R. C. MITCHELL.

LUBRICATING SYSTEM.

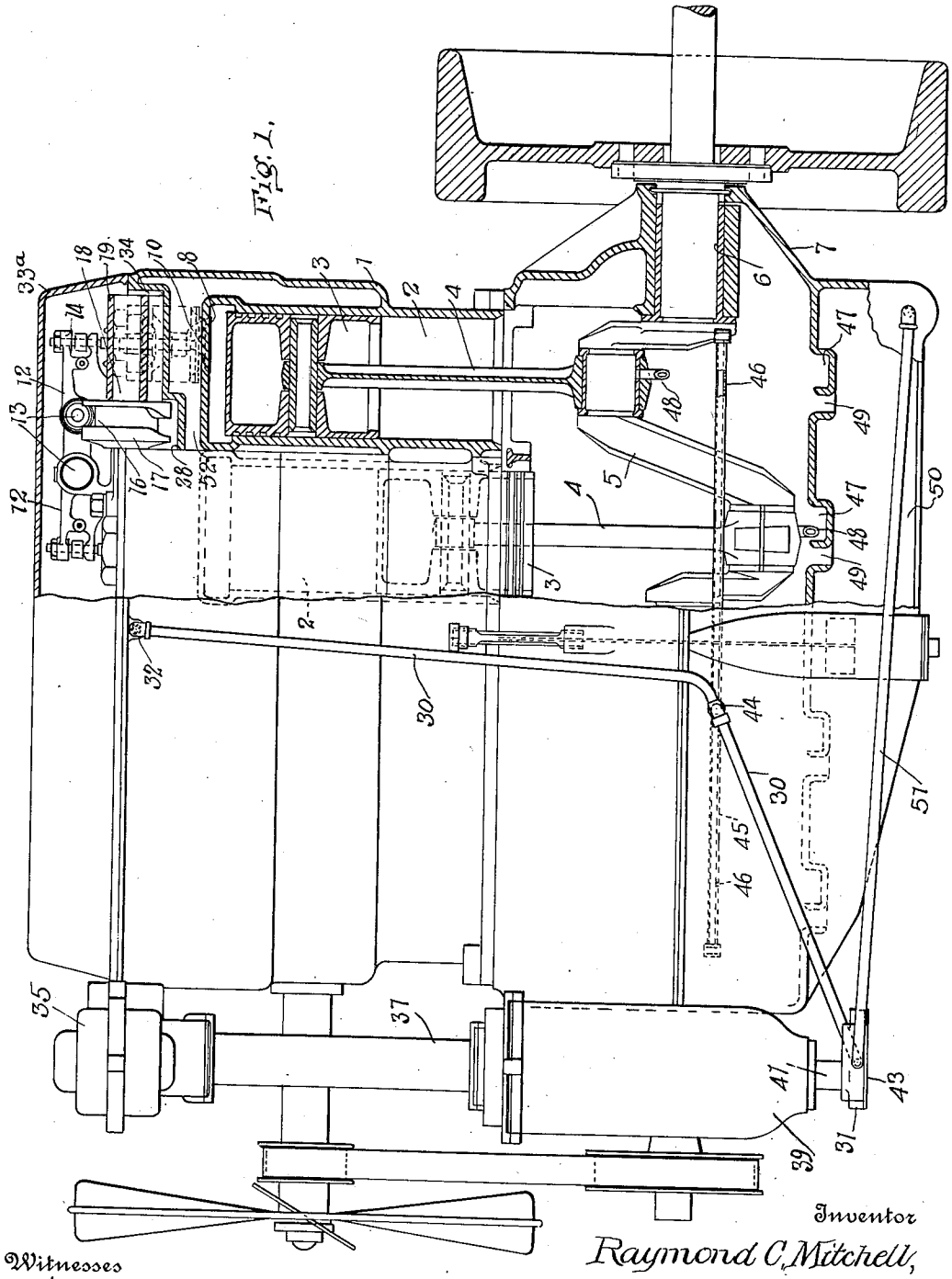
APPLICATION FILED FEB. 16, 1914.

1,119,102.

Patented Dec. 1, 1914.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses

Howard Walmsley.

H. L. Hammaker.

Inventor

Raymond C. Mitchell,

By Toulmin Reed & Dickinson

Attorneys

R. C. MITCHELL.

LUBRICATING SYSTEM.

APPLICATION FILED FEB. 16, 1914.

1,119,102.

Patented Dec. 1, 1914.

3 SHEETS—SHEET 2.

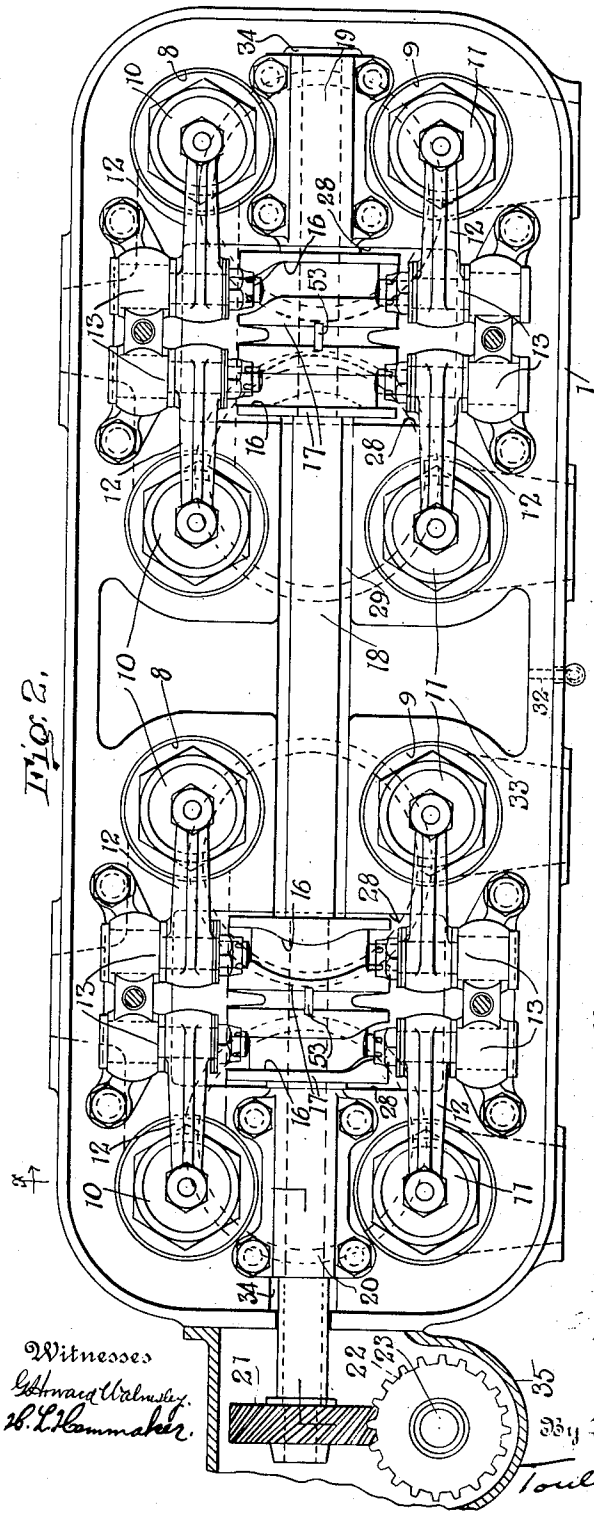


Fig. 2.

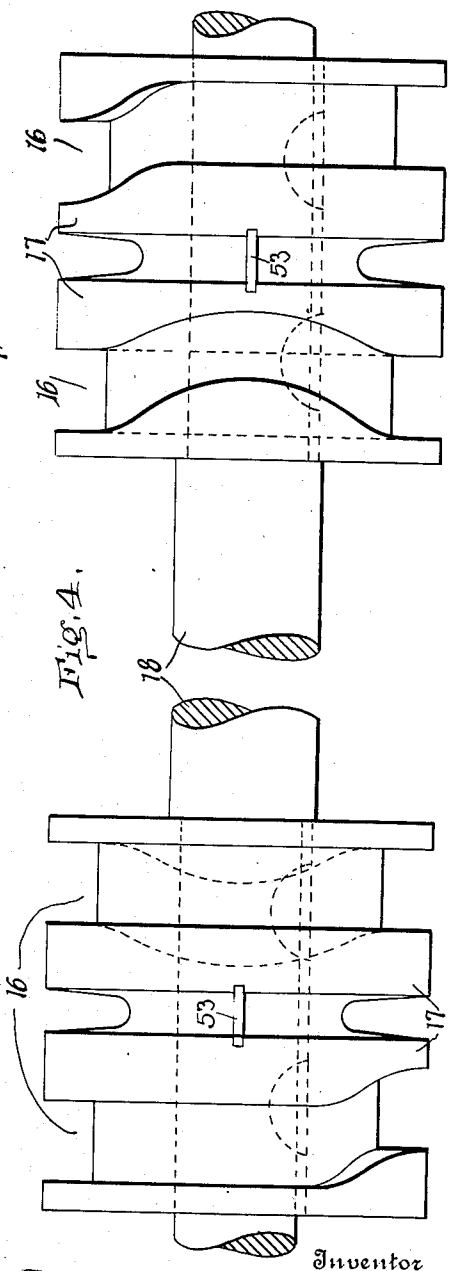


Fig. 4.

Witnesses

G. Howard Walmsley.

H. L. Hammaker.

Inventor

Raymond C. Mitchell,

By Toulmin Reed & Toulmin

Attorneys

R. C. MITCHELL.

LUBRICATING SYSTEM.

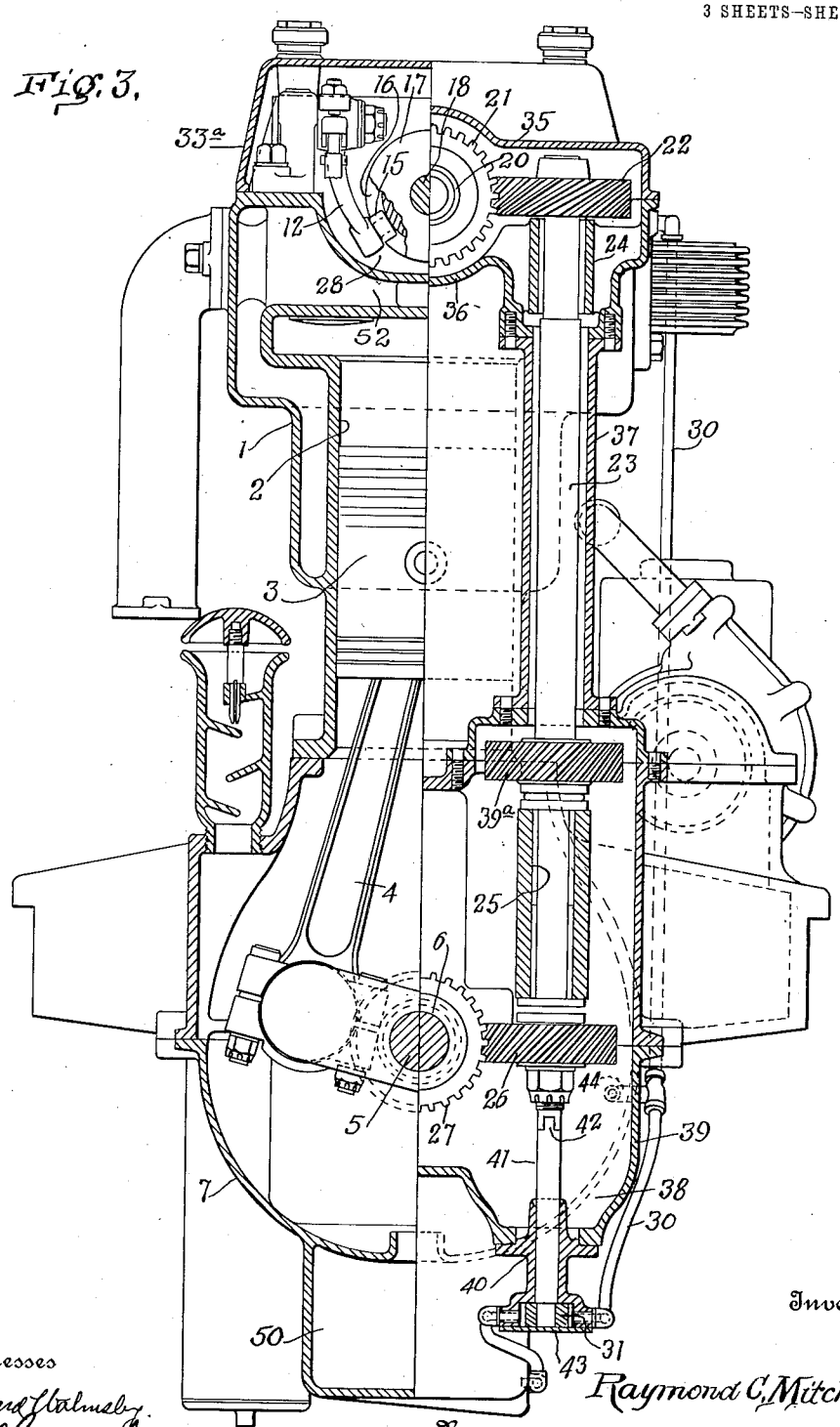
APPLICATION FILED FEB. 16, 1914.

1,119,102.

Patented Dec. 1, 1914.

3 SHEETS—SHEET 3.

FIG. 3.



Witnesses

G. Howard Holmes.

H. L. Hammaker.

Inventor

Raymond C. Mitchell,

By Toulmin & Reid & Toulmin

Attorneys

UNITED STATES PATENT OFFICE.

RAYMOND C. MITCHELL, OF SPRINGFIELD, OHIO.

LUBRICATING SYSTEM.

1,119,102. Specification of Letters Patent. Patented Dec. 1, 1914.

Application filed February 16, 1914. Serial No. 818,823.

To all whom it may concern:

Be it known that I, RAYMOND C. MITCHELL, a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in Lubricating Systems, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to lubricating systems for internal combustion engines.

The object of the invention is to provide a circulation of oil which will adequately lubricate the various parts of the engine without attention on the part of the operator; and further, to provide such a system which will lubricate the cam operated valve actuating devices forming a part of certain types of engines.

It is also an object of the invention to provide such a lubricating system which will add very little to the cost of construction and up-keep of the engine; and which will be simple in its construction, requiring the addition of very few parts to the engine as ordinarily constructed.

In the accompanying drawings, Figure 1 is a side elevation, partly in section, of an engine embodying my invention; Fig. 2 is a top, plan view of such an engine with the top plate or closure removed; Fig. 3 is a sectional view taken on the line *x x* of Fig. 2 and looking in the direction of the arrows; and Fig. 4 is a detail view of the valve operating cams.

In these drawings I have illustrated one embodiment of my invention and have shown the same as applied to an engine of the type shown and described in Patent No. 1,076,903, granted October 28th, 1913, to Mitchell and Neer and Patent No. 1,065,619, granted to me June 24th, 1913, but it will be understood that the invention is not limited to engines of this particular type.

Inasmuch as the construction and operation of the engine proper does not form a part of the present invention I have described only so much thereof as is necessary to an understanding of the invention.

As shown in the drawings of the present application the engine comprises a body portion or casing 1, in which are formed a plurality of cylinders 2, each cylinder having mounted therein a piston 3 which is connected by means of a piston rod 4 with a crank shaft 5 journaled in bearings 6 and inclosed in a crank casing 7. Each cylinder is provided with inlet and exhaust ports 8 and 9, respectively, these ports being controlled by valves 10 and 11, the stems of which extend upward above the ends of the cylinders. These valves are positively opened and closed by means of valve actuating devices, each of which comprises a bell crank lever 12 pivotally mounted on the body of the engine, as shown at 13, and having one arm connected with the stem of the valve which it is to operate, as shown at 14, and having its other end provided with a projection or pin 15 arranged to enter the peripheral cam groove 16 of a cam 17 which is rotatably mounted adjacent to the end of the cylinder. In the preferred construction, as here shown, a single cam serves to operate the two valves of the same cylinder and the cams for actuating the valves of adjacent cylinders are preferably arranged in pairs but this construction is optional. The cams may be supported and operated in any suitable manner, but as here shown the several cams are mounted on a shaft 18 which extends lengthwise of the engine and is journaled at its opposite ends in bearings 19 and 20. The cam shaft is positively driven from the engine or crank shaft 5 and to accomplish this one end of the shaft 18 projects beyond the bearing 20 and has secured thereto a worm gear 21 which meshes with a corresponding gear 22 on the upper end of a vertical shaft 23, which is journaled in bearings 24 and 25 mounted on the end of the engine. Secured to the lower end of the shaft 23 is a worm gear 26 meshing with a corresponding gear 27 connected with the engine shaft 5.

So much of the construction of the engine as has been described is substantially that shown in the patents mentioned and has been modified but little to accommodate it to the present invention. In order that the valve-actuating mechanism, including the bearings for the shaft, cams and valve actuating levers, may be properly lubricated I have provided means whereby the cams may be caused to run partially submerged in a bath of oil. Thus not only are the active parts of the cams and of the levers engaging the cams amply lubricated but the rotation of the cams causes the oil to be thrown or splashed over the other moving parts so that all bearing surfaces are lubricated.

Ordinarily the movement of the cams themselves will cause a sufficient lubrication of the parts but if desired the cams may be provided with projections or splashers, as shown at 53, to cause them to throw an increased amount of oil. The construction and arrangement of the parts to provide such an oil bath may be varied as circumstances may dictate, but in the present embodiment of the invention I have so constructed the top of the body portion or casing 1 of the engine as to provide therein oil receptacles 28 adjacent to the cams and so arranged that the lower portions of the cams will extend into the respective receptacles and this portion of each cam, together with the end of the lever which engages the same will be immersed in the oil in its receptacle. It will be noted that the arrangement of the oil receptacle is such that a water jacket 52 is interposed between the same and the cylinder, thereby preventing the undue heating of the oil.

In the present construction of the engine where there are two pairs of twin cams I have provided two receptacles which are of a width sufficient to receive both cams and are arranged adjacent to the bearings 19 and 20, respectively. The two oil receptacles 28 are connected one with the other by means of a conduit 29 extending longitudinally of the engine and of less depth than the depth of the receptacles. The oil is delivered to the receptacles by means of a pipe or conduit 30 leading from a pump 31 to the upper portion of the engine where it discharges, as shown at 32, on top of the engine casing and preferably into a shallow conduit 33 which delivers the oil to the longitudinal passage or conduit 29 and this in turn to the receptacles 28. The valve actuating devices are, of course, inclosed by means of a lid or closure 33[a] so that the oil is confined to the engine and not scattered over adjacent objects. The oil which is splashed out of the receptacles by the movement of the cams settles back to the top of the engine casing and runs back into the receptacles or some of the conduits. The oil also escapes from the receptacles through the bearings 19 and 20, the lower portions of which are beneath the upper level of the receptacles or wells and in communication therewith. The oil which works its way through the bearing 19, enters a conduit or passageway 34 at the end of the engine casing and is returned to the receptacle, but the oil which works its way through the bearing 20 enters a casing 35 which incloses the worm gears 21 and 22. This casing has a depressed portion, as shown at 36, which serves to retain a quantity of the oil therein and cause the lower portion of the gear 21 to run in an oil bath. The oil passes from the casing either about the outside of the bearing 24 or is conveyed along the gears 21 and 22 to the shaft 23 and through the bearing 24. In either instance it passes down along the shaft 23 within a casing 37 which incloses the vertical shaft, through the bearing 25 and into a receptacle or well 38 formed in the bottom of a casing 39 which incloses the bearing and the gear 26. A gear 39[a] is also mounted on the shaft 23 within the casing and serves to operate an auxiliary part of the engine, such as a water pump. The oil passes over or through these gears in the course of its passage to the well 38. The lower portion of the casing 39 is provided with a bearing 40 in which is journaled a vertical shaft 41 connected with the lower end of the shaft 23 by a tongue and groove connection, as shown at 42, and connected at its lower end with the operative part of the pump 31. This pump is here shown as a rotary pump of a known construction and is inclosed within a casing comprising a bottom wall 43 which may be removed and when removed will permit the ready removal of the operative element of the pump and the shaft 41. A branch pipe 44 extends from the pipe 30 into the crank casing 7 and is connected with a distributing pipe or manifold 45 which has a series of openings 46 arranged to discharge the oil into receptacles or troughs 47 formed in the bottom of the crank casing and so arranged that oil lifting devices or splash fingers 48 connected with the piston rods and the cranks will enter the receptacles or troughs and lift the oil therefrom and cause it to be thrown over the bearings within the casing and into the cylinder. It will be noted that these troughs extend transversely to the length of the engine and therefore the oil will be retained in them even though the engine may be inclined to a very considerable degree, as when the engine is mounted on an automobile which is climbing a hill. Each trough 47 is provided with an overflow port 49 which discharges the surplus oil into a depressed lower portion of the casing which forms a well, as shown at 50. A pipe or conduit 51 leads from this well to the pump 31 so that the oil is drawn from the well by the pump and again placed in circulation. In this manner it will be apparent that the oil is maintained in constant circulation and is caused to come in contact with and lubricate the various moving parts of the engine, this being accomplished without any action on the part of the operator. Further, it will be noted that the construction is such that very few parts are added to the engine and these are of such a character and so arranged as to be inconspicuous and out of the way. The oil is caused to travel along conduits formed either by casings and parts of the engine or formed in these parts, where they did not formerly exist. This not only simplifies

the construction of the engine but also brings the oil into contact with the bearings and other parts which are in frictional engagement.

While I have shown and described one embodiment of the invention it will be understood that this has been chosen for the purposes of illustration only and that I do not desire to be limited to the details of construction shown and described, for obvious modifications will occur to a person skilled in the art. For example, the cam shaft can be driven in other ways than by the bevel gears and vertical shaft, the essential feature being a drive connection between this shaft and the engine shaft and this drive connection, whatever its character, could be inclosed in a suitable casing which would have a conduit for the oil in substantially the same manner as does the connection here shown.

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

1. In an engine, the combination, with a cylinder having a port, a valve to control said port, a valve-actuating device, and a cam to operate said valve-actuating device, of an oil receptacle supported adjacent to said cam and so arranged that a portion of said cam is immersed in the oil therein, thereby lubricating the cam and causing it to throw oil on said valve-actuating device to oil the same.

2. In an engine, the combination, with a cylinder having a port, a valve to control said port, a valve-actuating device, and a cam to operate said valve-actuating device, of an oil receptacle carried by said engine adjacent to said cam and so arranged that a portion of said cam is immersed in the oil therein, thereby lubricating the cam and causing it to throw oil on said valve-actuating device to oil the same, and a water jacket interposed between said receptacle and said cylinder.

3. In an engine, the combination, with a cylinder having a port, a valve to control said port, a valve-actuating device, and a cam to operate said valve-actuating device, of an oil receptacle supported adjacent to said cam and so arranged that a portion of said cam is immersed in the oil therein, thereby lubricating the cam and causing it to throw oil on said valve-actuating device to oil the same, a pump to deliver oil to said receptacle, and means to return the oil from said receptacle to said pump whereby a constant circulation of oil is maintained.

4. In an engine, an engine casing, a cylinder in said casing having a port, a valve to control said port, a valve-actuating device mounted on said casing and connected with said valve, a cam rotatably mounted on said casing and operatively connected with said valve-actuating device, the top of said casing having a depression therein adjacent to said cam to form an oil receptacle into which a portion of said cam extends.

5. In an engine, an engine casing having a top provided with a depression to form an oil receptacle, a cylinder having a port, a valve to control said port, a valve-actuating device comprising a bell crank lever pivotally mounted on the top of said casing and having one arm connected to said valve, a cam rotatably mounted on top of said casing and extending into said oil receptacle, said cam being in operative engagement with the other arm of said bell crank lever.

6. In an engine, an engine casing having a top provided with a depression to form an oil receptacle, a cylinder having a port, a valve to control said port, a valve-actuating device comprising a bell crank lever pivotally mounted on the top of said casing and having one arm connected to said valve, a cam rotatably mounted on top of said casing and extending into said oil receptacle, said cam being in operative engagement with the other arm of said bell crank lever, the top of said casing being spaced away from the adjacent portion of said cylinder.

7. An engine comprising a plurality of cylinders each having a port, a valve to control each of said ports, valve-actuating devices for said valves, a shaft extending lengthwise of said engine, cams mounted on said shaft to operate said valve-actuating devices, and a plurality of oil receptacles arranged along said shaft adjacent to the respective cams and so positioned that said cams extend into the respective receptacles.

8. In an engine, a casing having its top wall provided with depressions to form oil receptacles, a plurality of cylinders in said casing, each having a port, valves to control the respective ports, actuating devices for said valves mounted on the top of said casing, a shaft journaled on the top of said casing, and cams mounted on said shaft adjacent to the respective oil receptacles and in operative engagement with the respective valve-actuating devices, the engaging portions of said valves and valve-actuating devices being immersed in the oil in the respective receptacles.

9. In an engine, a casing having its top wall provided with depressions to form oil receptacles, a plurality of cylinders in said casing, each having a port, valves to control the respective ports, actuating devices for said valves mounted on the top of said casing, a shaft journaled on the top of said casing, cams mounted on said shaft adjacent to the respective oil receptacles and in operative engagement with the respective valve-actuating devices, the engaging portions of said valves and valve-actuating devices being immersed in the oil in the respective re-

ceptacles, and splashers carried by said cams.

10. In an engine, a cylinder having a port, a valve therefor, and an actuating device for said valve, a piston mounted in said cylinder, an engine shaft connected with said piston, an oil receptacle carried by said engine near the end of said cylinder, bearings formed on said engine on opposite sides of said receptacle, a shaft journaled in said bearings, a cam carried by said shaft extending into said receptacle and in operative engagement with said valve-actuating device, a pump to deliver oil to said receptacle, vertical bearings at the end of said engine, a shaft journaled in said bearings, means connecting the opposite ends of said shaft with said cam shaft and said engine shaft, respectively, and means to convey the oil from said receptacle to said pump and cause it to come in contact with said bearings and said connecting means while it is being so conveyed.

11. In an engine, a plurality of cylinders, pistons mounted in said cylinders, an engine shaft connected with said pistons, each cylinder having a port, valves to control the respective ports, actuating devices for said valves, a shaft journaled on said engine, cams carried by said shaft and in operative engagement with the respective valve-actuating devices, a vertical shaft arranged at one end of said engine and geared at its opposite ends to said cam shaft and said engine shaft, respectively, oil receptacles arranged adjacent to the respective cams and adapted to receive portions of these cams, casings communicating with said receptacles and inclosing said vertical shaft and the gears therefor, said casings forming a conduit for said oil, a pump communicating with the conduit so formed, and another conduit to deliver the oil from said pump to said receptacles.

12. In an engine, a body portion provided in its top wall with a plurality of depressions forming receptacles, a plurality of cylinders each having a port, pistons mounted in said cylinders, an engine shaft connected with said pistons, valves to control the respective ports, actuating devices for said valves on the body portion of said engine, bearings at the opposite ends of said body portion having their ends communicating with the adjacent receptacles, a shaft journaled in said bearings, cams mounted on said shaft to operatively engage the respective valve actuating devices, portions of said cams being immersed in the oil in the respective receptacles to deliver oil to said receptacles, vertical bearings at one end of said body portion, a shaft journaled in said bearings, gearing connecting the opposite ends of said vertical shaft with said cam shaft and said engine shaft, respectively, a casing inclosing the gearing at the upper end of said vertical shaft and communicating with the adjacent bearing for said cam shaft to receive the oil which passes through said bearing, said casing having a depressed portion to receive the oil and into which one of said gears extends, other casings inclosing said shaft and said bearings, the lowermost of said casings forming a well to receive the oil which passes through the other casings, and a connection between said well and said pump.

13. In an engine, a body portion provided in its top wall with a plurality of depressions forming receptacles, a plurality of cylinders each having a port, pistons mounted in said cylinders, an engine shaft connected with said pistons, valves to control the respective ports, actuating devices for said valves mounted on the body portion of said engine, bearings at the opposite ends of said body portion having their ends communicating with the adjacent receptacles, a shaft journaled in said bearings, cams mounted on said shaft to operatively engage the respective valve actuating devices, portions of said cams being immersed in the oil in the respective receptacles to deliver oil to said receptacles, vertical bearings at one end of said body portion, a shaft journaled in said bearings, gearing connecting the opposite ends of said vertical shaft with said cam shaft and said engine shaft, respectively, a casing inclosing the gearing at the upper end of said vertical shaft and communicating with the adjacent bearing for said cam shaft to receive the oil which passes through said bearing, said casing having a depressed portion to receive the oil and into which one of said gears extends, other casings inclosing said shaft and said bearings, the lowermost of said casings forming a well to receive the oil which passes through the other casings, said lowermost casing having a bearing arranged in alinement with said vertical shaft, a shaft mounted in said bearing having its inner end detachably connected with said vertical shaft and its outer end connected with the operative end of said pump.

14. In an engine, a body portion provided in its top wall with a plurality of depressions forming receptacles, a plurality of cylinders each having a port, pistons mounted in said cylinders, an engine shaft connected with said pistons, valves to control the respective ports, actuating devices for said valves on the body portion of said engine, bearings at the opposite ends of said body portion and having their ends communicating with the adjacent receptacles, a shaft journaled in said bearings, cams mounted on said shaft to operatively engage the respective valve actuating devices, portions of said cams being

immersed in the oil in the respective receptacles to deliver oil to said receptacles, vertical bearings at one end of said body portion, a shaft journaled in said bearings, gearing connecting the opposite ends of said vertical shaft with said cam shaft and said engine shaft, respectively, a casing inclosing the gearing at the upper end of said vertical shaft and communicating with the adjacent bearing for said cam shaft to receive the oil which passes through said bearing, said casing having a depressed portion to receive the oil and into which one of said gears extends, other casings inclosing said shaft and said bearings, the lowermost of said casings forming a well to receive the oil which passes through the other casings, said lowermost casing having a bearing arranged in alinement with said vertical shaft, a shaft mounted in said bearing having its inner end detachably connected with said vertical shaft and its outer end connected with the operative end of said pump, and detachable means for holding said last-mentioned shaft against longitudinal movement.

15. In an engine, a body portion having a plurality of receptacles in the upper portion thereof, cylinders having ports, valves to control the respective ports, actuating devices for said valves, a cam shaft journaled on said body portion, cams mounted on said cam shaft, extending into said receptacles and in engagement with the respective valve-actuating devices, pistons mounted in said cylinders, an engine shaft connected with said pistons, a crank casing inclosing said engine shaft and having receptacles in the lower portion thereof, splashers connected with said crank shaft and adapted to enter the respective receptacles and lift the oil therefrom, a connection between said engine shaft and said cam shaft, a pump, conduits leading from said pump to the receptacles in the body portion of said engine and to the receptacles in said crank casing, and conduits to return the oil to said pump, whereby the circulation of oil is maintained.

16. In an engine, a body portion having a plurality of receptacles in the upper portion thereof, cylinders having ports, valves to control the respective ports, actuating devices for said valves, a cam shaft journaled on said body portion, cams mounted on said cam shaft, extending into said receptacles and in engagement with the respective valve-actuating devices, pistons mounted in said cylinders, an engine shaft, piston rods connecting said pistons with said engine shaft, splashers carried by said piston rods at their point of connection with said engine shaft, a crank casing inclosing said engine shaft and the connected portions of said piston rod, a crank casing having a plurality of transversely extending receptacles arranged in alinement with the respective piston rods, splashers carried by said piston rods and adapted to enter said receptacles, a well arranged beneath said crank casing, said crank casing having overflow ports to deliver the oil from said receptacles to said well, a pump, a pipe leading from said pump to the receptacles in the body portion of said engine, a distributing pipe arranged within said crank casing, connected with said pipe and arranged to deliver oil to the respective receptacles in said crank casing, and conduits leading from the receptacles in said body portion and from said well to said pump.

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

RAYMOND C. MITCHELL.

Witnesses:
W. W. WITMEYER,
W. G. CAMPBELL.