No. 768,038. PATENTED AUG. 23, 1904.

E. C. FERRIS & C. ROUSSEAU.

AUTOMATIC OILING DEVICE.

APPLICATION FILED DEC. 3, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

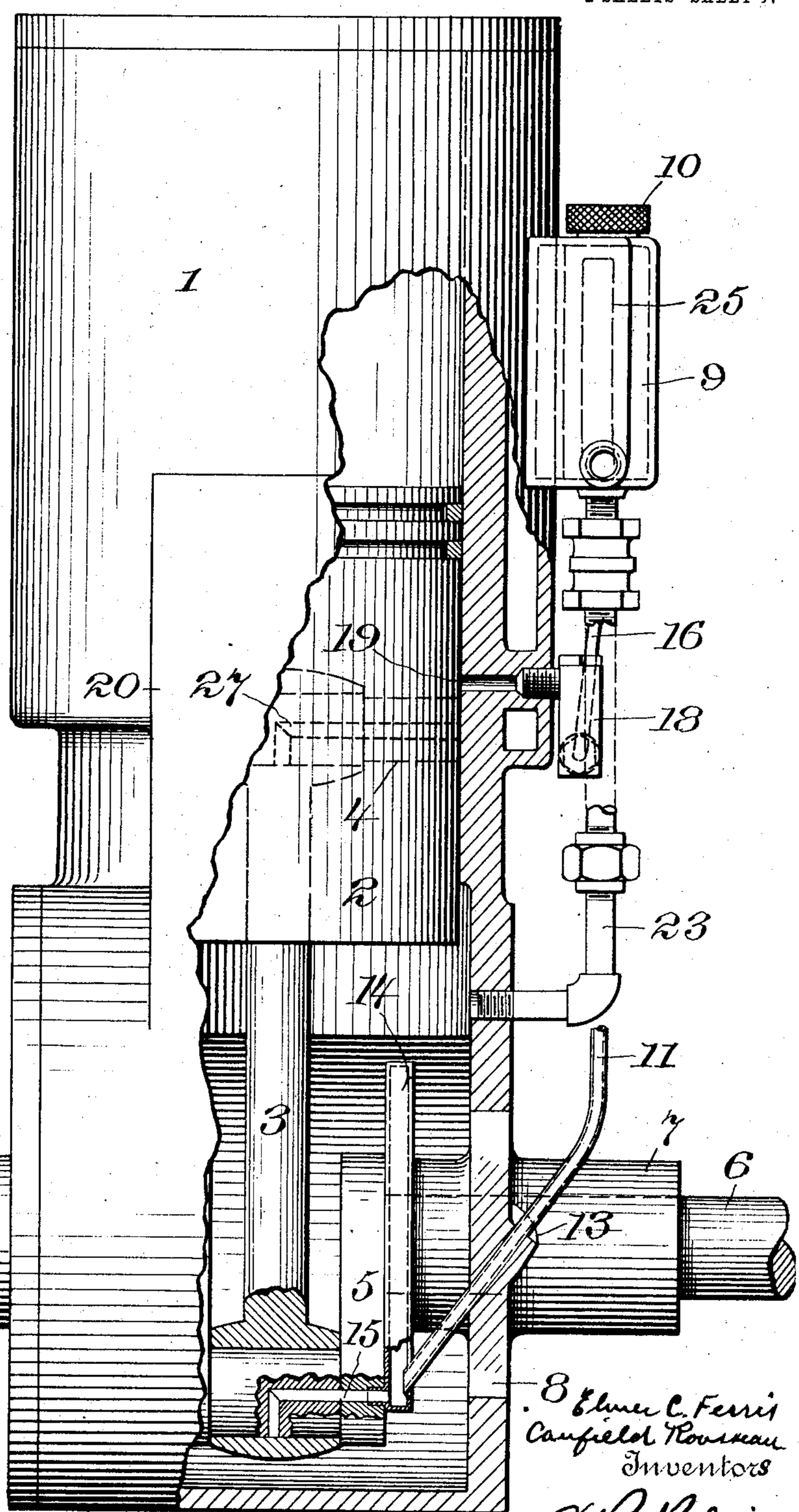


Fig. 1.

Witnesses
M. G. Crawford
N. H. Humphrey.

Elmer C. Ferris
Canfield Rousseau
Inventors
By their Attorney A. Van Kleeck Smith

No. 768,038. PATENTED AUG. 23, 1904.

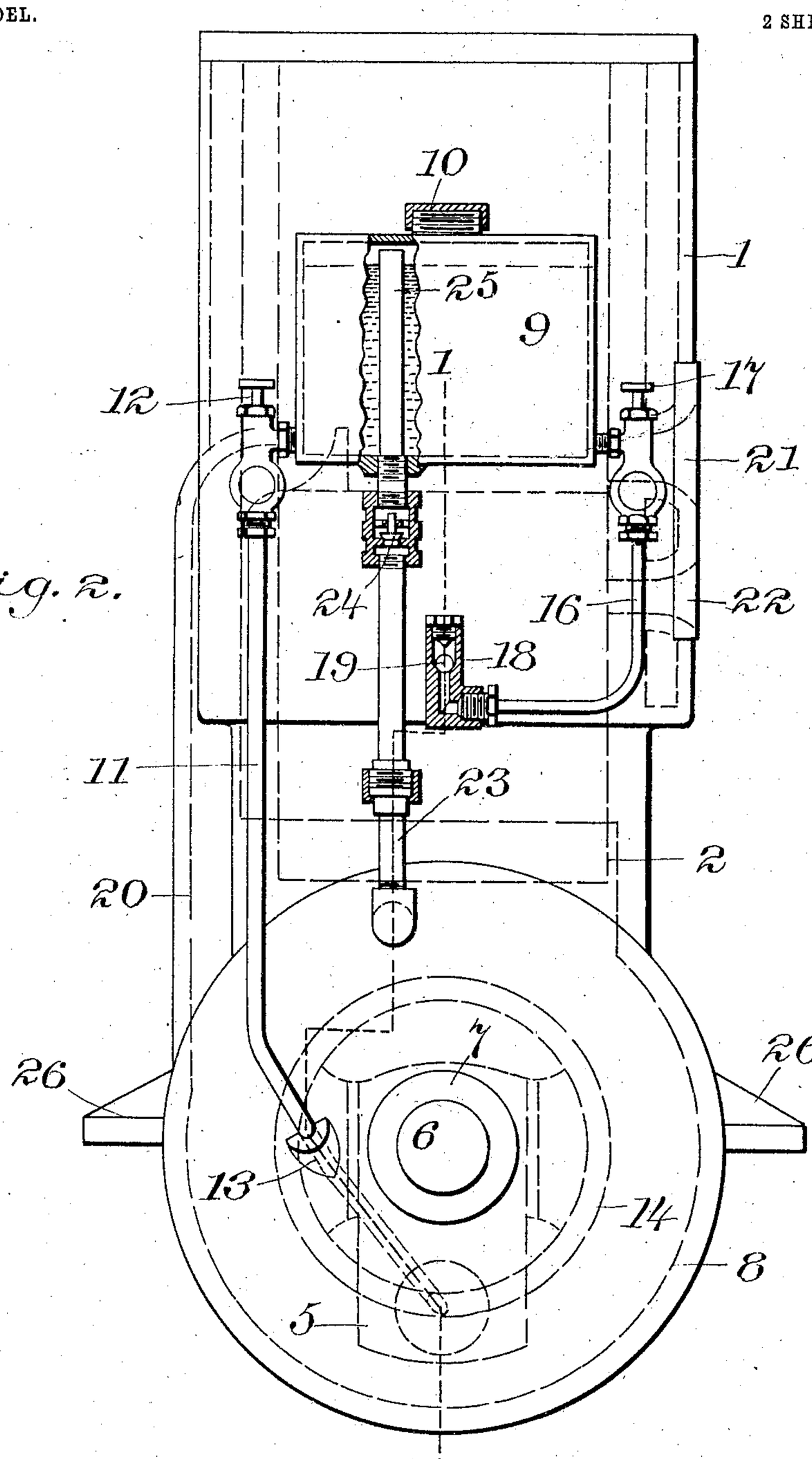
E. C. FERRIS & C. ROUSSEAU.

AUTOMATIC OILING DEVICE.

APPLICATION FILED DEC. 3, 1903.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2.



Witnesses
N. G. Crawford,
W. H. Dunphrey.

Elmer C. Ferris
Canfield Rousseau
Inventors
By their Attorney A. Parkhurst

No. 768,038. Patented August 23, 1904.

UNITED STATES PATENT OFFICE.

ELMER C. FERRIS, OF STAMFORD, CONNECTICUT, AND CANFIELD ROUSSEAU, OF NEW YORK, N. Y.

AUTOMATIC OILING DEVICE.

SPECIFICATION forming part of Letters Patent No. 768,038, dated August 23, 1904.

Application filed December 3, 1903. Serial No. 183,601. (No model.)

To all whom it may concern:

Be it known that we, ELMER C. FERRIS, a citizen of the United States of America, and a resident of the city of Stamford, county of Fairfield, State of Connecticut, and CANFIELD ROUSSEAU, a subject of the King of Great Britain, and a resident of the city, county, and State of New York, have invented certain new and useful Improvements in Automatic Oiling Devices, of which the following is a specification.

Our invention relates generally to means for oiling machine-bearings, and more specifically consists of improved means for forcing the necessary supply of oil into the interior of a casing inclosing the crank and operating parts of an engine for the purpose of lubricating the bearings within said casing.

Our invention finds its most useful application to that class of hydrocarbon internal-combustion motors having an inclosed crank-casing and a reciprocating trunk-piston which communicates with said casing, thereby producing the alternate compression and rarefaction of air which is utilized to force the necessary charge of air into the working end of the cylinder. In order to secure the positive delivery of the necessary oil to the machine-bearings in question, we employ a closed oil-reservoir in the upper portion of which is created an air-pressure in excess of the atmospheric pressure, thereby positively forcing the oil through the various regulating passage-ways and delivering it to the machine-bearing.

When our invention is applied to the above-described hydrocarbon-engine, we take our supply of compressed air from the inclosed crank-casing itself, and by placing the oil-reservoir at a higher level we secure a positive flow at all periods of the engine operation.

The preferred form of apparatus embodying our invention is illustrated in the accompanying two sheets of drawings, in which—

Figure 1 is a side elevation of a vertical engine with parts broken away and a partial section on broken line 1 1 of Fig. 2. Fig. 2 is a side elevation at right angles to that of Fig. 1 with certain details shown in section and other parts broken away.

Throughout the drawings like reference-figures indicate like parts.

As shown, the engine consists of the vertical cylinder 1, in which reciprocates the trunk-piston 2, connected, by means of the connecting-rod 3 and cross-pin 4, with the crank 5 of the crank-shaft 6, which is mounted in bearings 7 7, formed integral with the casing 8, which surrounds and incloses the crank and connecting-rod.

9 is an inclosed oil-reservoir rendered air-tight by the screw-stopper 10 and supported in any convenient manner, as by attachment to the cylinder-casing. The lower portion of this reservoir is connected by means of the tube 11, controlled by the valve 12, with the interior of the crank-casing, the boss 13 being cast in the side of the casing for the purpose of facilitating the boring of the same for the passage of the tube 11, as clearly shown in Fig. 1. This tube 11 delivers its oil to the slightly-eccentric circular trough 14, which is mounted on the crank 5 and connected at the point farthest from the center of the crank-shaft by the passage-way 15 to the interior of the crank-pin and to the crank-pin bearing or connecting-rod journal. The pipe 16 also connects with the lower portion of the oil-reservoir 9 and under control of the valve 17 delivers oil to the casting 18, which communicates by the passage 19 with the interior of the engine-casing at the point where it forms a bearing for the trunk-piston 2. This opening 19 is also in line with the passage 27, extending lengthwise of the cross-pin 4, as shown in dotted lines in Fig. 1, and delivering oil to the journal-bearing on the upper end of the connecting-rod.

The crank-chamber is connected by the passage-way 20 with the upper or working end of the cylinder, and through this the air compressed in the crank-casing by the outward stroke of the trunk-piston is delivered to the interior of the cylinder when the trunk-piston is in its lowest position, as shown in Fig. 2. The burned gases remaining in the said

cylinder from the previous combustion will be expelled through the exhaust passage-way 21 (which is simultaneously opened) in the manner well understood by those familiar with this type of engine. On the upward stroke of the trunk-piston the passage-way 20 is closed off, and consequently a partial vacuum is created in the crank-casing, so that when at the extreme upper point of travel or end of its instroke the trunk-piston 2 uncovers the inlet-passage 22 and air rushes into the crank-casing and fills the same at atmospheric pressure.

23 is a tube connecting the interior of the crank-casing with the upper portion of the closed oil-reservoir 9 by means of the extension 25, reaching above the level of the oil in said reservoir, and 24 is a check-valve in said tube opening outward from the crank-casing. 26 26 represent lugs on which the engine may be supported from any proper foundation.

The operation of our invention is as follows: During each revolution of the crank the air within the crank-casing passes from a degree of compression equal to atmospheric pressure to a certain maximum and then drops to the atmospheric pressure as communication with the working end of the cylinder is established and during the succeeding upward stroke of the piston undergoes a period of rarefaction until the inlet 22 is again opened and the atmospheric pressure is reëstablished. During the compression period of the operation a certain amount of air is forced through the pipe 23 past the check-valve 24 into the upper portion of the oil-reservoir 9. The check-valve preventing any backward flow through the pipe during the period when the pressure in the inclosed crank-casing is less than that in the oil-reservoir, it is evident that a practically constant pressure will be maintained in said oil-reservoir. This positively forces the oil through the tubes 11 and 16 at all times when the pressure in the inclosed crank-casing is less than that in the oil-reservoir. During such period of time as the pressures may be equal of course there will be the usual flow due to gravity. The result is that there is always at all periods of time a positive flow of oil into the crank-casing. The oil entering through the pipe 11 is discharged into the circular trough 14 and by centrifugal action is driven to that portion of the trough which communicates with the passage-way 15 and through that passage-way to the crank-pin surface. The oil delivered through the passage-way 19 to the trunk-piston is gradually distributed about its surface, and thereby lubricates the same and the upper connecting-rod journal.

The advantages of our invention comprise the positive feeding action resulting from the creation of the air-pressure in the closed oil-reservoir, the simplicity of the construction, and the adaptation of the operation of the engine itself to the creation of this air-pressure, thereby avoiding the necessity of using a separate air-compressor.

It is evident, of course, that various changes could be made in the details of construction illustrated in order to apply our invention to different forms of engines and machine-bearings without departing from the spirit and scope thereof so long as the principle of operation were retained. Other means of delivering the oil to the crank-pin might be substituted, and other means of generating the necessary air-pressure might be employed. Other forms of oil-reservoir might be used, and the same might be differently located; but all such modifications would be obvious to those skilled in the art and mere mechanical equivalents of the embodiment of our invention herein described and shown.

Having therefore described our invention, what we claim as new, and desire to protect by Letters Patent, is—

1. The combination of a machine-bearing, a closed oil-reservoir, a tube leading from a point in said reservoir below the oil-level to the bearing, and means for creating an air-pressure in said oil-reservoir in excess of the atmospheric pressure at the bearing.

2. The combination of an engine having an inclosed crank-casing, a closed oil-reservoir exterior of said casing, a tube leading from said oil-reservoir through the crank-casing and adapted to deliver oil to the crank-pin of the engine, and means for creating an air-pressure in said oil-reservoir in excess of the atmospheric pressure at the crank-pin bearing.

3. The combination of a trunk-engine having an inclosed crank-casing with which the trunk communicates, a closed oil-reservoir exterior of said casing, a tube leading from said oil-reservoir through the crank-casing and adapted to deliver oil to the crank-pin of the engine, and means for creating an air-pressure in said oil-reservoir in excess of the atmospheric pressure at the crank-pin bearing, said means comprising a tube connecting the interior of the crank-casing with the upper portion of the oil-reservoir, and a check-valve controlling said connection and opening outward from the casing.

4. The combination of a trunk-engine having an inclosed crank-casing with which the trunk communicates, a closed oil-reservoir exterior of said casing, a tube leading from said oil-reservoir through the crank-casing and adapted to deliver oil to the crank-pin of the engine, and means for creating an air-pressure in said oil-reservoir in excess of the pressure of the atmosphere, said means comprising a tube connecting the interior of the crank-casing with the upper portion of the oil-reservoir, and a check-valve controlling said con-

nection and opening outward from the casing, together with a second tube leading from the oil-reservoir to the trunk-bearing in the engine-cylinder.

5. The combination of a trunk-engine having an inclosed crank-casing with which the trunk communicates, a closed oil-reservoir exterior of said casing, a tube leading from said oil-reservoir through the crank-casing and adapted to deliver oil to the crank-pin of the engine, and means for creating an air-pressure in said oil-reservoir in excess of the pressure of the atmosphere, said means comprising a tube connecting the interior of the crank-casing with the upper portion of the oil-reservoir, and a check-valve controlling said connection and opening outward from the casing, the oil-reservoir being located at a point higher than that at which the tube delivers the oil to the crank-pin.

6. The combination of an engine having an inclosed crank-casing, a closed oil-reservoir exterior of said casing, a tube leading from said oil-reservoir through the crank-casing and adapted to deliver oil to the crank-pin of the engine, and means for creating an air-pressure in said oil-reservoir in excess of the atmospheric pressure at the crank-pin bearing, together with a valve controlling the flow of oil from the reservoir through the tube.

7. In a hydrocarbon internal-combustion trunk-engine having an inclosed crank-casing and air-passages from the interior of the casing to the engine-cylinder and to the external air, which said air-passages are controlled by the trunk-piston to deliver the compressed contents of the crank-casing to the engine-cylinder when the piston is at the outward limit of its stroke, and to create a vacuum in said casing during the instroke of the trunk-piston and thereby suck in fresh charge from the external air when the trunk-piston is at the inward limit of its stroke, the combination of a closed oil-reservoir exterior of said crank-casing, oil-communicating means between the lower part of said reservoir and the interior of said casing, air-communicating means between said casing and the upper portion of the oil-reservoir, and a check-valve controlling said last-mentioned communicating means, opening outward from the casing.

8. The combination of a rotating crank and connecting-rod journaled thereto, the crank-pin having an oil-passage extending from the surface of the crank-pin through the same to the back of the crank, of an annular oil-trough mounted on the back of the crank, connected at the point farthest from the axis of the crank-shaft with said oil-passage, and a stationary oil-conduit adapted to deliver oil into said annular trough.

9. In a trunk-engine, the combination of a cross-pin in said trunk having a passage-way extending from the exterior of the trunk to the connecting-rod journal surrounding said cross-pin, a trunk-bearing having a passage-way opening at the bearing-surface at a point such that it will register once during each stroke with the end of the passage-way in the cross-pin, and means for forcing a lubricating fluid into the passage-way in the trunk-bearing.

10. The combination with a rotating crank and connecting-rod journaled thereto a crank-pin and an oil-passage extending from the surface of the crank-pin through the same to the back of the crank, of an annular oil-trough mounted on the back of the crank, circular in shape and slightly eccentric to the crank circle, said annular trough being connected at the point farthest from the center of the crank circle with said oil-passage, and a stationary oil-conduit adapted to deliver oil into said oil-trough.

Signed at New York this 30th day of November, 1903.

ELMER C. FERRIS.
CANFIELD ROUSSEAU.

Witnesses:
J. E. PEARSON,
M. G. CRAWFORD.