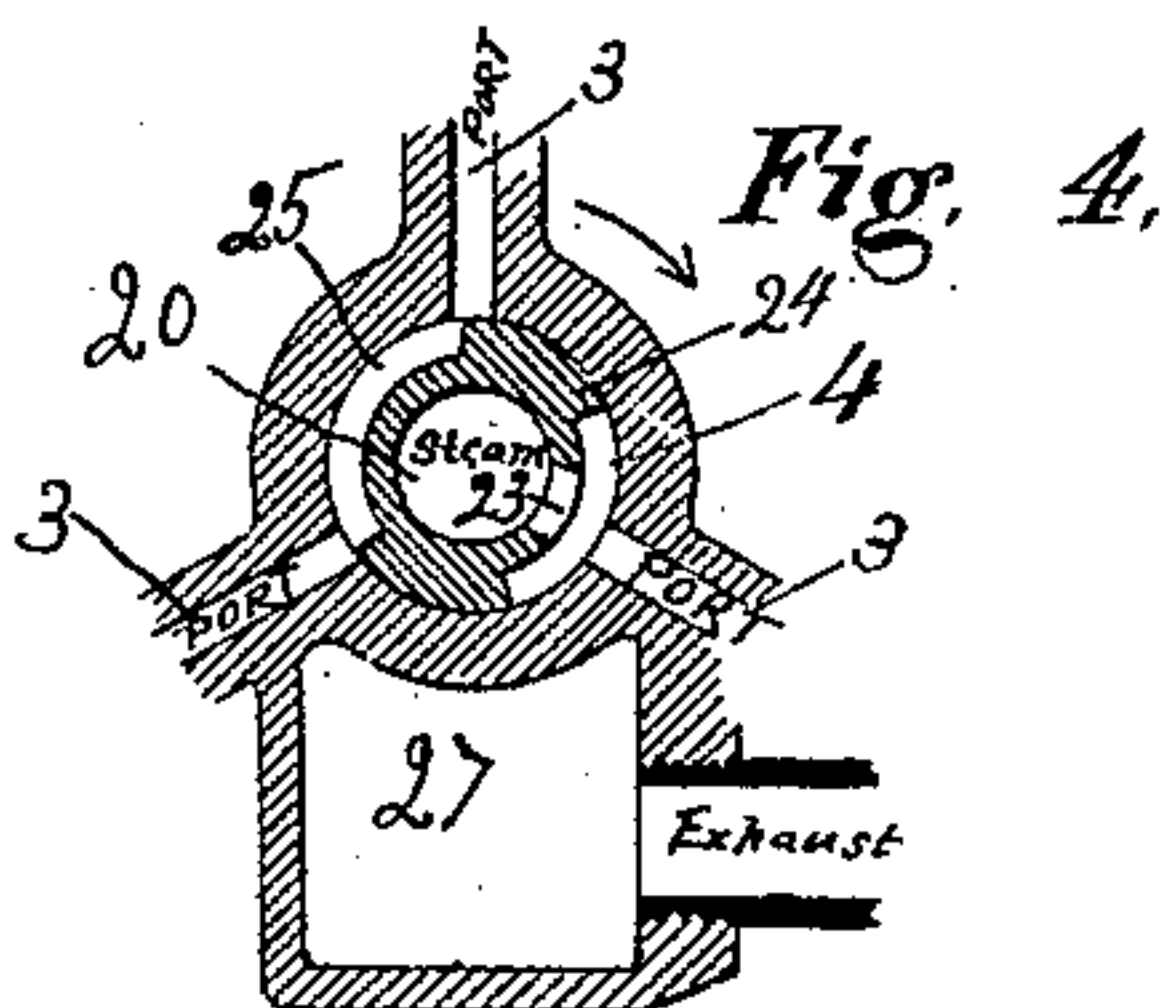
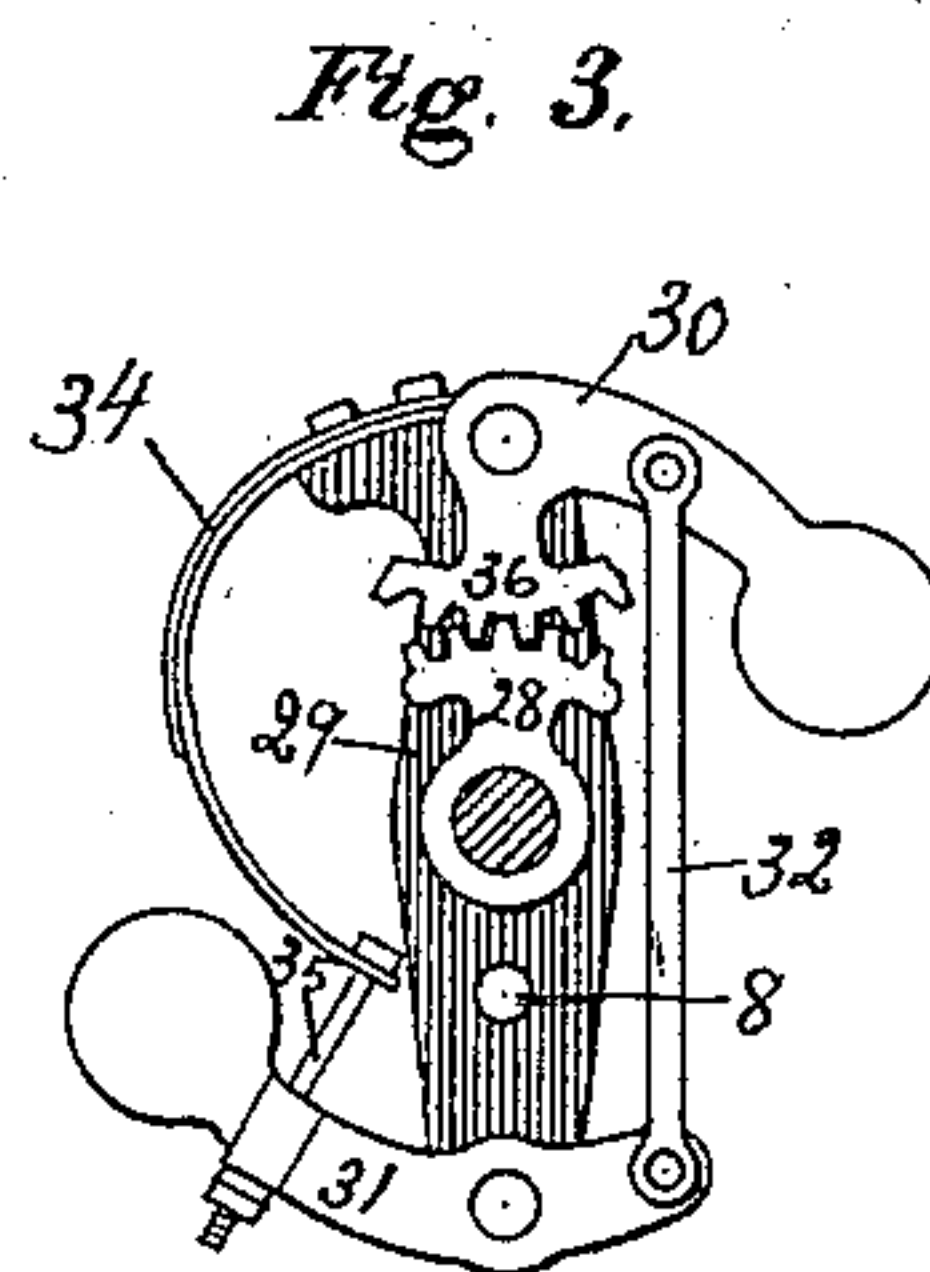
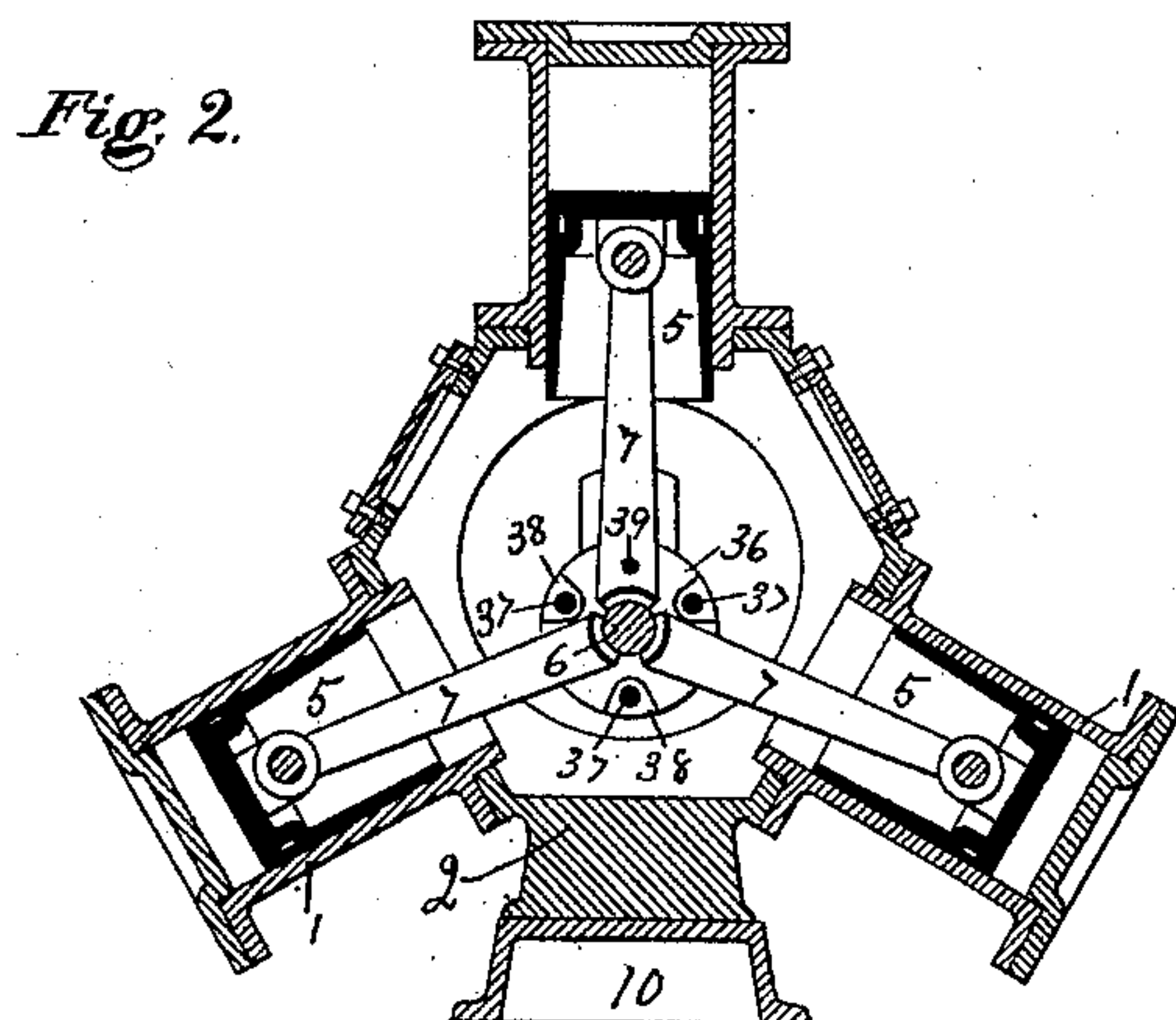
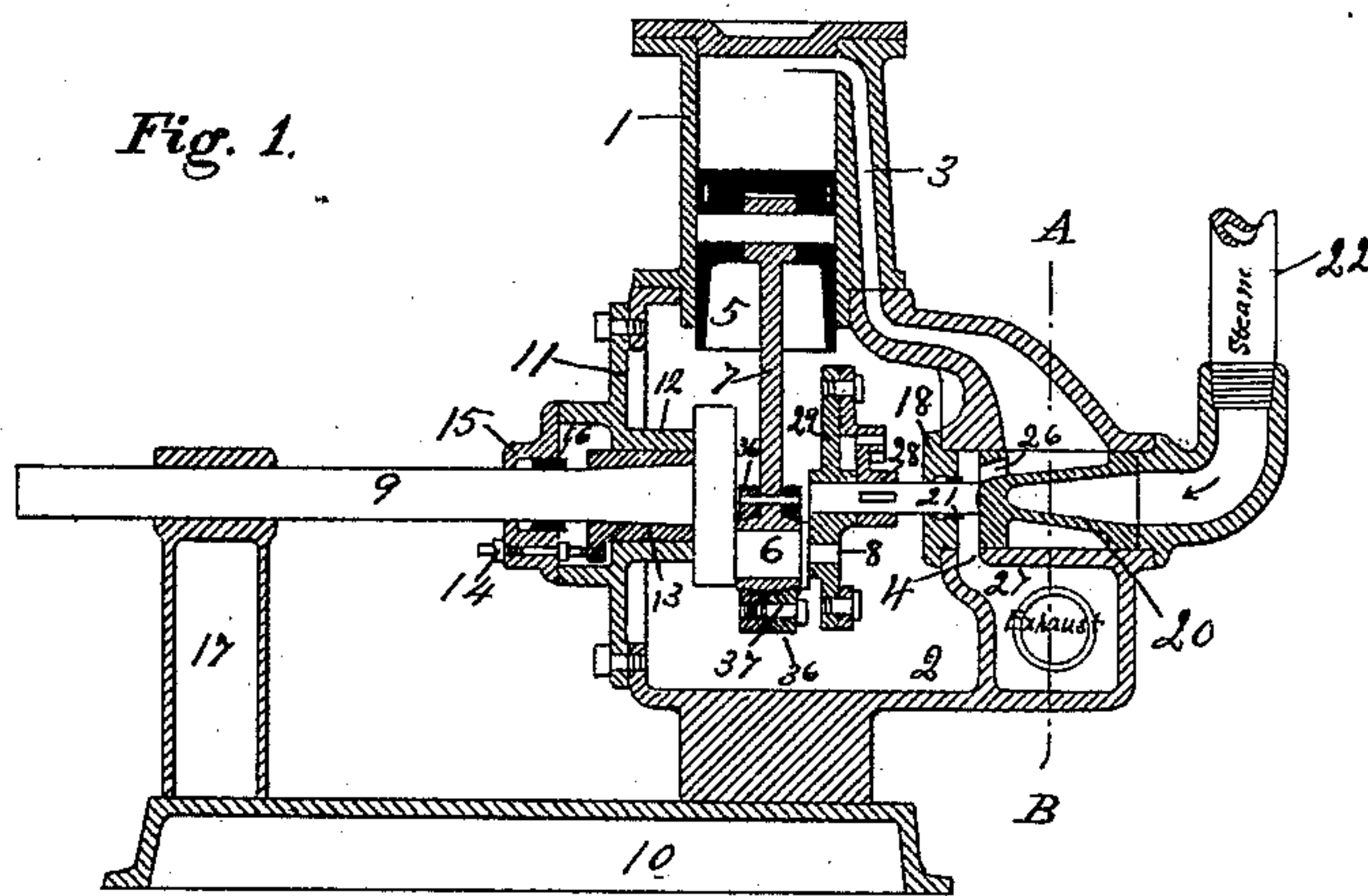


(No Model.)

N. J. TUBBS.
STEAM ENGINE.

No. 428,656.

Patented May 27, 1890.



Witnesses:
Minor Harvey
Amos Steiens

Inventor,
N. J. Tubbs.
by his atty.
Arthur L. Steiens

UNITED STATES PATENT OFFICE.

NELSON J. TUBBS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO DANIEL SCULL, OF SAME PLACE.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 428,656, dated May 27, 1890.

Application filed August 23, 1889. Serial No. 321,745. (No model.)

To all whom it may concern:

Be it known that I, NELSON J. TUBBS, a citizen of the United States, residing at Philadelphia, in the State of Pennsylvania, have
5 invented a new and useful Improvement in Steam-Engines, of which the following is a specification.

My invention relates to that class of engines known as "multiple-cylinder engines;"
10 and it consists of certain improvements in the valve and general construction, by which is attained great simplicity of parts and economical operation. Some of the advantages secured by my invention being low first cost
15 of engine, efficiency, and durability, provision is made for taking up wear of the parts.

In the accompanying drawings, Figure 1 is a vertical longitudinal section through the engine. Fig. 2 is a vertical transverse section
20 through the cylinder. Fig. 3 is a detail view of the governor, and Fig. 4 a cross-section through the valve on line A B.

Similar reference-signs refer to similar parts throughout the several views.

25 The cylinders 1 are secured to the cored box 2. The cylinders have ports 3, cored out in one side, the continuations of which are cored in the box 2 and communicate with the valve-chamber 4. In the cylinders 1 are the
30 pistons 5, which are provided with packing-rings, and are connected to the crank-pin 6 by the rods 7. The pin 6 has an extension 8, and is forged with the shaft 9. The box 2 is secured to the base-plate 10, and has a cover
35 11 bolted to one side. The cover 11 has an inward-projecting base 12, which is bored out to receive the bushing 13, which fits the taper bearing on shaft 9. Wear is taken up in this
40 bearing by means of the studs 14, which project through the cap 15. The cap 15 is provided with a stuffing-box 16. A suitable pedestal 17 is secured to the base-plate 10 and forms the other bearing for the shaft 9. The
45 box-casting 2 has a cap 18 to the valve-chamber, through which passes the stem of the valve 20. A stuffing-box 21 is provided to prevent the escape of exhaust-steam to the interior of the box. Steam is admitted through
50 the pipe 22 to the end of the valve 20, the interior of said valve being conical in shape. A passage 23 is provided to admit steam to

the ports 3, the steam being cut off from said ports by the edges 24 of the valve as it revolves in the direction of the arrow in Fig. 4. On the opposite side of the valve from the
55 passage 23 is the space 25, communicating through the port 26 with the exhaust-passage 27. On the stem of the valve is keyed a toothed segment 28. Loose on the valve-stem is the double arm-piece 29, to which are piv-
60 oted the weighted arms 30 and 31, which are connected by the rod 32. The arm 30 is in the form of a bell-crank, with teeth at 36, meshing with the toothed segment 28. Secured to one end of the piece 29 is the spring 34, which
65 is connected to arm 31 by means of the bolt 35. The valve is opposite and in line with the shaft, and is actuated by the extension 8 on the crank-pin, which carries the loose arm
29 around in exact time with the shaft. The
70 load being constant on the engine, the valve is also rotated in exact time with the shaft; but should the load vary then the weighted arms 30 and 31, by moving in or out from the center, as a consequence of a variation in
75 speed, change the relative position of the valve with the crank-pin by means of the toothed segments 28 and 36, and therefore change the point of cut-off.

The crank end of the connecting-rods 7 are
80 provided with taper flanges, over which are secured two rings 36, bored to fit over said flanges and secured together by screws 37, the bosses 38 acting as liners, which can be
85 filed to insure proper working fit between the connecting-rods and crank-pin. Through one of the connecting-rods a pin 39 keeps the rings 36 in the same relative position with that rod, preventing the bosses 37 striking
90 the other rods.

It will be seen from the foregoing that I employ a revolving slide-valve in which the steam enters at the center and is distributed to the cylinders in succession. The exhaust-
95 port, which is always open, is brought successively to register with the cylinder-ports. My valve is in the center of the engine, in line with the shaft, and from the valve radiate the cylinder-ports. I provide the engine
100 with an automatic cut-off by placing the governor on the valve stem or spindle and driving the valve from the crank-pin. I have

made provision for wear in the main bearing, and also the crank end of the connecting-rods. When an automatic cut-off is not desirable, I remove the governor and connect
5 the valve-spindle direct with the crank-pin; and should it be desired to use the engine as a water-motor it is adapted to that purpose by making the valve without lap, in all other respects it remaining the same.

10 Having fully described the construction and operation of my invention, what I claim as new, and wish to secure by Letters Patent, is—

15 1. In a multiple-cylinder engine, a revolving valve in line with the shaft of said engine, in combination with the toothed segment 28, secured to the stem of said valve, and the toothed segment 36 on the weighted arm 30, said arm 30 and the weighted arm 31 being pivoted to the piece 29, which is loose

or free on the stem of the valve and is connected with the crank-pin of the engine, in substantially the manner described, and for the purpose set forth.

2. In a multiple-cylinder engine, the combination of the cored box 2, having a valve-
25 chamber 4, and the valve 20, provided with the passage 23 through one side, and the exhaust-port 26, with a shaft and crank-pin, as described, and connecting-rods having taper bosses and secured to said crank-pin by
30 means of the rings 36, which are provided with liners 38 and screws 37, substantially as described, and for the purpose set forth.

NELSON J. TUBBS.

Witnesses:

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FRANK R. STEVENSON.