F. E. RUPRIGHT.

INTERNAL COMBUSTION ENGINE.

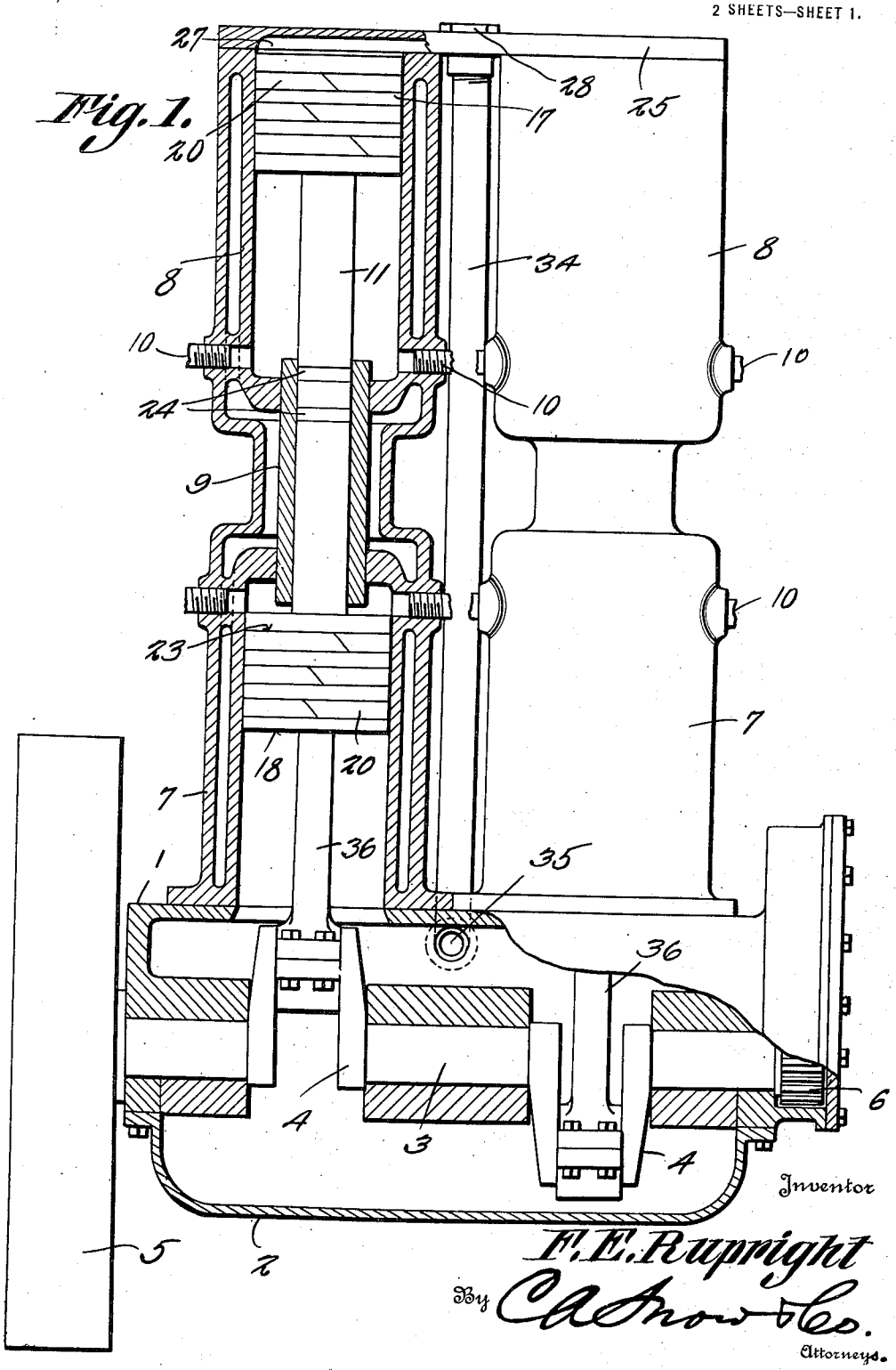
APPLICATION FILED JUNE 16, 1921.

1,405,009.

Patented Jan. 31, 1922.

2 SHEETS—SHEET 1.

Fig. 1.



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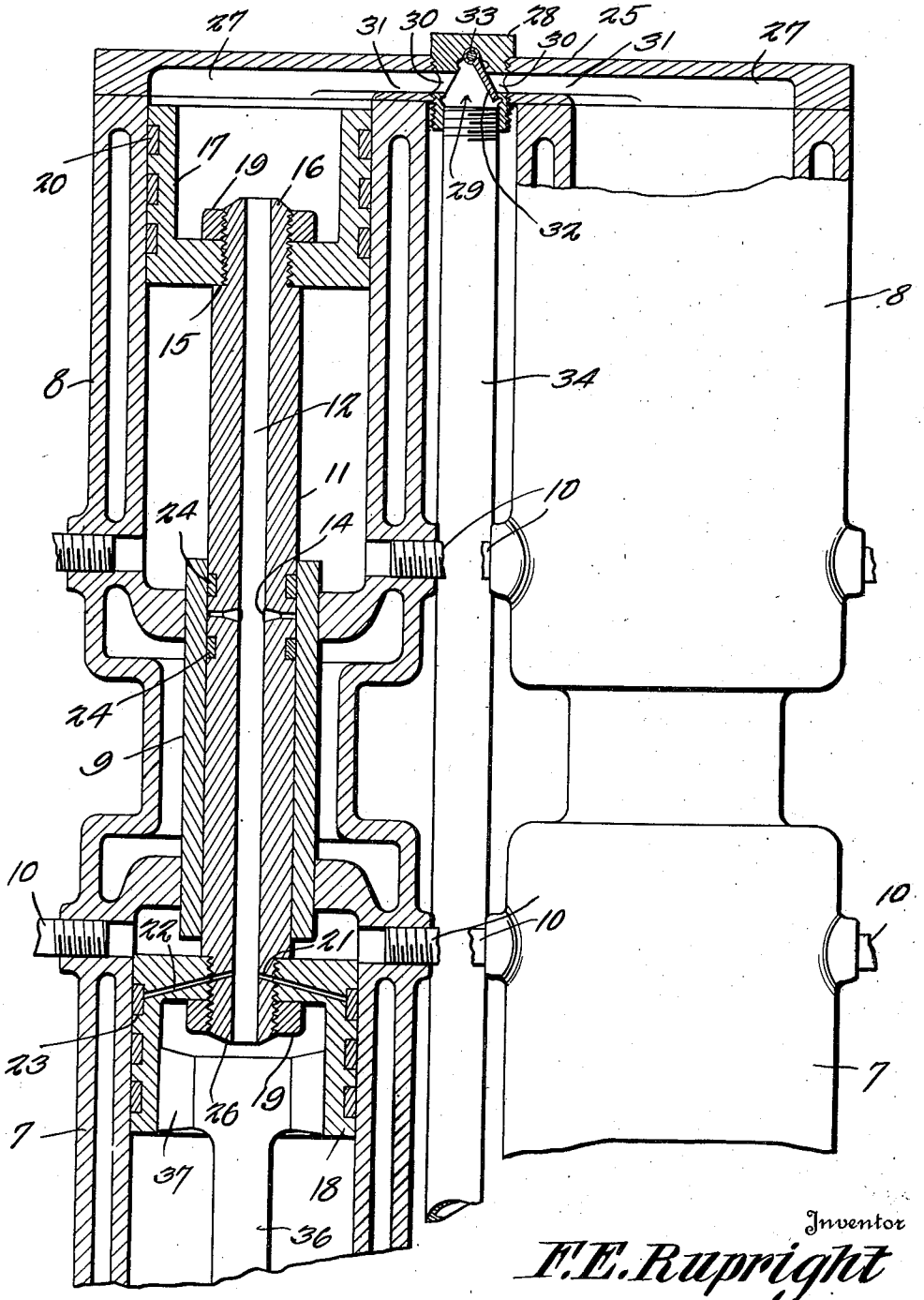


Fig. 2.

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UNITED STATES PATENT OFFICE.

FREDRICK E. RUPRIGHT, OF GRAND HAVEN, MICHIGAN, ASSIGNOR TO RUPRIGHT ENGINEERING COMPANY, OF GRAND HAVEN, MICHIGAN, A CORPORATION.

INTERNAL-COMBUSTION ENGINE.

1,405,009. Specification of Letters Patent. Patented Jan. 31, 1922.

Application filed June 16, 1921. Serial No. 478,136.

To all whom it may concern:

Be it known that I, FREDRICK E. RUPRIGHT, a citizen of the United States, residing at Grand Haven, in the county of Ottawa and State of Michigan, have invented a new and useful Internal-Combustion Engine, of which the following is a specification.

The device forming the subject matter of this application is an internal combustion engine of that type in which pistons, connected to a single rod, reciprocate in alined cylinders, the charges being fired at the inner or adjacent ends of the cylinders.

It is the object of this invention to provide novel means for lubricating the pistons and the cylinders from the crank case. The invention aims, further, to improve generally and to enhance the utility of devices of that type to which the invention appertains.

With the above and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that, within the scope of what is claimed, changes in the precise embodiment of the invention shown can be made without departing from the spirit of the invention.

In the accompanying drawings:—

Figure 1 shows in vertical section, an engine constructed in accordance with the invention, parts remaining in elevation; and Figure 2 is a detail enlarged from Figure 1, some parts appearing in section which are shown in elevation in Figure 1.

The frame of the engine includes a base 1 to which a crank case 2 is attached, a shaft 3 being journaled in the base and being provided with cranks 4. The shaft 3 carries a fly wheel 5. The timing mechanism may be of any desired sort, and is omitted, since, in this application, no claims specific to a timing mechanism can be made. Let it suffice to say that the shaft 3 may carry a gear wheel 6 constituting a part of the timing means.

Lower cylinders 7 are superposed upon and secured to the base 2, upper cylinders 8 being shown, the cylinders 7 and 8 being connected by a tubular guide 9. The admission and exhaust ports are shown at 10 and are located near to the inner or adjacent ends of the cylinders 7 and 8, the charges being fired, one at a time, in the inner ends of the cylinders, and the pistons, hereinafter described, moving outwardly to perform the power stroke.

A hollow piston rod 11 is mounted for reciprocation in the tubular guide 9 and has a longitudinal bore 12, the piston rod being supplied with lateral ports 14, establishing communication between the bore 12 of the piston rod and the interior of the tubular guide 9. The piston rod 11 is supplied with packing rings 24, operating in the guide 9 and located on opposite sides of the rings 24, to the end that there may be practically no leakage of the lubricant from the tubular guide 9 into the compression chambers which exist at the inner ends of the cylinders 7 and 8. The piston rod 11 is provided at its ends with reduced threaded tips 16 and 26 defining shoulders 15.

A piston 18 of cup-shape is mounted for reciprocation in the cylinder 7. A pitman 36 is pivoted at 37 to the piston 18 and is connected operatively with the crank 4. A cup-shaped piston 17 is mounted for reciprocation in the cylinder 8. The pistons 17 and 18 cooperate with the shoulders 15 of the piston rod 11, the piston 17 being carried by the tip 16, and the piston 18 being carried by the tip 26. The tips 16 and 26 not only are threaded into the pistons but, as well, nuts 19 are mounted on the tips, the nuts engaging with the bases of the pistons. The pistons 17 and 18 are surrounded by packing rings 20. The tip 26 has lateral passages 21, communicating with lateral passages 22 in the base of the piston 18, the passages 21 and 22 cooperating to define ports leading from the bore 12 of the piston rod 11 to one of the grooves 23 in which the packing rings 20 of the piston 18 are located.

The cylinders 8 carry a head 25 provided with chambers 27 communicating with the cylinders 8. A valve casing 28 is threaded or mounted otherwise in the head 25 and is provided with a compartment 29. There are lateral openings 30 in the valve casing 28, these openings communicating at their inner ends with the compartment 29, and communicating at their outer ends with openings 31 in the head 25, the openings 31 leading to the chambers 27. A valve 32 is located in the compartment 29 of the valve casing 28 and is mounted pivotally at 33

to swing, responsive the pressure produced in the cylinders 8, when the pistons 17 move upwardly. The valve 32, swinging from the point 33, is adapted to close the openings 30, one at a time. The upper end of a conduit 34 is mounted in the valve casing 28, the conduit communicating with the chamber 32. At its lower end, the conduit 34 opens into the crank case 2, as shown at 35 in Figure 1.

In practical operation, when the pistons 18 and 17 move downwardly, compression is produced in the crank case 2 and the oily vapor moves upwardly, the vapor traversing the bore 12 of the piston rod 11. The lubricant finds its way through the passages 21 and 22, and, thus, the lower piston 18 is lubricated. As the upper piston 17 moves downwardly, the oily vapor accumulates in the cylinder, above the piston 17, and the inner surface of the cylinder 8 is lubricated. On the upstroke of the piston 17, the oily vapor is compressed and is forced, through the chamber 27 and through the openings 31 and 30 into the conduit 34, the lubricant thus being returned to the crank case 2. When the oily vapor moves to the right (Figure 2) through the openings 31 and 30, into the compartment 29, the valve 32 is swung to a closed position with respect to the openings 30 and 31 which are individual to the right hand cylinder 8 in Figure 2. As a result, the oily vapor is compelled to move downwardly through the conduit 34 into the crank case 2, it being impossible for a mass of vapor to oscillate or "see-saw" back and forth, between the upper end of one cylinder 8 and the upper end of the other cylinder 8, through the openings 30 and 31, across the compartment 29. A circulation of oily vapor is produced, owing to the presence of the valve 32, and the cylinders 8 and the pistons 17 are lubricated adequately.

I claim:—

1. In an internal combustion engine, a crank case; a cylinder; a piston mounted to reciprocate in the cylinder and defining a firing chamber at the inner end of the cylinder and a lubricant chamber at the outer end of the cylinder; a hollow rod carrying the piston and establishing communication between the crank case and the lubricant chamber; a conduit leading from the lubricant chamber to the crank case; and means for constraining the lubricant to circulate.

2. An internal combustion engine, constructed as set forth in claim 1, and further characterized by the fact that said means consists of a check valve controlling the flow of lubricant through the conduit.

3. In an internal combustion engine, a crank case; cylinders; pistons mounted to reciprocate in the cylinders, each piston defining a firing chamber at the inner end of one cylinder and a lubricant chamber at the outer end thereof; hollow rods carrying the pistons and establishing communication between the crank case and the lubricant chambers; a conduit leading from the lubricant chambers to the crank case; and a valve controlling the passage of lubricant from either lubricant chamber to the conduit, the valve closing with respect to one lubricant chamber, responsive to an increase of pressure in the other lubricant chamber.

4. In an internal combustion engine, a crank case; alined cylinders and a guide connecting the cylinders; pistons mounted to reciprocate in the cylinders, the pistons defining firing chambers in the inner ends of the cylinders, one piston defining a lubricant chamber in the outer end of one cylinder; a hollow piston rod mounted for reciprocation in the guide, the piston rod carrying the pistons and establishing communication between the crank case and the lubricant chamber, the piston rod having a port discharging within the guide, the piston rod and the other piston having a conduit discharging within the cylinder of said other piston, the conduit and the port communicating with the interior of the piston rod; means for returning the lubricant from the lubricant chamber to the crank case; and means for constraining the lubricant to flow in a circuit.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

FREDRICK E. RUPRIGHT.

Witnesses:
JOHN HOFFMAN,
CHARLES E. MISNER.