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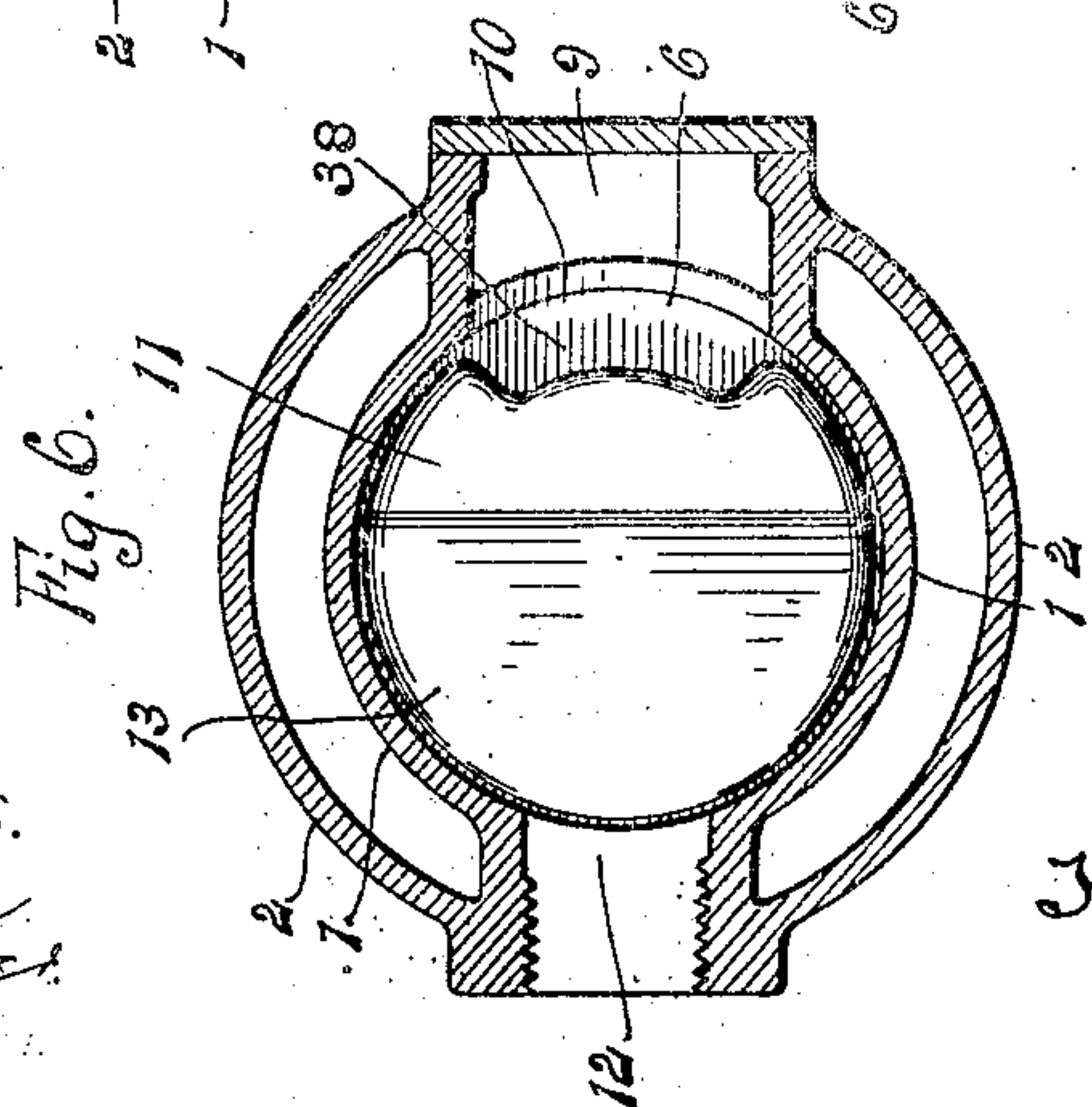
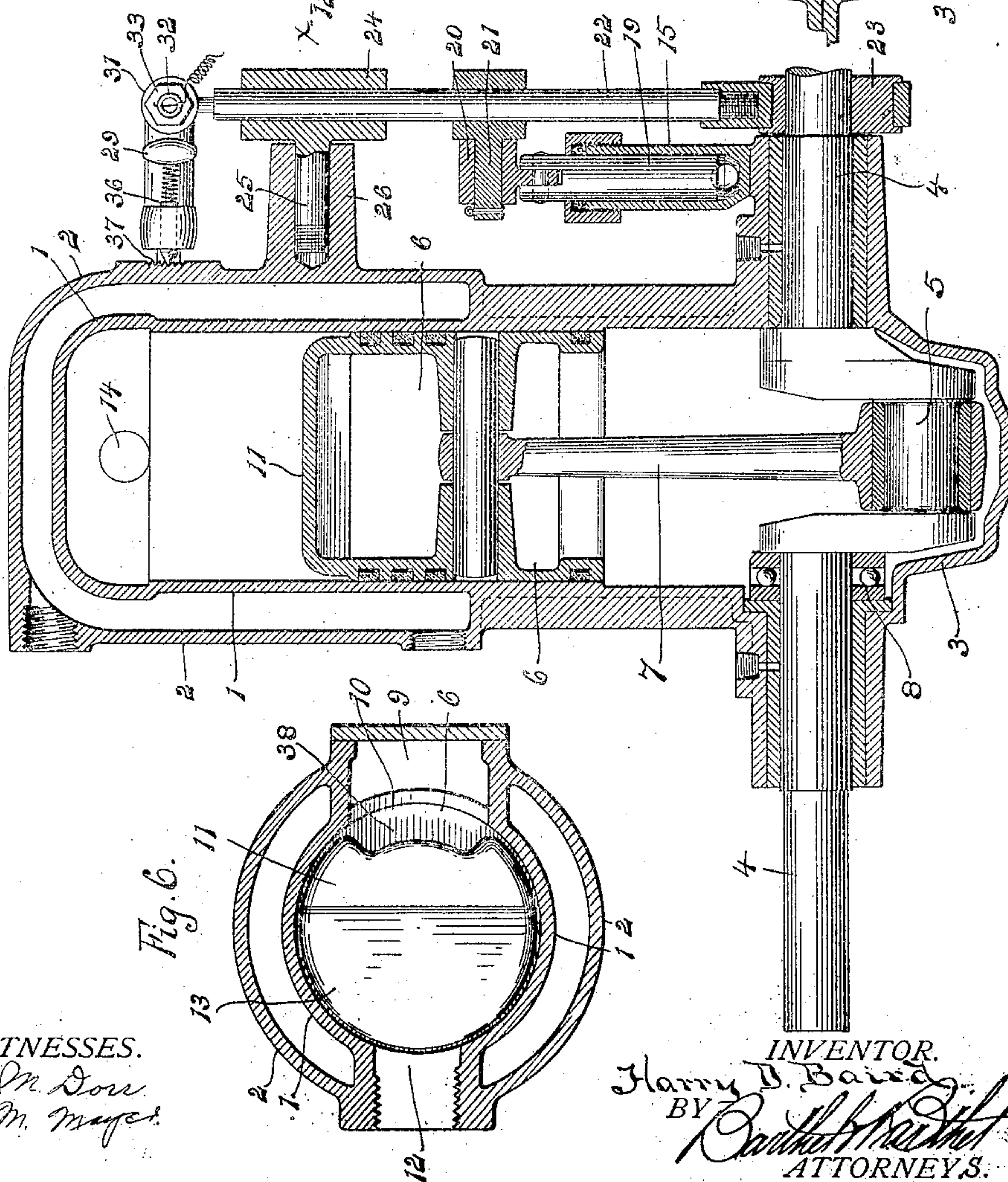
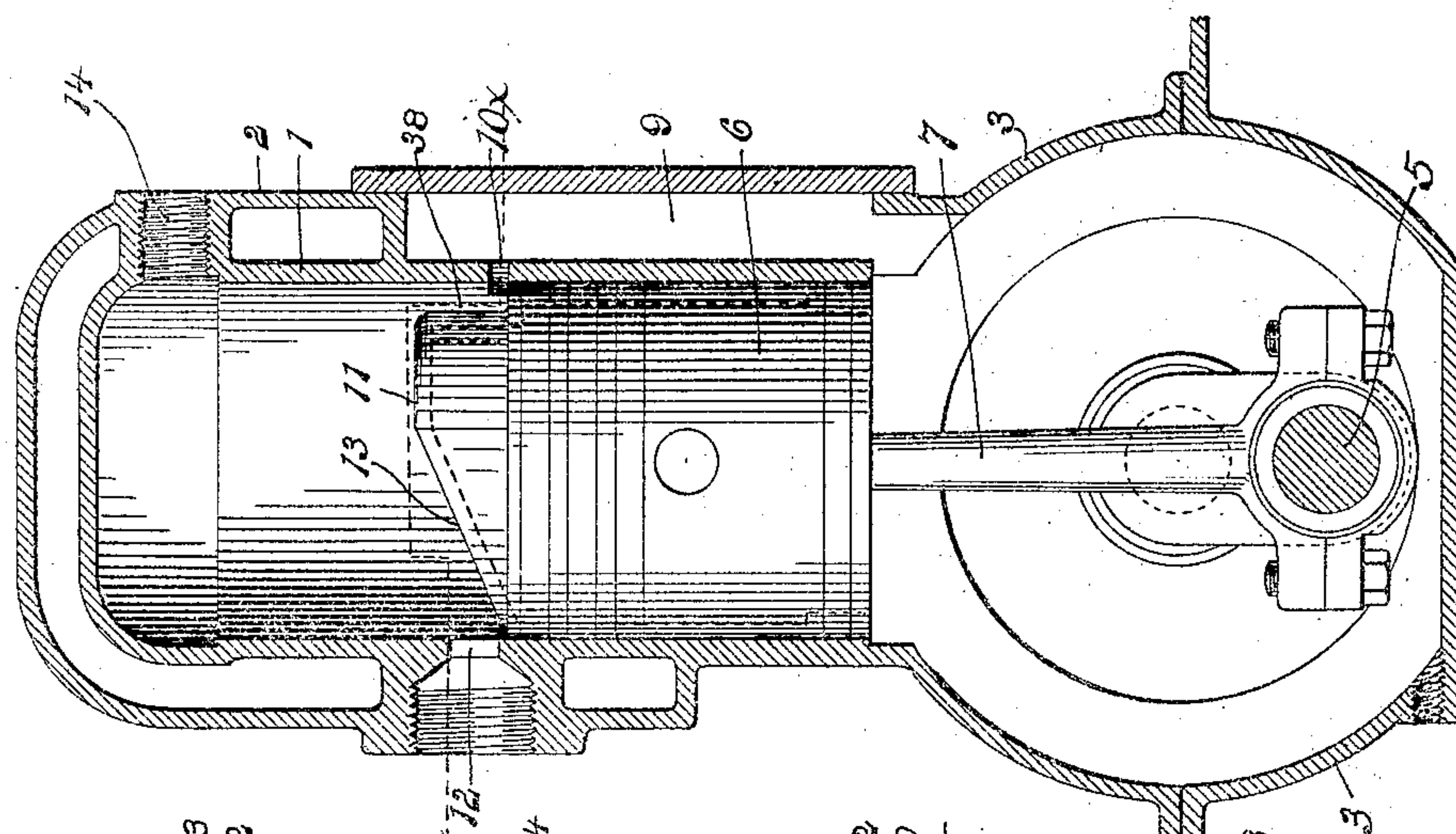
PATENTED MAY 19, 1908.

H. D. BAIRD.

EXPLOSIVE ENGINE.

APPLICATION FILED FEB. 14, 1907.

2 SHEETS—SHEET 1.



WITNESSES.

Anna M. Dorr
Anna M. Mayes.

INVENTOR.

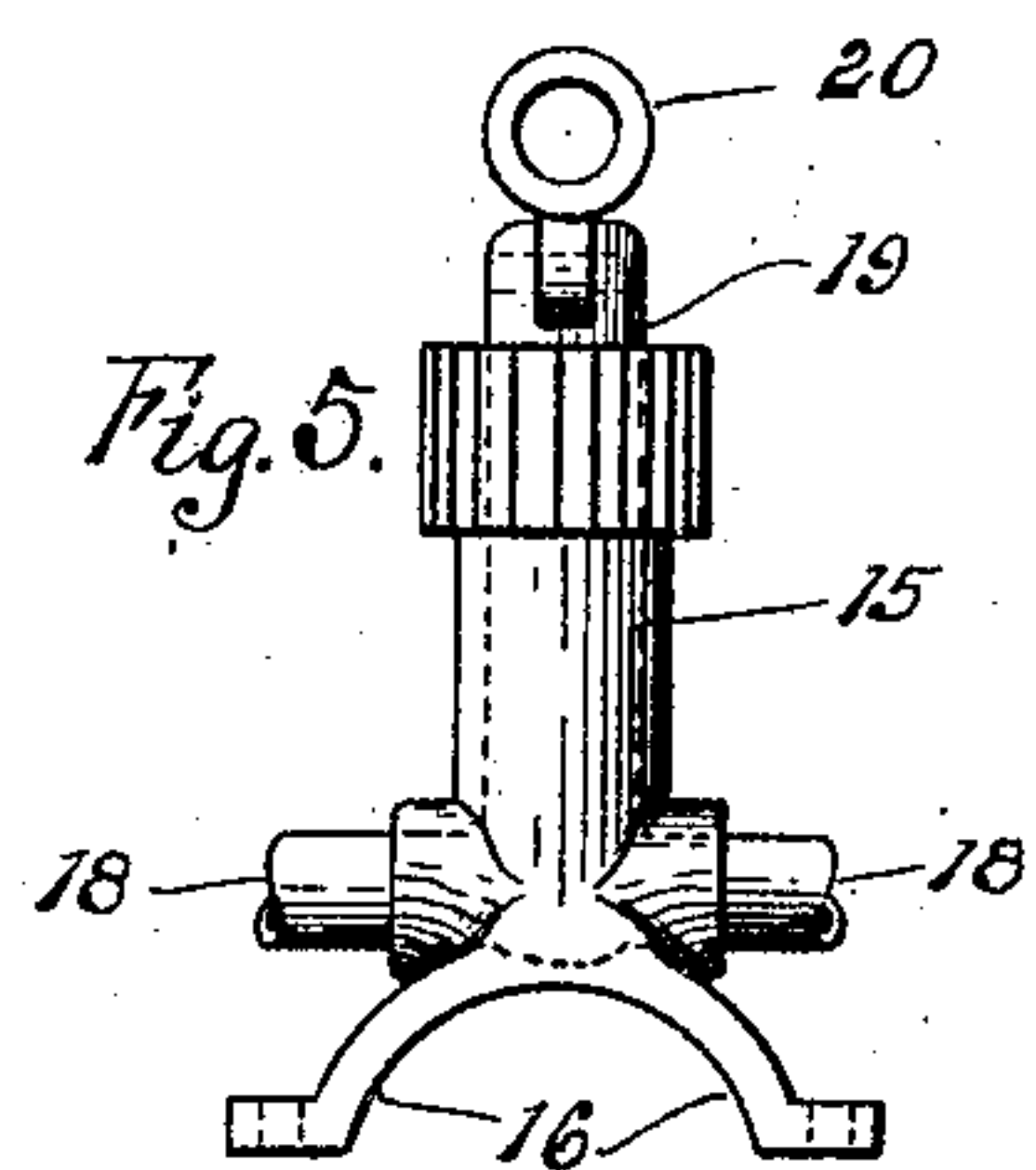
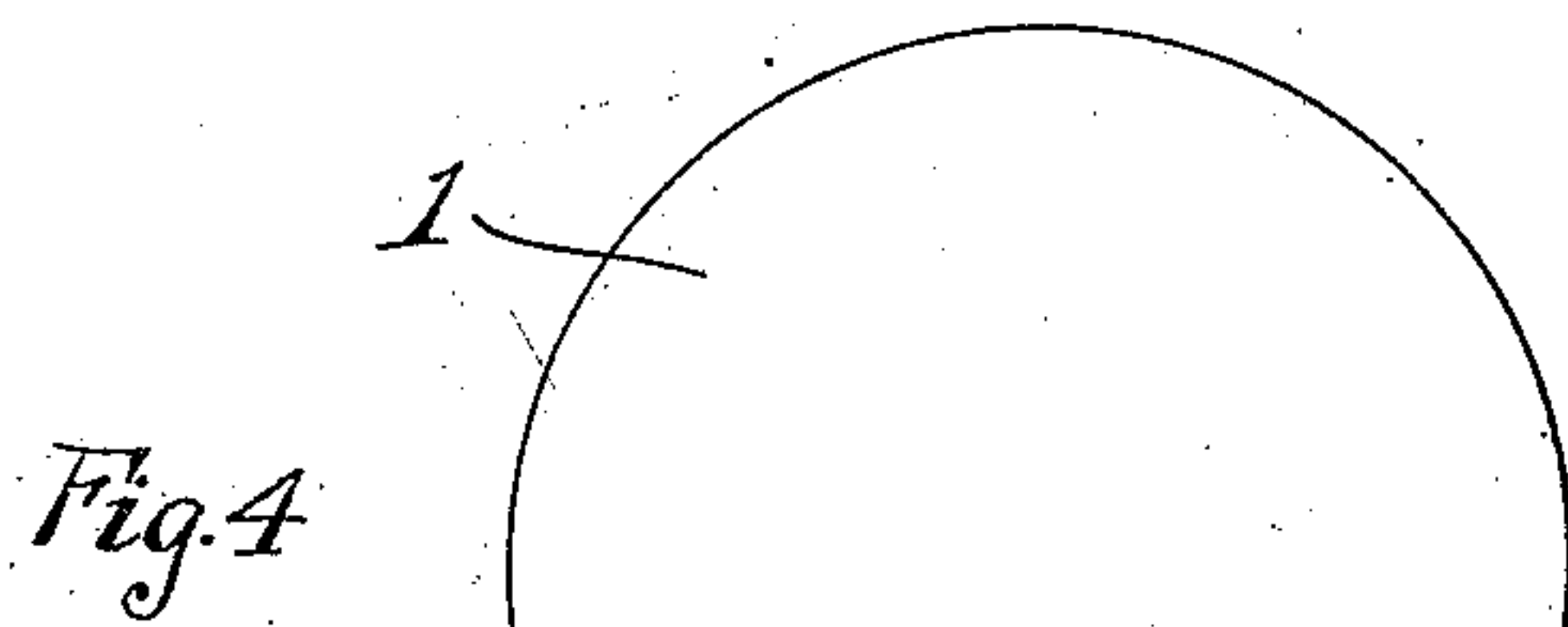
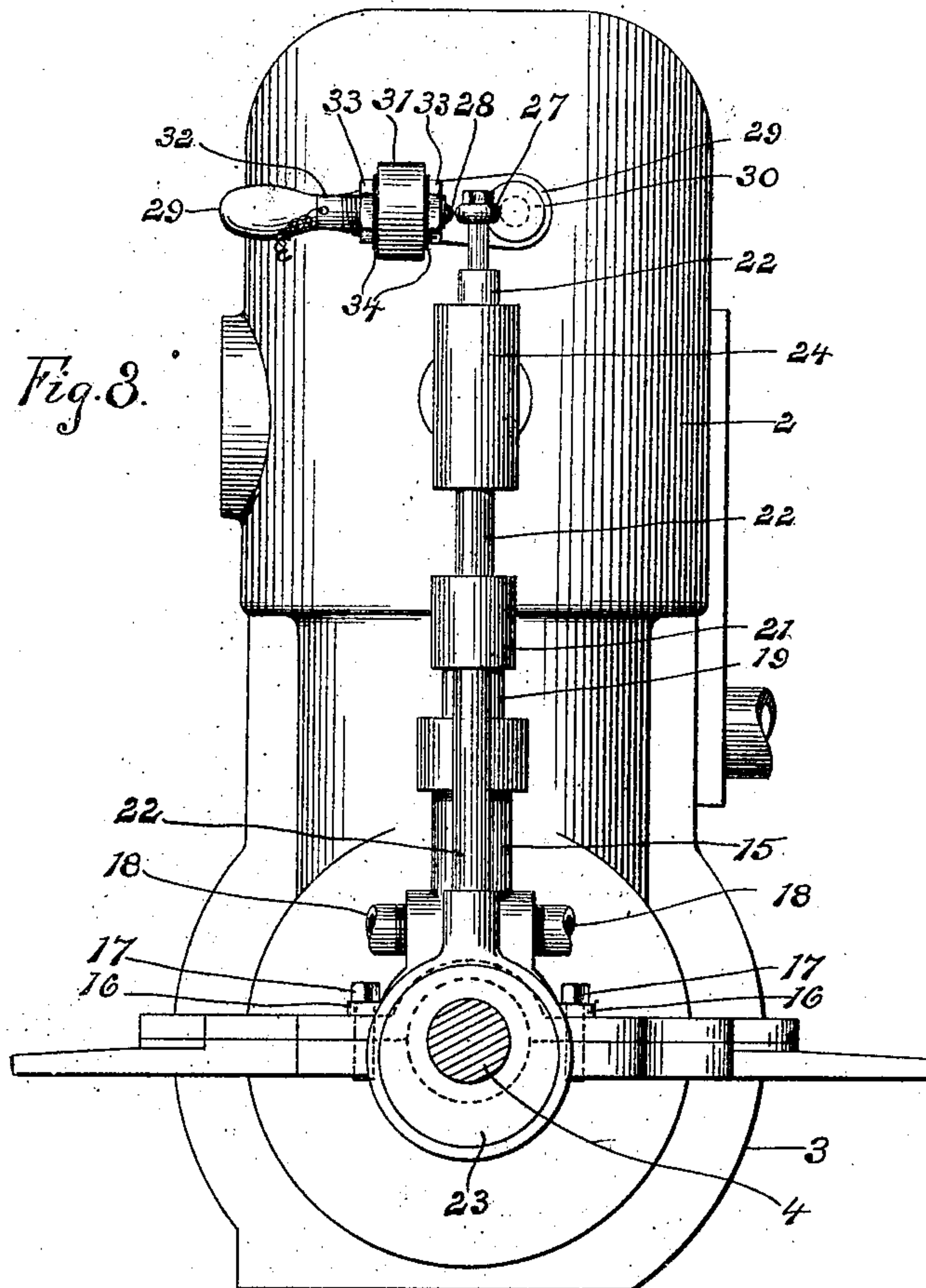
Harry D. Baird
BY *Carroll Baird*
ATTORNEYS.

No. 887,749.

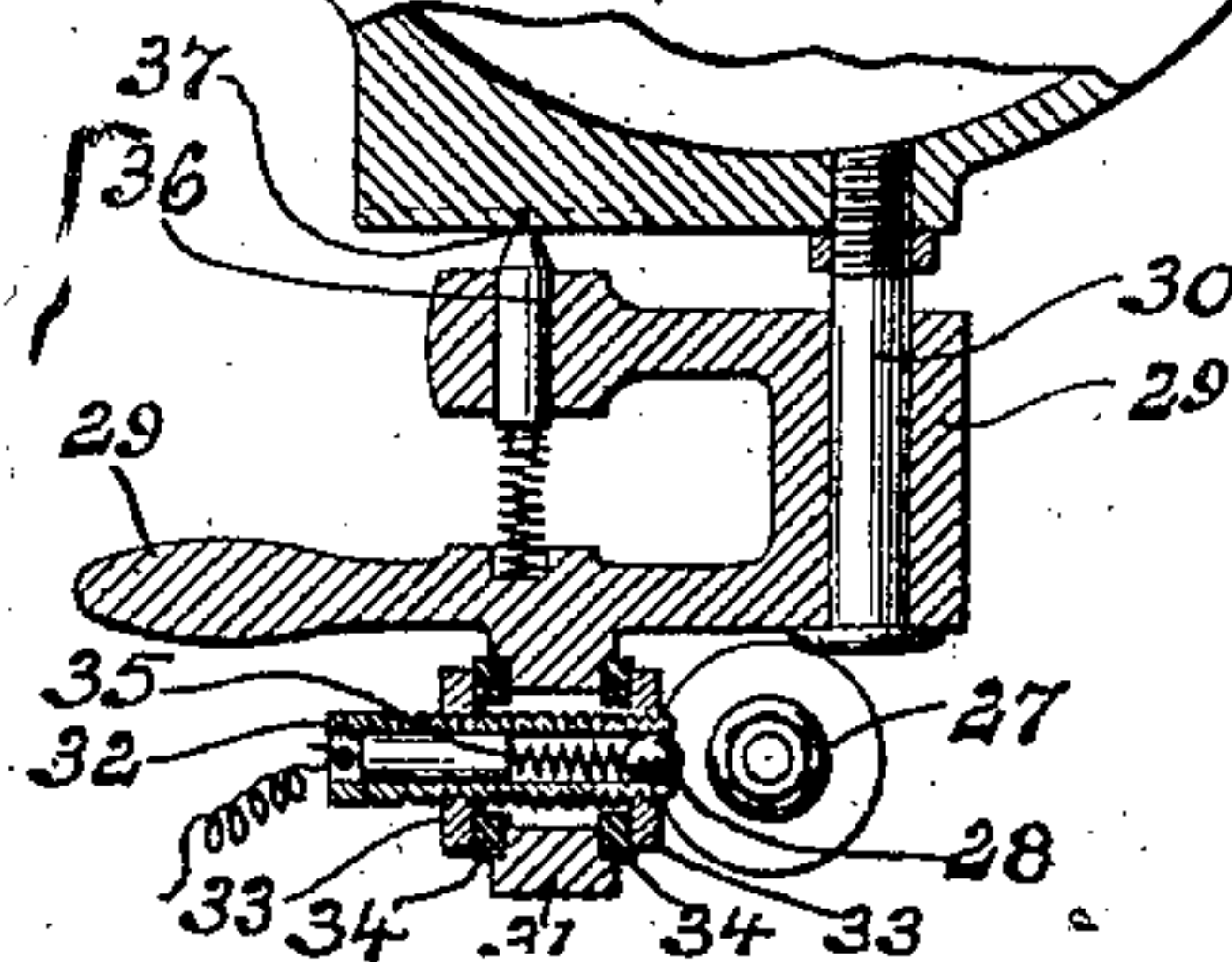
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2 SHEETS—SHEET 2.



WITNESSES:
Anna M. Lore.
Anna M. Mayer.



INVENTOR.
Harry D. Baird
BY *Robert C. Baird*
ATTORNEYS.

UNITED STATES PATENT OFFICE.

HARRY D. BAIRD, OF DETROIT, MICHIGAN, ASSIGNOR TO SAINT CLAIR MOTOR CO., OF
DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

EXPLOSIVE-ENGINE.

No. 887,749.

Specification of Letters Patent.

Patented May 19, 1908.

Application filed February 14, 1907. Serial No. 357,322.

To all whom it may concern:

Be it known that I, HARRY D. BAIRD, a citizen of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Explosive-Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention relates to improvements in internal combustion engines of the base compression type in which the explosive charges are forced into the cylinder under pressure by the downstroke of the piston, and the
15 main object of the invention is to produce a very simple, light compact and efficient engine at a minimum cost.

A further object of the invention is to increase the power and efficiency of the engine
20 by the particular construction of piston head and by the position and location of the igniter, and to simplify and cheapen the construction by operating the circulating pump and circuit breaker by a common eccentric,
25 and to provide certain other new and useful features in the construction, arrangement and combination of parts all as hereinafter more fully described and particularly pointed out in the claims, reference being had to the
30 accompanying drawings, in which:—

Figure 1, is a longitudinal vertical section of an engine embodying the invention; Fig. 2, a transverse vertical section of the same; Fig. 3, an end elevation; Fig. 4, a plan view
35 of the same with the circuit breaker in section; Fig. 5, a side elevation of the pump detached; and Fig. 6, is a horizontal section through the engine cylinder, on the line $x-x$ of Fig. 2.

40 1 represents the engine cylinder provided with a water jacket 2, 3 the closed circular crank casing communicating with the lower end of the cylinder and which is divided in the center of the bearings thereon for the
45 crank shaft 4 into two parts which are flanged and secured together by bolts.

5 is the crank on the crank shaft connected to the piston 6 by a connecting rod 7, and 8 is a thrust bearing sleeved on the shaft between the crank and the inner end of the adjacent bearing to take the end thrust of the shaft. A vertical passage 9 extends upward at one side of the cylinder from the crank case and communicates at its upper end with
55 the interior of the cylinder above the piston,

through an intake port 10, to conduct the explosive charges to the cylinder, apparatus, not shown, being provided to supply air and combustible vapor to said passage.

The head of the piston is formed with an upwardly projecting portion or boss 11, the vertical side of which opposite the inlet port forms a deflector to direct the ingoing gas into the upper end of the cylinder and the wall of this vertical side is set inward to form a notch 38 which gives added space between the wall and the wall of the cylinder to permit the free inflow of the gas from the inlet port. The opposite side adjacent to the exhaust port 12 is formed with a long slant 13 to give free egress for the products of combustion when the exhaust port is opened and to direct said exhaust toward said port. This projecting end or boss is cast integral with the head of the piston and is hollow so that it will cool rapidly and prevent burning out and by projecting upward from the cylinder head into the explosive chamber, it partially fills said chamber, thus materially increasing the compression therein and at the same time gives free ingress for the charges and egress for the exhaust. By locating the spark plug directly over the inlet port, in the screw-threaded opening 14 in the side wall of the cylinder near its upper end, the incoming charges will be deflected directly over its projecting inner end and tend to keep it clean and free from soot, and the firing of the charges will be insured, as the notch 38, will form a pocket when the piston is at the upper end of its stroke into which the inner end of the plug will project and as this pocket will contain the richest part of the charge owing to the fact that the inlet port opens directly into it.

Secured to one of the outwardly extending hubs of one of the bearings for the crankshaft is a pump cylinder 15 provided at its lower end with laterally extending legs 16 which are curved to form a seat to fit over the bearing with their ends engaging the upper side of the laterally extending flange of the bearing and secured in place by bolts 17 extending through the legs and flanges to secure the pump in place and also to hold the parts of the bearing together. At its lower end the pump cylinder is provided with openings to receive pipes 18 leading to the source of water supply and water jacket of the engine cylinder, and these pipes are provided

with check valves, not shown, which cause the water to be drawn from the source of supply by the pump through one of said pipes and to be discharged through the other pipe. A piston 19 in the pump cylinder extends through a suitable stuffing box on its upper end and is pivotally attached to an ear on a rotatable sleeve 20 carried by a fixed laterally extending arm 21 secured to the eccentric rod 22 of an eccentric 23 on the crank-shaft. The upper end of the eccentric rod is guided in a sleeve 24 which is provided with an integral laterally extending pin 25 externally screw-threaded to engage an internally screw-threaded boss 26 projecting from the side of the cylinder and the extreme upper end of said rod is reduced and on this reduced rod is secured a contact roll 27 adapted to engage a ball contact 28 carried by a hand lever 29 pivoted to turn upon a bolt 30 screwed into an opening in the engine cylinder. The lever 29 is provided with a laterally extending arm 31 having an opening and in this opening is secured an externally screw-threaded tube 32 by means of jam-nuts 33 engaging insulating washers 34 interposed between the nuts and the arm. The tube is of considerably less diameter than the diameter of the hole in the arm so that it is thoroughly insulated from said arm by the washers and air space. One end of the tube is contracted to form a seat for the ball contact 28 which is within the tube and said ball is held against its seat with one side projecting from the end of the tube, by a coiled spring 35 interposed between the ball and a plug in the opposite end of the tube. One terminal of an electric conductor leading to the spark plug is attached to said tube and the other terminal to the engine, in the usual manner, and the lever 29 is held in the position to which it is turned on its pivot bolts 30 by a spring actuated pin 36 engaging a series of notches 37 in the side of the cylinder wall.

A very simple and efficient means for advancing or retarding the spark is thus secured as by moving the handle lever up or down the contact between the roll and ball will be made and broken earlier or later in relation to the position of the piston.

Having thus fully described my invention, what I claim is:—

1. The combination with a vertical cylinder, a piston in said cylinder, a crank-shaft and a crank on said shaft connected to said piston, of an eccentric on the crank-shaft, an upwardly extending eccentric rod, a pivotally supported guide in which the upper end of the rod slides and upon which it rocks, a contact adapted to be intermittently engaged by the upper end of said rod, and a pivoted lever to which the contact is secured adapted to be turned to move the contact in relation to the upper end of the rod.

2. The combination with a vertical cylinder, a piston in said cylinder, a crank-shaft and a crank on said shaft connected to said piston; of an eccentric on the crank-shaft, an upwardly extending eccentric rod, a guide for said rod pivoted to turn upon a horizontal pivot and through which the rod is free to slide, a contact adapted to be engaged by the upper end of said rod, and a lever pivotally attached to the cylinder, adapted to carry the contact and to be turned to change the relation of the contact to the rod.

3. The combination with a vertical cylinder, a piston in said cylinder, a crank-shaft, and a crank on said shaft connected to said piston; of an eccentric on the crank-shaft, an upwardly extending eccentric rod, means secured to the cylinder for guiding the rod in its longitudinal movement and pivotally supporting the same to turn upon a horizontal pivot, a lever pivotally supported by the cylinder to turn upon a horizontal pivot, a contact carried by said lever, means for securing said contact to the lever and insulating the same therefrom, and a contact roll on the upper end of the eccentric rod.

4. The combination with a vertical cylinder, a piston in said cylinder, a crank-shaft, and a crank on said shaft connected to the piston; of an eccentric on the crank-shaft, an upwardly extending eccentric rod, an internally screw-threaded boss on the cylinder, a sleeve on the eccentric rod having a laterally extending screw-threaded pin to engage said boss, a contact roll on the upper end of the rod, a lever pivoted to the side of the cylinder upon a horizontal pivot, a tube carried by said lever and insulated therefrom, a contact ball in said tube, a spring in the tube to engage the ball and hold the same to its seat at one end of the tube in a position to be engaged by the contact roll, and means for holding the lever in the position to which it is turned.

5. The combination with a vertical cylinder, a piston on said cylinder, a crank-shaft and a crank on said shaft connected to said piston; of an eccentric on the shaft, an eccentric rod, means for guiding and pivotally supporting the upper end of said rod, a lever pivotally attached to the cylinder by a horizontally extending bolt, an arm on said lever having an opening, a tube of lesser diameter than said opening having an internal ball seat at one end thereof, a contact ball in said tube, a spring in said tube engaging the ball to hold the same in contact with said seat, binding nuts on the tube at each side of the arm, insulating washers between the nuts and arm, and a spring actuated pin on the lever engaging a series of notches in the side of the cylinder.

6. The combination with a cylinder, an air tight crank case provided with laterally extending bearings and made in halves provided with flanges, and a crank-shaft in said bear-

ings; of a piston in said cylinder, a water
jacket for the cylinder, a pump cylinder con-
nected to the water jacket, arms on the lower
end of the pump cylinder to seat upon one of
5 the shaft bearings and rest upon the flanges,
bolts to secure the arms and flanges together,
a piston in the pump cylinder, an eccentric
on the crank-shaft, an eccentric rod, a guide
sleeve for the upper end of said rod provided
10 with a laterally extending pin, a boss on the
engine cylinder to receive said pin, a laterally
extending arm on the eccentric rod, a sleeve
on said arm having an ear pivotally attached

to the pump piston, a contact roll on the up-
per end of the rod, a lever pivotally attached 15
to the engine cylinder, a contact carried by
said lever to which one terminal of an electric
circuit for the spark plug is attached, and
means for holding said lever in its adjusted
position. 20

In testimony whereof I affix my signature
in presence of two witnesses.

HARRY D. BAIRD.

Witnesses:

HARRY M. LICK,

OTTO F. BARTHEL.