projection 33 on the plunger 26 is normally out of engagement with the cam 32, so that the spring 29 is adapted to normally press the plunger 26 against the valve 21, thereby forcing said valve into contact with the recess 16. A handle 34 is fast to the plunger 26.

The valve 21 is provided with a stem 35 having a square portion 36 on which is mounted an arm 37 having a corresponding square hole. A pinion 38 fast to the crank-shaft 12 meshes into a gear 39 fast to a cam-shaft 40, the ratio of said gear to said pinion being two to one. A cam 41, fast to the cam-shaft 40, is provided with a cam groove 42 in which is located a cam-roll 43 journaled on a stud 44. The stud 44 is fast to a valve-rod 45, said valve-rod being slidably arranged in the crank case 11. A link or connecting rod 46 is pivotally connected at its lower end to the valve-rod 45 and at its upper end to the arm 37.

The operation of the engine hereinbefore specifically described is as follows: Assuming the valve 21 to be in the position shown in Fig. 3 and the crank-shaft 12 to be rotating

in the direction of the arrow *a*, the piston 15 moves downwardly, thereby drawing into the cylinder 10 a charge of gas from any suitable source. The cam 41 acts through the valve-rod 45, link 46 and arm 37 to rock the valve 21 into the position shown in Fig. 2. The piston 15 moves upwardly, thereby compressing into the combustion space 19 the charge of gas contained within the cylinder 10. The compressed gas is then ignited by any suitable means (not shown,) and the piston 15 is thereby driven downwardly. The cam 41 then acts to rock the valve 21 into the position shown in Fig. 4 and the piston 15 in its upward stroke forces the burned gas out through the passages 20, 22 and 18. A new cycle of operations then begins, the valve 21 being rocked into the position shown in Fig. 3. If, for any reason, it is desired to remove the valve 21 the plunger 26 is rotated by means of the handle 34 and the pin 33 rides up the incline of the cam 32 and thereby withdraws the hemispherical end of said plunger from engagement with the valve 21. The arm 24 is then swung on its pivot 25 out of alignment with the valve 21 and said valve may then be readily withdrawn.

The cylinder 10 is preferably provided with a suitable water jacket 48 which incloses a water space 49 which extends around the recess 16 and the passages 17 and 18. As the valve 21 becomes heated by the gas, said valve will, of course, expand and the metal which surrounds said valve will not necessarily expand as much as said valve will and, therefore, said valve, owing to its form and owing to the spring 29, yields toward the left (Fig. 5) and is thus prevented from sticking or binding in the recess 16. The valve 21 as it rocks in the recess 16 continually wipes off against the walls of said recess any deposit of carbon that may be formed thereon and furthermore said valve, by reason of its continual rocking movement, preserves its close contact with the walls of the recess 16, thereby preventing any leakage of gas. Instead of having the passages 22 and 23 extend through the valve 21 I may, if I so desire, flat the sides of said valve or provide recesses therein which will serve the same purpose as the passages 22 and 23.

Having thus described my invention, what I claim and desire by Letters Patent to secure is:

1. In an internal combustion engine, a cylinder provided with a combustion space, a conical valve recess connected to said combustion space and an inlet passage leading into said conical recess, a conical valve rotatably mounted in said recess, said valve provided with a passage adapted to be moved into position to open communication from said inlet passage to said combustion space, an arm pivotally mounted on said cylinder, said arm having a cam formed thereon, a plunger slidably and rotatably mounted in said arm, a pin fast to said plunger adapted to engage said cam, a spring adapted to normally press said plunger against said valve, and mechanism for actuating said valve.

2. In an internal combustion engine, a cylinder provided with a combustion space, a conical valve recess connected to said combustion space and an inlet passage leading into said conical recess, a conical valve rotatably mounted in said recess, said valve provided with a passage adapted to be moved into position to open communication from said inlet passage to said combustion space, an arm pivotally mounted on said cylinder, said arm having a cam formed thereon, a plunger slidably and rotatably mounted in said arm, a pin fast to said plunger adapted to engage said cam, a spring adapted to normally press said plunger against said valve, and mechanism for actuating said valve.

3. In an internal combustion engine, a cylinder provided with a combustion space, a conical valve recess connected to said combustion space and an inlet passage leading into said conical recess, a conical valve rotatably mounted in said recess, said valve provided with a passage adapted to be moved into position to open communication from said inlet passage to said combustion space, an arm mounted on said cylinder, said arm having a cam formed thereon, a plunger slidably and rotatably mounted in said arm, a pin fast to said plunger adapted to engage said cam, a spring adapted to normally press said plunger against said valve, and mechanism for actuating said valve.

4. In an internal combustion engine, a cylinder provided with a combustion space, a conical valve recess connected to said combustion space and an inlet passage leading into said conical recess, a conical valve rotatably mounted in said recess, said valve provided with a passage adapted to be moved into position to open communication from said inlet passage to said combustion space, an arm mounted on said cylinder, a plunger mounted in said arm, said plunger being slidably toward and away from said valve, a spring adapted to normally press said plunger against said valve, and means for withdrawing said plunger from engagement with said valve.

5. In an internal combustion engine, a cylinder provided with a combustion space, a valve recess connected to said combustion space and an inlet passage leading into said recess, a valve rotatably mounted in said recess, said valve provided with a passage adapted to be moved into position to open communication from said inlet passage to said combustion space, an arm pivotally mounted on said cylinder, said arm having a cam formed thereon, a plunger slidably and rotatably mounted in said arm, a pin fast to said plunger adapted to engage said cam, a spring adapted to normally press said plunger against said valve, and mechanism for actuating said valve.

6. In an internal combustion engine, a cylinder provided with a combustion space, a conical valve recess connected to said combustion space and an inlet passage leading into said conical recess, a conical valve rotatably mounted in said recess, said valve provided with a passage adapted to be moved into position to open communication from said inlet passage to said combustion space, an arm pivotally mounted on said cylinder, said arm having a cam formed thereon, a plunger slidably and rotatably mounted in said arm, a pin fast to said plunger adapted to engage said cam, a spring adapted to normally press said plunger against said valve, and mechanism for actuating said valve.

rotatably mounted in said arm, a pin fast to said plunger adapted to engage said cam, a spring adapted to normally press said plunger against said valve, and mechanism for
5 actuating said valve.

6. In an internal combustion engine, a cylinder provided with a combustion space, a valve recess connected to said combustion space and an inlet passage leading into said
10 recess, a valve rotatably mounted in said recess, said valve provided with a passage adapted to be moved into position to open communication from said inlet passage to
15 said combustion space, an arm mounted on said cylinder, a plunger mounted in said arm, said plunger being slidable toward and away from said valve, a spring adapted to normally press said plunger against said
20 valve, and means for withdrawing said plunger from engagement with said valve.

7. In an internal combustion engine, a cylinder provided with a combustion space, a valve recess connected to said combustion space and a passage leading into said valve
25 recess, a valve rotatably mounted in said recess, said valve provided with a passage adapted to be moved into position to open communication from said first passage to said combustion space, a bracket mounted
30 on said cylinder, a plunger mounted on said bracket, said plunger being slidable toward and away from said valve, a spring adapted to normally press said plunger against said valve, and mechanism for actuating said
35 valve.

8. In an internal combustion engine, a cylinder provided with a combustion space, a valve recess connected to said combustion

space and a passage leading into said valve recess, a valve rotatably mounted in said
40 recess, said valve provided with a passage adapted to be moved into position to open communication from said first passage to said combustion space, a bracket mounted on said cylinder, said bracket having a cam
45 formed thereon, a plunger slidably and rotatably mounted on said bracket, a projection on said plunger adapted to engage said cam, a spring adapted to normally press said plunger against said valve, and mechanism
50 for actuating said valve.

9. In an internal combustion engine, a cylinder provided with a combustion space, a valve recess connected to said combustion space and a passage leading into said valve
55 recess, a valve rotatably mounted in said recess, said valve provided with a passage adapted to be moved into position to open communication from said first passage to said combustion space, said valve also pro-
60 vided with a depression in one end thereof, an arm pivotally mounted on said cylinder, a plunger mounted on said arm and adapted to enter said depression, said plunger being
65 slidable toward and away from said valve, a spring adapted to normally press said plunger into said depression, and mechanism for actuating said valve.

In testimony whereof I have hereunto set my hand in presence of two subscribing wit-
70 nesses.

BENJAMIN A. SLOCUM.

Witnesses:

LOUIS A. JONES,
ANNIE J. DAILEY.