

Aug. 5, 1930.

A. W. F. MANZEL

1,772,319

OIL PUMP

Filed Jan. 15, 1925

3 Sheets-Sheet 1

Fig. 1.

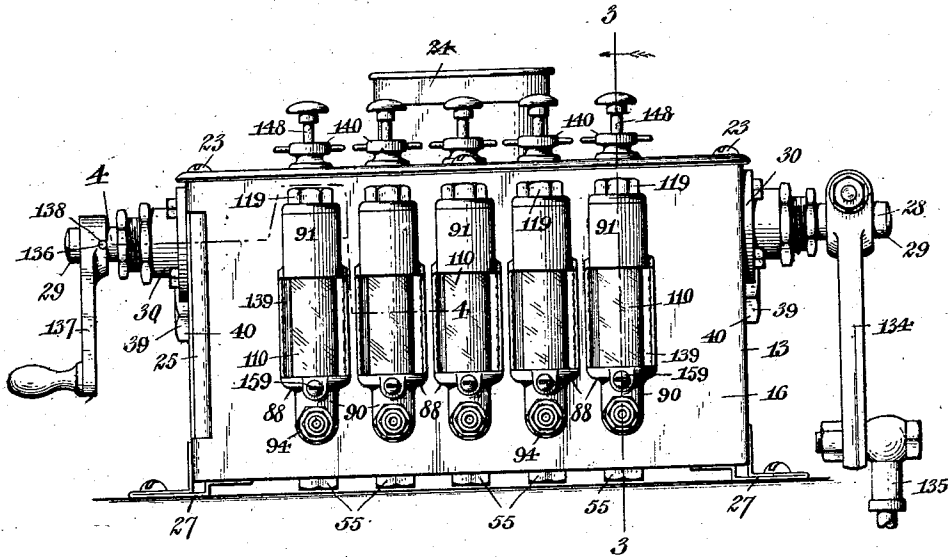


Fig. 2.

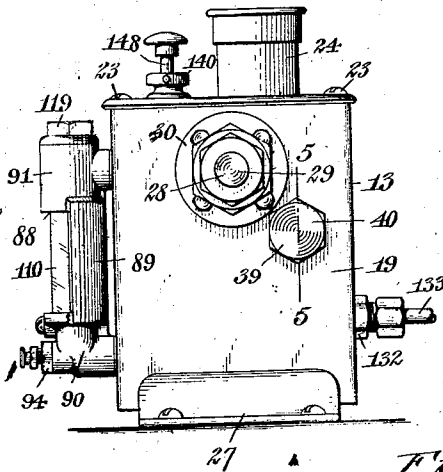


Fig. 5.

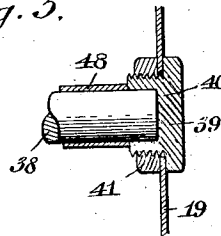


Fig. 6.

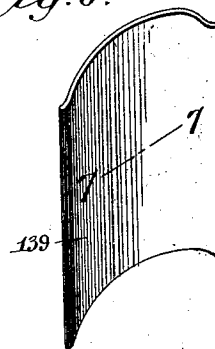
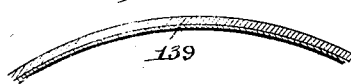


Fig. 7.



Witness:  
J. J. Oberst,

Adolph W. F. Manzel, Inventor.  
By Emil Kuehner  
Attorney.

Aug. 5, 1930.

A. W. F. MANZEL

1,772,319

OIL PUMP

Filed Jan. 15, 1925

3 Sheets-Sheet 2

Fig. 5.

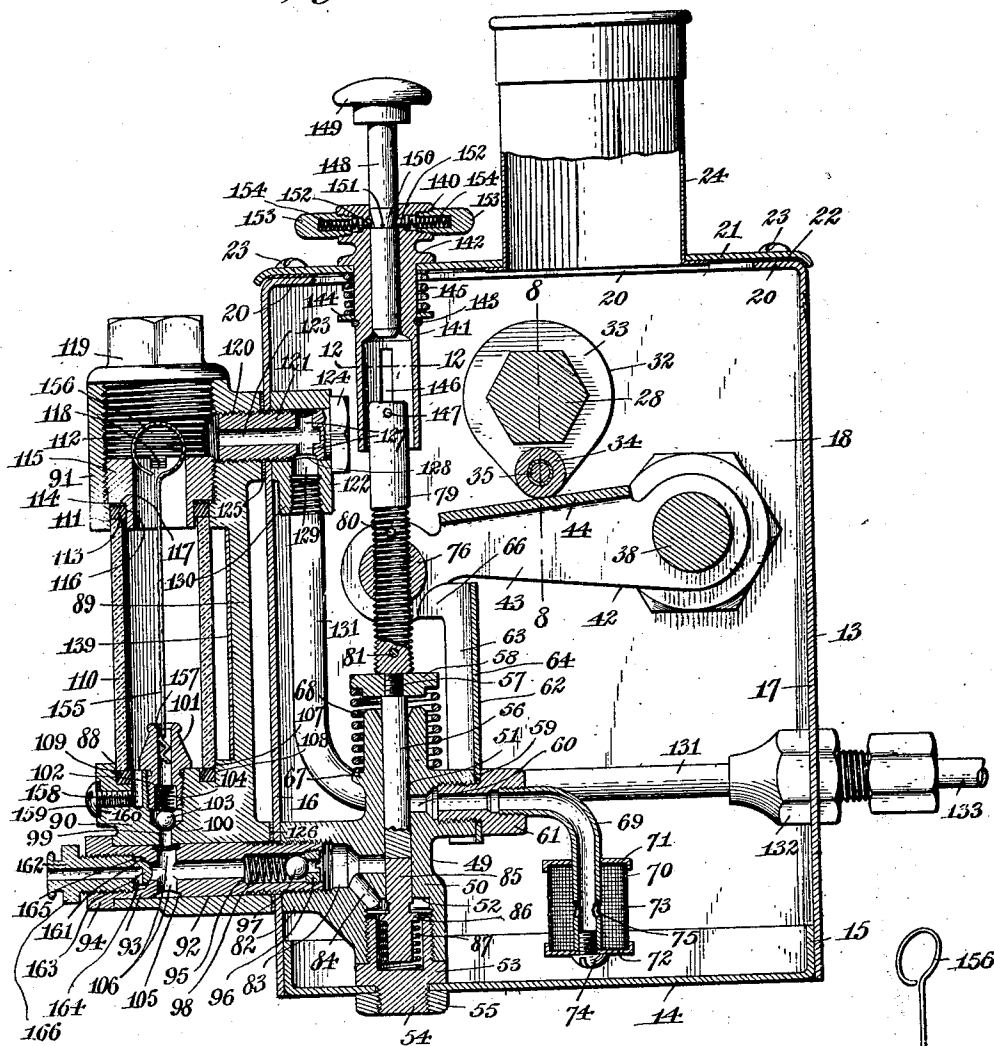


Fig. 8.

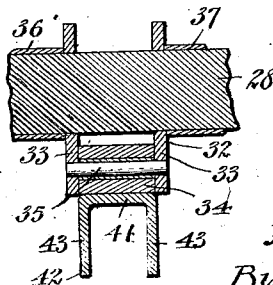
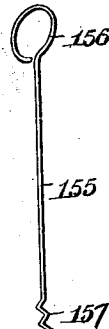


Fig. 9.



Adolph W. F. Manzel, Inventor.  
By Emil Neubert  
Attorney.

Witness:  
J. J. Oberst,

Aug. 5, 1930.

A. W. F. MANZEL

1,772,319

OIL PUMP

Filed Jan. 15, 1925

3 Sheets-Sheet 3

Fig. 4.

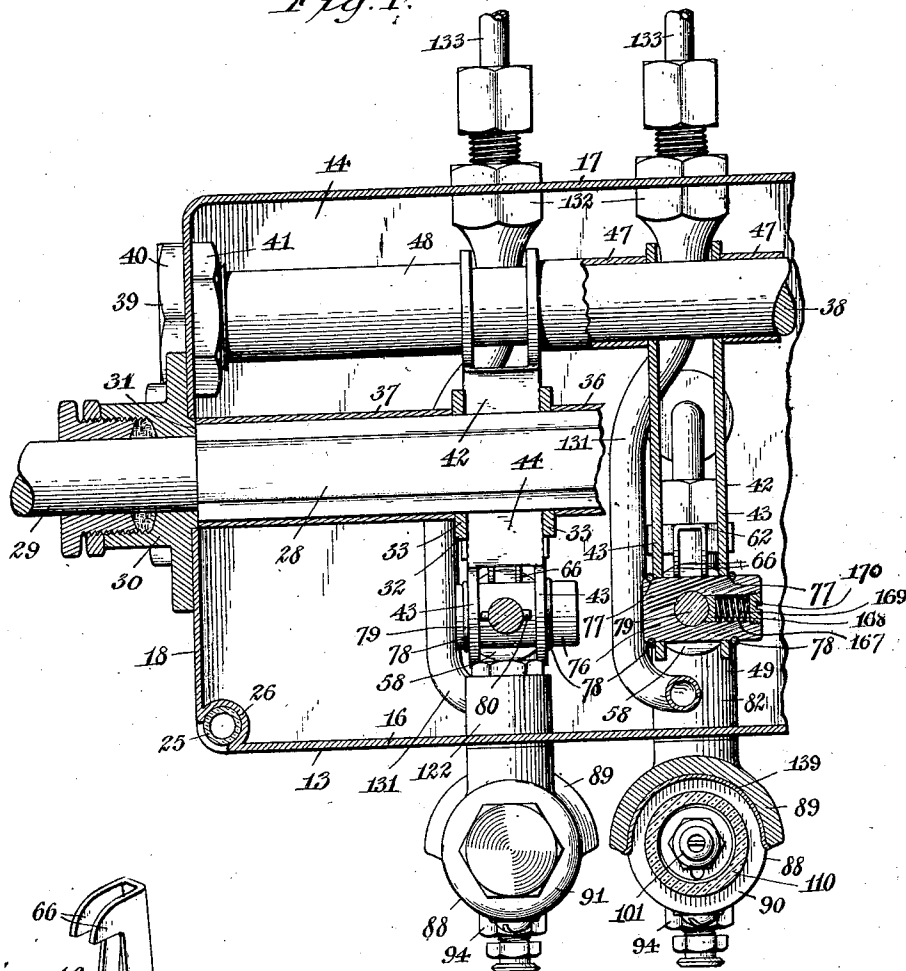


Fig. 10.

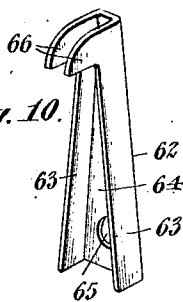


Fig. 11.

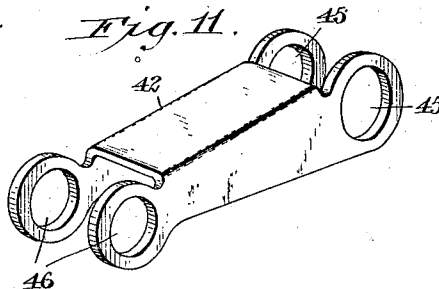
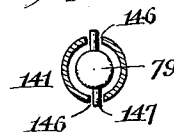


Fig. 12.



Witness:  
J. J. Oberst.

Adolph W. F. Manzel, — Inventor.  
By Emil Neuhart  
Attorney.

## UNITED STATES PATENT OFFICE

ADOLPH W. F. MANZEL, OF BUFFALO, NEW YORK, ASSIGNOR TO MANZEL BROS. CO., OF  
BUFFALO, NEW YORK, A CORPORATION OF NEW YORK

## OIL PUMP

Application filed January 15, 1925. Serial No. 2,710.

My invention relates to improvements in oil pumps, especially of the type embodying a plurality of pump elements, each feeding independently quantities of oil to a part or  
5 parts to be lubricated.

One of the objects of my invention is the production of an improved oil pump whereby the exact quantity of oil fed to a part or parts to be lubricated can be readily seen  
10 through a sight-tube.

Another object of my invention is to provide a multiple oil pump embodying a plurality of pump elements actuated by a mechanical element common to all, and where-  
15 in provision is made for actuating said pump elements, either mechanically or manually.

Another object of my invention is to provide an oil pump having a plurality of pump elements adapted to feed oil in predetermined  
20 quantities to different parts to be lubricated, said pump elements being actuated by a mechanical element common to all; and where- in provision is made for manually actuating any pump element individually to increase  
25 the quantity of oil fed to any individual part being lubricated.

A further object of my invention is to provide an oil pump of the type mentioned and in which a plurality of pump elements are  
30 included, and to provide novel means for regulating the quantity of oil fed by each pump element.

A further object of my invention is to provide an oil pump having a plurality of pump  
35 elements, a sight-tube connected with each pump element and through which the oil fed by said pump elements rises in predetermined quantities; and to equip said pump with means to accurately determine the quan-  
40 tity of oil fed by each pump element, if for any reason the quantity fed through the sight-tube cannot be determined with certainty, this being particularly desirable due to the fact that oil passing through a sight-  
45 tube, particularly in globular form, becomes magnified and makes it difficult to determine the exact quantity passing therethrough.

A further object of my invention is to provide an oil pump with a sight-tube and to so  
50 fasten the tube in place that leakage of oil

is absolutely prevented, and so that the tube can be readily removed from its place for cleaning the same.

A further object of my invention is to provide means for draining the sight-tube so  
55 that said tube can be removed without any possibility of the liquid matter contained therein being wasted, and at the same time guard against the liquid matter splashing  
60 over parts of the pump and necessitating cleansing of the same.

A still further object of my invention is to provide the sight device through which the lubricant fed by the pump is adapted to  
35 pass with means for maintaining a clear vision through the sight-tube of the device so that the oil passing through said sight-  
tube can be readily seen.

A still further object is, to provide an oil pump having an oil casing and a pump ele-  
70 ment enclosed by said casing, and to equip the pump with exteriorly accessible means for regulating the quantity of oil fed by said pump element.

With the above and other objects in view, the invention consists in the novel features  
75 of construction, and in the arrangement and combination of parts to be hereinafter described and more particularly pointed out in the subjoined claims.  
80

In the drawings:—

Fig. 1 is a front elevation of a multiple feed oil pump constructed in accordance with my invention.

Fig. 2 is an end view of the same showing the actuating pitman removed therefrom.  
85

Fig. 3 is an enlarged transverse section, taken on line 3—3, Fig. 1, looking in the direction of the arrow crossing said line.

Fig. 4 is an enlarged horizontal section, taken on line 4—4, Fig. 1.  
90

Fig. 5 is an enlarged vertical section taken on line 5—5, Fig. 2.

Fig. 6 is a detached perspective view of one of the removable linings or segments  
95 situated behind each oil sight-tube.

Fig. 7 is a horizontal section on an enlarged scale taken through a portion of one of the linings or segments, as indicated by the line 7—7, Fig. 6.  
100

Fig. 8 is a vertical longitudinal section through a portion of the cam shaft and one of the actuating levers of one of the oil-feeding units, the same being taken on line 8—8, Fig. 3.

Fig. 9 is a perspective view of one of the oil guiding wires along which the oil delivered through the oil sight-tubes is guided.

Fig. 10 is a detached perspective view of one of the piston plunger stops.

Fig. 11 is a detached perspective view of one of the actuating levers.

Fig. 12 is a horizontal section taken on line 12—12, Fig. 3.

Referring to the drawings in detail, 13 designates the casing which serves as an oil chamber, and in preferred form is constructed of sheet material and given a substantially rectangular form. While this casing or chamber may be variously constructed, in the drawings it is shown as having a bottom 14 provided with upstanding marginal flanges 15, front and rear walls 16, 17, respectively, and end walls 18, 19, respectively. The front, rear and end walls surround the upstanding marginal flanges of the bottom 14, and by any suitable means are secured thereto in a liquid-tight manner. The front, rear, and end walls have inturned flanges 20 at their upper ends which are comparatively narrow so that a comparatively large opening is provided at the top of the casing. Said opening is closed with a removable cover 21, a gasket 22 being placed between the inturned flanges 20 and said cover, and screws 23 being passed through said cover and gasket and having threaded engagement with said inturned flanges to securely fasten the cover to said casing.

The cover 21, or top of the casing, as it may be termed, is provided with a filler tube 24 through which oil is to be delivered into the casing to be fed therefrom by a plurality of oil-feeding units to be hereinafter described. The oil may, however, be delivered into the casing in any other suitable manner. For convenience in determining the level of the oil within the casing or chamber 13, an oil gage 25 is suitably fitted within a depressed portion 26 arranged at one corner of the casing, and for the purpose of fastening the oil pump to a machine or other suitable support, brackets 27 are fastened to the exterior of the casing at the lower end thereof.

Extending longitudinally through the casing or oil chamber is an operating shaft 28 formed preferably of hexagonal material along a length extending from one end wall to the other of the casing and having at opposite ends cylindrical portions 29 which are journaled in bearings 30 secured to opposite end walls. The bearings 30 are preferably in the form of stuffing boxes, as clearly shown in Fig. 4, so that leakage of oil along the op-

erating shaft cannot take place. By constructing the operating shaft of hexagonal material, and turning down the ends thereof to form cylindrical journals, shoulders 31 are provided which bear against the inner ends of the bearings 30 so that lengthwise movement of the shaft is prevented.

Mounted on the hexagonal portion of the operating shaft are a number of cams 32 which are spaced at regular intervals along the shaft, and each cam comprises two spaced disk-like members 33, each extended outwardly at corresponding points, and between the extended portions of each pair of disk-like members a roller 34 is rotatably mounted on a pin 35 straddling the space between said disk-like members and fastened at opposite ends into said members.

In the drawings I have shown five oil-feeding units and each includes a cam 32. The series of cams are arranged along the hexagonal portion of the operating shaft and are spaced apart by sleeves 36, and between the outermost cams of the series and the adjacent end walls, spacing sleeves 37 are arranged. In this manner the cams are held against movement lengthwise along the shaft, and by reason of said shaft being of hexagonal formation, the disk-like members of the cams are provided with hexagonal openings into which the hexagonal portion of said operating shaft is fitted.

Although I have shown and described the operating shaft as of hexagonal formation in cross section, it will be apparent that this shaft may be given any other non-cylindrical formation and the disk-like members of each cam provided with openings to conform to the cross sectional formation of the shaft to permit of their being slipped onto the shaft. If the advantages derived from such assemblage are not desired, the cams may be fastened to the operating shaft in any well known manner, but I consider the special arrangement and assemblage set forth to be essential from the view point of durability and simplicity, and especially for the reason that slippage or displacement of parts cannot take place.

Arranged parallel with the operating shaft and extending through the casing or oil chamber, is a fulcrum bar or spindle 38, the ends of which are stepped in bearings 39 secured in the end walls of the casing 13. Each bearing 39 comprises an externally-threaded socket thrust through an opening in one of said end walls and provided with a head 40 which bears against the outer surface of said wall, said socket having a nut 41 threaded thereon which bears against the inner surface of the wall and thus holds the socket in place.

Spaced on said fulcrum bar or spindle 38 is a series of actuating levers 42, one being provided for each cam 32 and co-operating

therewith. Each lever is stamped of a piece of sheet material and has two parallel side members 43 connected at their upper edges by a cross or contact member 44. Said side members 43 have alined openings 45 at corresponding ends through which the fulcrum bar or spindle 38 is passed, and similar openings 46 are provided at the opposite ends of said side members, for a purpose to appear hereinafter.

Arrangement between the actuating levers and surrounding the fulcrum bar or spindle 38 are spacing sleeves 47, and similar sleeves 48 are provided between the end actuating levers of the series and the bearings 39. In this manner the actuating levers are maintained in alinement with the cams 32 secured to the non-cylindrical operating shaft 28.

Fastened to the walls of the casing is a series of pump elements 49, one pump element being provided for co-operation with each actuating lever. Each pump element has a body or casting provided with a main vertical portion 50, in the main or cylindrical cross sectional formation, and provided with an axial bore 51 serving as a cylinder. Said main vertical portion is enlarged at its lower end and counterbored so as to form a downwardly facing shoulder 52. The counterbored part of said main vertical portion is internally threaded and receives a cap sleeve 53 which closes the lower end of said counterbored part and said cap sleeve has an externally threaded axial boss 54 at its outer end which is passed through an opening in the bottom 14 of the casing, a nut 55 being threaded onto said boss and bearing against the under side of said bottom to securely fasten the cap and consequently the pump element in position within the casing.

Slidably fitted in said plunger cylinder 51 and inserted therein from the upper end thereof is a piston plunger 56, which has an externally threaded reduced upper end 57 onto which a collar 58 is threaded, said collar bearing against the shoulder formed by reducing the upper end of said plunger. The plunger cylinder has a nipple 59 extending laterally therefrom, which is internally threaded and the interior of which is in communication with the interior of the plunger cylinder through the medium of a port 60 serving as the oil inlet for said plunger cylinder. Threaded into said nipple is a headed sleeve nut 61 and between the outer end of said nipple and the head of said sleeve nut, a stop element 62 is clamped, said stop element being shown in detail in Fig. 10 and being preferably constructed of sheet material fashioned to provide two side members 63 and a connecting cross member 64, said cross member having an opening 65 at its lower end through which the threaded portion of the sleeve nut 61 is passed. The head of said sleeve nut bears against the outer side

of the connecting cross member 64 and forces the inner side of said cross member against the end of the nipple 59 so as to securely fasten the stop element in place. The stop element extends upwardly from its point of fastening and the side members 63 have forwardly extending stop ears 66 at their inner edges, which are adapted to be engaged by the collar 58 threaded onto the upper end of the piston plunger 56.

The plunger cylinder has a flange 67 formed to extend around the same and the upper face of this flange is preferably in line with the highest point of the nipple 59. Surrounding the upper end of the plunger cylinder is a spiral spring 68, the lower end of which bears against said flange and nipple and the upper end against the collar 58, which for convenience may be termed the piston plunger collar, the purpose of said spring being to elevate the piston plunger under conditions to appear hereinafter.

Threaded into the outer end of the sleeve nut 61 attached to each pump element is an oil inlet pipe 69, which is preferably curved in the form of an elbow and its depending portion is inserted into a screen or filter 70. Said screen is preferably of cylindrical formation and comprises a top 71, a bottom 72, and a cylindrical wall 73 holding said top and bottom spaced apart and being preferably formed of wire mesh material; but if desired, any other suitable material may be used for filtering the oil drawn into the pump element. The depending portion of the oil inlet pipe extends through an axial opening in the top of said screen or filter, and its lower end bears against the upper surface of the bottom thereof. Said bottom has an axial opening therein through which a screw 74 is passed, which is threaded into the lower extremity of said pipe, said pipe being internally threaded to receive said screw. The head of the screw bears against the under side of said bottom, and in this manner the screen or filter is properly maintained on the oil inlet pipe, which is provided with one or more oil inlets 75 within said screen or filter.

Thrust through the alined openings 46 at the outer end of each actuating lever is a cylindrical bar or block 76. Said bar or block extends from opposite sides of the lever, and near each end is provided with an annular external groove 77. Snapped into each of said grooves is a spring ring 78, one ring bearing against one side of the lever and the other against the other side thereof to prevent lengthwise movement of said cylindrical bar or block in said lever, yet permit said bar or block to be given slight rotary movement within the openings of said lever.

Threaded adjustably through each of said cylindrical bars or blocks is a push rod 79, the lower end of which bears against the plunger collar 58 while the upper end thereof

extends upwardly a distance above the cylindrical bar or block. By reason of said bar or block supporting the push rod, it may, in a broader sense be termed a push-rod support. To limit the adjustment of said push rod within said cylindrical bar or block, a stop pin 80 is passed therethrough above said bar or block, and a similar stop pin 81 is passed therethrough beneath said bar or block, the distance between said stop pins determining the range of adjustment of the push rod through said bar or block.

It is to be noted that the spiral springs 68 tend, at all times, to force the piston plungers 56 of the several pump elements upwardly, and by reason of the plunger collars bearing against the lower ends of the push rods 79, the actuating levers 42 are pressed upwardly in contact with the cams 32, the positions of the cams determining the positions of said levers and consequently controlling the position of the plungers against the action of the spiral springs 68.

Each pump element also has a second nipple 82 provided with an axial bore 83, which is reduced at its inner end and opens into the axial bore or cylinder 51, said bore 83 serving as the oil outlet of the plunger cylinder. The enlarged portion of said bore 83, or outlet passage as it may be termed, is internally threaded and the end thereof bears against the inner side of the front wall of the casing. An equalizing passage 84 extends from the outlet passage 83 into the counterbored portion at the lower end of the pump element, and slidably fitted in the lower portion of the plunger cylinder and extending into said counterbored portion is an equalizing valve 85. Said equalizing valve is provided with a collar 86 against which one end of a spiral spring 87 bears, the other end of said spring bearing against the inner wall of the bore formed in said sleeve nut, thus tending to keep said valve elevated within the plunger cylinder so as to normally shut off the outlet passage 83 of said cylinder.

Associated with each pump element is an oil feed sighting device 88, which is applied to the outer side of the casing at any desirable point, but as arranged in the drawings, to the front of said casing. This sighting device includes a casting which comprises a transversely curved body portion 89, an inlet head 90 at the lower end of said body portion, and an outlet head 91 at the upper end thereof. The inlet head 90 has a bore 92 formed therein which is co-axial with the outlet passage 83 in the pump element and into which is fitted a control sleeve 93, which serves also as a means to secure the pump element to the front wall of the casing. For this purpose the sleeve is threaded at its inner end and the outlet passage 83 correspondingly threaded to receive at least a part of

the threaded portion of said control sleeve, said sleeve having a head 94 at its outer end formed hexagonal or otherwise for convenience in applying a wrench or other suitable tool thereto for the purpose of threading said sleeve into said outlet passage, the head of said sleeve bearing against the outer side of said inlet head. The bore of this sleeve is enlarged at its inner end to form a shoulder 95 and the inner end of the enlarged portion of said bore is threaded to receive an externally threaded collar 96 which serves as a valve seat for an outwardly opening valve 97, preferably a ball valve, against which one end of a spiral spring 98 bears, the opposite end of said spring bearing against the shoulder 95 to keep said valve seated against said valve seat.

Opening upwardly from the bore 92 to the top of the inlet head 90 is an oil passage 99, which is counter-bored from the upper end downwardly to form a shoulder 100 which serves as a valve seat, the upper portion of said counterbore being threaded to receive a nozzle 101 which extends upwardly from the upper face of said inlet head, said nozzle having its bore enlarged at its lower end to form a shoulder 102.

Seated against the shoulder or valve seat 100 is an upwardly or outwardly opening valve 103 against which one end of a spiral spring 104 bears, said spring bearing with its other end against the shoulder 102 formed in said nozzle and serving to hold said valve seated against the valve seat 100.

The control sleeve has an external annular groove 105 in line with the oil passage 99 formed in the inlet head 90, said groove forming an annular chamber between said control sleeve and the wall of the bore 92 in said inlet head, into which chamber opens one or more ports 106 extending radially from the bore of said control sleeve. Therefore, regardless of whether or not the port or ports 106 have their axes coincident with the oil passage 99, communication will at all times be maintained between the bore or passage in said control sleeve and the oil passage 99 in said inlet head. In a broad sense the bore of said control sleeve 93, the passage 99, and the bore of the nozzle 101 may be considered as a continuation of the outlet passage 83 formed in the pump element, or more particularly in the nipple 82 of said pump element.

In the upper face of the inlet head a circular recess 107 is formed, and around the marginal portion of said recess an annular groove 108 is provided in which a cork or other suitable gasket 109 is fitted. 110 designates a sight tube which has its lower end entered in said circular recess and its lower edge bearing against said gasket. The upper end of said sight tube, which is preferably constructed of glass, is entered in a vertical

bore 111 formed in the outlet head 91 of the sighting device, said bore having its upper portion enlarged and internally threaded, as at 112. Resting upon the upper edge of said sight tube is a cork or other gasket 113 onto which is placed a metal washer 114.

Threaded into the enlarged and internally threaded portion 112 of said vertical bore is a sleeve nut 115, reduced in diameter externally along its lower portion, as at 116, to form a shoulder 117, said reduced portion extending through the metal washer 114, the cork or other gasket 113, and into the upper end of the sight tube 110. The shoulder of said sleeve nut bears against the upper face of said metal washer and the upper edge thereof is provided with notches at diametrically opposite points, one of which is shown at 118 so that a suitable tool may be inserted into said notches for rotating said sleeve nut to tighten the gasket 113 against the upper end of the sight tube and at the same time press the lower end of said sight tube against the gasket 109 fitted into the inlet head of said sighting device. By using a metal washer in conjunction with the cork or other gasket 113, downward pressure is exerted by the sleeve nut 115 against said gasket without imparting thereto rotary motion, as would occur if the sleeve nut were in direct contact with the gasket, and in this manner the life of the gasket is prolonged since there is no tendency to move the same around the upper edge of the sight tube and cause the gasket to be cut or otherwise injured. By interposing a metal washer between the gasket and the shoulder of said sleeve nut, the sleeve nut will ride over the metal washer while being rotated in contact therewith. The upper end of the enlarged portion of the vertical bore 111 is closed by a screw plug 119.

The outlet head 91 has a bore 120 extending laterally therefrom and opening at its inner end to the bore 111. The bore 120 is threaded to receive a sleeve nut 121 which extends through a fitting 122 formed against the inner side of the front wall of the casing. For this purpose the fitting 122 has a bore 123 through which said sleeve nut is passed, said sleeve nut extending also through an opening in the front wall of the casing and being threaded into the bore 120 of the outlet head 91. Said sleeve nut 121 is provided with a head which bears against said fitting and forces the same firmly against the inner side of said front wall and at the same time draws the outlet head 91 of the sighting element against a washer 125 inserted between said inlet head and said front wall, thus assuring an oil-tight connection at this point.

It is also to be noted that a washer 126 is interposed between the inlet head 90 of the sighting element and the front wall of the casing, and that said inlet head is forced firmly against said washer when tightening

the control sleeve 93 into the pump element within the casing, this being due to the head or said control sleeve bearing against the outer side of said inlet head. The bore 123 extends through the greater portion of the length of said sleeve nut 121 and has ports 127 opening thereinto. Said sleeve nut is provided with an annular external groove 128 into which said ports open, said groove providing an annular space between said sleeve nut and the wall of the bore 123 in said fitting so that upon tightening the sleeve nut the bore 123 will at all times be in communication with a bore 129 extending through a lateral nipple 130 forming part of said fitting, this communication being effected regardless of whether or not the axes of said ports are coincident with the axis of the bore 129 in said nipple.

It is of course understood that a fitting 122 is used in connection with each pump element and the parts associated therewith or, as it may be termed, with each pumping unit, and that each of said fittings has an outlet pipe 131 connected therewith, said pipe being threaded into the nipple 130 and passed through the casing or chamber 13, and finally out through the rear wall 17 of said casing; or, if desired, through any of the other walls thereof. To guard against leakage of oil from the oil chamber outwardly along the outlet pipes, they are passed through stuffing boxes 132 carried by said pipes and having parts thereof at opposite sides of the wall through which each pipe is led; or any other suitable means may be employed for this purpose. Each of the outlet pipes has a feed pipe 133 connected therewith outside of the casing, and these feed pipes are adapted to be led to various points to which oil is to be fed in predetermined quantities.

The operating shaft 28 extends outwardly through opposite end walls of the casing, and to one end thereof is secured a crank arm 134 having an actuating pitman 135 pivotally connected to its outer end, said pitman being reciprocated by any suitable mechanism so as to cause said crank arm to move through a circular path and thus rotate the operating shaft in a positive manner.

While I have shown a crank arm and pitman connected thereto to serve as means for mechanically rotating the operating shaft, any other suitable mechanism may be substituted therefor. At times it may be found desirable to disconnect the shaft from the machine-actuated mechanism, for example such as include the crank arm 134 and the pitman 130, and substitute therefor hand operated mechanism, and for this purpose I have passed a pin 136 through the opposite end of the operating shaft to be used in connection with a hand lever 137, such as shown for example in Fig. 1, in which the hub of said hand lever is provided with notches 138,

When the hand lever is placed over the shaft, the pin 136 will enter said notches 138, and by pressing inwardly upon the hand lever while causing the same to rock, or travel in a circular path, said lever will be maintained in locked connection with said pin and assure the rocking or the rotation of said operating shaft.

The body portion 89 of the sighting device is, as stated, transversely concaved and as it is preferably formed integral with the inlet and outlet heads 90, 91, respectively, these parts are in the form of a casting, and invariably in sighting devices of this type, regardless of construction, it is difficult, at times, to see oil passing through the sight tubes, particularly owing to the fact parts behind the sight tubes become dusty and oftentimes soiled with oil, and when the dust becomes oil soaked it is found a difficult matter to keep such parts clean. To overcome this I have provided removable transversely concaved linings or segments 139 which are slipped between the inlet and outlet heads of the sighting device and lie in contact with the transversely concaved body portions 89 of said devices. The concaved surfaces of said linings or segments are covered with white or other light covering matter, baked or otherwise permanently applied thereto, or said surfaces may be enameled, or the linings or segments may be constructed of vitreous material properly glazed with light covering or facing material so that in looking through the sight tubes, a light background is provided for each. By having the concaved surfaces of said linings or segments glazed or highly polished and whitened or otherwise light colored, the passage of the oil through the sight tube can be easily seen; and furthermore, by passing a cloth between the sight tubes and said linings or segments, which are preferably slightly spaced from the sight tubes, said linings or segments can be easily cleaned. If, over a length of time, it is found that the linings or segments have been badly soiled, they can be easily removed from the sighting elements and scrubbed, scoured, or otherwise cleansed, after which they can be easily replaced. These linings or segments provide a light backing, through the medium of which the action of the globules of oil passing through the sight tubes, as and in the manner to be hereinafter explained, can be easily seen and the quantity being fed ascertained.

The series of actuating levers 42 fulcrumed on the fulcrum bar or spindle 38 and operated by the cams 32 cause actuation of all of the pump elements 48 within the casing, and the amount of oil fed by each pump element depends upon the stroke of the piston plunger 56 and particularly the range of the stroke from the oil inlet 60 downwardly, such range being the effective

stroke of the piston plunger. The limit of movement upwardly of the piston plungers is controlled by the stop elements 62, and the adjustment of the push rods 79 within their supports, or more particularly, within the cylindrical bars or blocks carried at the outer ends of the actuating levers, effects the limit of movement of said plungers downwardly and regulates the range of movement of said plungers from the oil inlets 60 downwardly. The operating shaft 28 is, as stated, mechanically actuated, but if desired, it may be manually actuated; provision being made at one end of said shaft for the mechanical actuation of the same, and at the other end for manual actuation of the same.

I have devised means for individually actuating each pump element by hand so that when it is found that the oil fed by any pump element does not sufficiently lubricate a part connected therewith, such pump element may be manually actuated independent of the actuation of the remaining pump elements, which latter may be actuated mechanically without affecting the manual actuation of the pump element deficient in its supply. For this purpose there is axially aligned with each push rod 79 an individual actuating device 140 which is mounted in an opening formed in the removable cover or top wall of the casing directly above each push rod. Arranged in each opening is a rod guide or tubular member 141 having an enlargement or head 142 at its upper end, furnishing a downwardly facing shoulder which is adapted to bear against the upper surface of said cover or top wall. This rod guide or tubular member is retained within said cover or top wall and suitable means provided to prevent upward movement thereof. In the embodiment shown, said rod guide or tubular member is provided with an annular groove in which a split spring ring 143 is snapped, a collar 144 being placed over said rod guide or tubular member above said ring and being held against said ring by a spiral spring 145 bearing with one end against said collar and with its other end against the under side of the cover or top. The rod guide or tubular member 141 is therefore held against lengthwise movement in one direction by the shoulder forming the under side of the enlargement or head 142, and the split spring ring 143. The internal diameter of said rod guide or tubular member is enlarged along its lower portion, and at diametrically opposite points is provided with longitudinal slots 146 which extend from the lower end of said guide or member upwardly and terminate close to the upper end of the enlarged internal diameter of said tubular member. The push rods 79 extend upwardly into the rod guides or tubular members 141, and each push rod has a pin 147 passed therethrough near its upper end, op-

posite ends of said pin extending from the push rod and passing through the longitudinal slots 146 in said guide or member.

Axially retained in the upper end of each rod guide or tubular member 141 and extending from the upper end thereof is an actuator rod 148. Each actuator rod is provided with an enlargement or head 149 at its upper end and with an annular groove 150 between its ends, said groove being formed by tapering a portion of the rod downwardly to form an upwardly-facing shoulder 151. The groove so formed is adapted to receive the inner ends of retainer pins 152 arranged within radial bores formed in the enlargement or head of the rod guide or tubular member 141, each radial bore being threaded along its outer portion to receive the inner threaded ends of elongated knobs 153, cored or machined with axial bores extending inwardly from their inner ends. In the bores of each knob and the radial bores in the enlargement or head 142, spiral springs 154 are arranged which exert pressure against the retainer pins 152 and cause them to engage the actuator rod axially arranged within said rod guide or tubular member. The elongated knobs 153 provide suitable handles for conveniently rotating the rod guide or tubular member 141.

By reason of the pin and slot connection between said rod guides or tubular members and the push rods, said push rods may be rotated and adjusted within the actuating levers or, more particularly, within the cylindrical bars or blocks 76 of said actuating levers, thus raising or lowering said push rods and thereby changing the effective strokes of their co-operating piston plungers.

It will be apparent, therefore, that although the push rods and the piston plungers are confined within the casing or oil chamber of the pump, said push rods can be easily adjusted from without the casing or oil chamber, and the feed of oil thereby conveniently regulated.

When it is desired to operate a pump element individually, regardless of the actuation of its push rod by means of the mechanical drive connected therewith, it is simply necessary to depress the associated actuator rod, and upon pressure being exerted downwardly on said rod, the tapered portion of the retainer groove in said rod rides in contact with the inner ends of the retainer pins 152, allowing said actuator rod to be moved downwardly so as to be brought into contact with the inner end of the co-axially-disposed push rod beneath the same and cause downward movement of said push rod, which in turn causes downward swinging movement of the actuating lever through which said push rod is threaded, and corresponding downward movement of the piston plunger aligned with said push rod.

Positioned within each of the sight tubes

110 is an oil guide wire 155. Each oil guide wire has a loop or eye 156 at its upper end and a crimped lower end 157 entered into the nozzle 101. The crimped lower end of this wire occupies the full diameter of the bore or passage in said nozzle and when positioned in place prevents movement laterally of said guide wire within the sight tube. The eye of the oil guide wire is of sufficient size to rest at opposite points against the sleeve nut 115 by means of which the upper end of the sight tube is firmly clamped, and it can therefore be said to be suspended from the sleeve nut 115, and in this manner it is maintained in a fixed position axially within the sight tube.

Each inlet head is provided with an angular drain passage 158, one end of which opens into the sight tube supported on said head and the other end opens through the side of said head. A screw 159 is threaded into said drain passage to close the same and the head of the screw bears against a washer 160 seated in a recess formed in the outer side of said inlet head.

In oil pumps of this type, wherein the oil rises through liquid confined within a sight tube and which is of heavier specific gravity than oil, the globules of oil rising through the liquid within the sight tube may appear magnified, and to one inexperienced it will be difficult to determine the exact quantity of oil fed through the sight tube. With a view of readily determining the exact quantity of oil fed by the pump element, or each of the pump elements, as the case may be, I have embodied in the construction of the pump, means to cause the oil fed by the pump element, or elements, to be delivered to the exterior, drop by drop, and for this purpose each control sleeve 93 has its bore enlarged at its outer end to form an outwardly-facing shoulder 161, which serves as a valve seat, and this enlarged portion of said bore is internally threaded from its outer end inwardly to within a short distance from said valve seat. In this internally-threaded portion of the bore of said control sleeve, a sleeve valve 162 is threaded, said sleeve valve having a reduced inner end 163. The longitudinal bore of said sleeve valve terminates short of the inner end so that the inner end of said sleeve valve is closed. The inner end portion of the bore of the sleeve valve has a lateral port 164 opening outwardly into the enlarged portion of the bore of said control sleeve, and by reason of the inner end of said sleeve valve being reduced in diameter externally, an annular space or chamber 165 is provided around said reduced inner end into which said port opens. At the outer end of said sleeve valve a hexagonal or other non-circular flange 166 is provided for conveniently rotating said valve with a wrench or other suitable tool, and when said sleeve valve is threaded in-

wardly to its full extent, the inner closed end thereof is seated against the valve seat 161 formed in said control sleeve.

When the sleeve valve, which may also be termed a test valve, is closed, the oil fed into the control sleeve from the pump element is allowed to pass upwardly into the passage 99, and from the latter into the sight tube. When, however, it is desired to ascertain or test the exact quantity of oil fed by the pump without depending upon the appearance of oil globules rising through the sight tube, the test valve 162 is unseated, and as the spring-pressed valve 103 in the passage 99 formed in the inlet head of the sighting device offers resistance to the oil fed by the pump element, the oil will be forced outwardly through the test valve, due to the fact that a free passage is provided for the oil through the control sleeve and said test valve. The oil will drip from the outer end of the test valve, where the quantity of the same and the intervals between drops escaping therefrom can be easily determined. While the oil is being so fed through the test valve, adjustment of the push rod 79 can be made to increase or diminish the supply of oil fed by the pump element, and when the pump is adjusted to feed the desired quantity the test valve may be closed and the oil will then be fed upwardly through the sight tube, and from the latter out of the pump to the point to be lubricated.

With a view of preventing rotation of the push rods within their rod supports 76, each of said rod supports, or more particularly defined, each of said cylindrical bars or blocks has an axial bore 167 extending from the push rod threaded therethrough to one end of said bar or block, the outer end of said bore being threaded. In said bore 167 is a pressure member or block 168, which bears against the push rod and is maintained thereagainst by a spring 169 compressed within said bore by an abutment nut 170 threaded into the outer end of said bore, said spring serving to hold said pressure member against said push rod with sufficient force to prevent accidental rotation of the rod within the cylindrical bar or block.

The rotation or rocking of the operating shaft 28 causes oscillation of the actuating levers 42, due to the action of the cams 32, or actuators, as they may be termed, against said levers, and by reason of the push rods 79 being carried by the outer ends of said levers, the piston plungers 58 are caused to reciprocate within the piston cylinders 51; movement in one direction of said piston plungers being effected by said push rods, while movement in the opposite direction is caused by the springs 68. In Fig. 3, the piston plunger is shown in its lowermost position, due to the fact that the outermost point or throw of the associated cam is in contact

with the co-acting actuating lever 42. As the cam rotates and the roller 34 thereof, which is located at the throw of the cam, moves away from the lever, the spring 68 causes the push rod 79 to move upwardly, and due to the connection of said push rod with the actuating lever, said lever moves upwardly, retaining contact with the cam 32. The piston plunger also rises during such action, due to the action of the spring 68, as stated, and when its lower end passes the oil inlet 60, a quantity of oil enters from the oil chamber 13; this oil entering under vacuum or being drawn in by suction through the filter 70 and the inlet pipe 69.

When the piston plunger is forced downwardly, as shown in Fig. 3, the equalizing valve is forced downwardly by said plunger against the action of the spring 87, due to the fact that the lower end of the piston plunger is in contact with the upper end of said valve, but as the piston plunger rises the spring 87 causes said valve to rise until the collar 86 thereon engages the shoulder 52 formed by enlarging the lower end of the plunger cylinder. When the equalizing valve is elevated it closes the outlet passage 83 of the pump element. During the downward movement of the actuating lever 42 the piston plunger lowers and the oil between the lower end of said plunger and the equalizing valve is subjected to pressure with the result that any part of the oil above the level of the lowermost point of the oil inlet 60 will be forced back into the oil chamber through said oil inlet; but at the instant that the lower end of the piston plunger is brought into alignment with the lowermost point of said oil inlet, the plunger acts upon the body of oil underneath the same and forces the equalizing valve 85 downwardly, thus opening the outlet port and causing the oil within the plunger cylinder to pass through said outlet port.

It is of course to be understood that the enlarged portion of the bore at the lower end of each plunger cylinder is filled with oil and that the relief passage 84 is also filled with oil so that the oil is forced outwardly into the control sleeve 93, the oil under pressure forcing the ball valve 97 open against the action of the spring 98, with the result that the oil passes under pressure into said control sleeve and out through the ports 106 therein. The pressure exerted by the piston plunger causes the oil to pass upwardly through the passage 99 in the inlet head of the sighting device, thereby unseating the valve 103 in said passage against the action of the spring 104, with the result that the oil rises upwardly into the nozzle 101. That portion of the passage 99 above the valve 103, the nozzle 101, the sight tube 110, and the outlet head at least to the level of the bore 123 in the sleeve nut 121 are filled with wa-

ter, glycerine, or other liquid of greater specific gravity than oil. The oil forced beyond the valve 103 rises within the liquid so confined and accumulates on the crimped portion of the guide wire 155 and forms itself into globules. The globules of oil pass upwardly through the water, glycerine, or other liquid within the sight tube while adhering to the guide wire and this oil frees itself and passes through the sleeve nut 121, enters the fitting 122 through which said sleeve nut is passed, and finally passes out through the outlet pipe 131, from which it is delivered into the feed tube 133, which is connected to a part to be lubricated, said tube and pipe being filled with oil.

By reason of the equalizing passage 84 connecting the space underneath the equalizing valve 85 with the space above the same, positive feed of the oil is assured and return of the oil from the outlet passage 83 to the plunger cylinder is prevented. By reason of the control sleeve 93 having an annular groove surrounding the same, into which the ports 106 open, the interior of said sleeve is at all times maintained in communication with the passage 99 in the inlet head of the sighting device, and this communication is therefore maintained, even though the ports are out of alinement with said passage 99.

When it is desired to remove the sight tube 110 for the purpose of cleaning the interior of the same, it is simply necessary to remove the screw plug 119 from the outlet head 91, unthread the sleeve nut 115 and withdraw the same from said inlet head, after which, the washer 114, the gasket 113, and said sight tube can be thrust upwardly through said outlet head. This, however, causes the lower end of said sight tube to be unseated from the gasket 109 fitted into the inlet head 90; and for this reason it is desirable to provide means for draining the liquid contents of the sight tube before loosening said tube from between the gaskets 109 and 113. To accomplish this, the screw 159 is removed from the drain passage 158 within the inlet head, allowing the liquid contents to flow out through said passage. If desired, a small vessel may be positioned underneath the inlet head to receive the liquid contents of the sight tube when drained. After removing and again replacing the sight tube, the liquid may be poured back into the sighting device.

By enameling or otherwise finishing the concaved surfaces of the lining or segments 139, preferably white, clear vision can be had through the sight tubes 110, and by reason of having said segments polished they can be easily kept in clean condition by passing a cloth between the same and the sight tube. Furthermore, these white or light surfaces, readily seen through the glass tubes, give the pump a neat appearance, in addition to providing the advantage set forth.

The rod guide or tubular member 141 may also be termed an adjusting sleeve, exteriorly operable, since by rotating the same, the push rods are adjusted within the outer ends of the actuating levers 42, and these adjusting sleeves serve also as guides for the manual actuator rods 148. The upward movement of each actuator rod 148 is limited by the shoulder 151 thereof coming in contact with the retainer pins 152, and by reason of the annular groove 150 in said actuator rod being tapered downwardly, said rod can be forced downwardly through the adjusting sleeve 141 without offering resistance to such action, said action being permitted due to the retainer pins 152 receding within their pockets when the tapered portion of said groove passes in contact therewith. By forcing any one of the actuator rods downwardly against its associated push rod 79, the latter will be forced downwardly and compel the piston plunger directly underneath to be lowered and feed a quantity of oil to the sight tube 110 connected with the particular pumping unit of which said plunger forms part. The action of the spring 68 against the collar 58 of said piston plunger is imparted to said push rod and by the latter to the actuator rod 148, at least through a part of the upward movement of said actuator rod; the final upward movement, however, being accomplished manually and being limited by the retainer pins coming in contact with the shoulder 151 on said actuator rod.

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

1. An oil pump, comprising a casing, an operating shaft journaled in opposite walls of said casing, cams on said shaft, each comprising two spaced disk-like members extended outwardly at one point to form the throw of the cam and a roller rotatable between the outwardly-extended portions of said spaced members, pump elements within said casing, and actuating mechanism between said cams and said pump elements.

2. An oil pump, comprising a casing; an operating shaft extending through said casing, cams on said shaft in spaced relation, each cam comprising two disk-like members extended outwardly at corresponding points to form the throw of the cam, and a roller rotatably mounted between the outwardly-extended portions of said disk-like members, a fulcrum spindle arranged parallel with said operating shaft, actuating levers mounted on said spindle for co-action with said cams and over and in contact with which the rollers of said cams ride, push rods carried by said actuating levers, and a plurality of pump elements operated by said push rods.

3. An oil pump, comprising a casing, a fulcrum spindle extending through said casing and supported at opposite ends by opposite

walls of said casing, actuating levers fulcrumed on said spindle, each actuating lever having two side members and a cross member connecting the upper edges of said side members, supported cams acting against the cross members of said actuating levers, a rotatable element supported by the side members of each actuating lever, a push rod threaded through each rotatable element, and a plurality of pump elements, each having a piston plunger engaged by one of said push rods.

4. An oil pump, comprising a pump element, an actuating lever having spaced side members and a cross member connecting the upper edges of said side members, said lever being fulcrumed at one end and having alined openings in its side members at the other end thereof, a cylindrical member extending through said alined openings and having an annular groove near each end, a spring ring fitted into each of said grooves and bearing against the outer side of each side member of said actuating lever; and a push rod adjustably threaded through said cylindrical member and adapted to actuate said pump element.

5. An oil pump, comprising a pump element including a piston plunger and a spring to keep said piston plunger at the end of its movement in one direction, an actuating lever fulcrumed at one end and having a supporting element rotatably retained at its other end, a push rod extending adjustably through said supporting element and adapted to actuate the piston plunger against the action of said spring, and means to maintain said push rod in adjusted position.

6. An oil pump, comprising a pump element including a piston plunger and a spring for moving said piston plunger in one direction and maintaining the same at the end of its movement in such direction, an actuating lever fulcrumed at one end, a rod support carried by the other end of said lever and mounted for slight rotary movement, a push rod threaded through said rod support and adjustable therein, and a spring-pressed element within said rod support bearing against said push rod for maintaining the same in adjusted position, said push rod serving to actuate said piston plunger against the action of said spring.

7. An oil pump, comprising a casing, a pump element within said casing adapted to feed oil outside of said casing and including a piston plunger and a spring for moving said piston plunger in one direction and maintaining the said plunger at the end of its movement in such direction, an actuating element, means for operating said actuating element, a rod support carried by said actuating element and mounted for slight rotary movement, a push rod adjustably

threaded through said rod support and adapted to actuate said piston plunger against the action of said spring, and a manually-operated device adapted to actuate said push rod independent of said actuating element.

8. An oil pump, comprising a pump element, an actuating lever fulcrumed at one end and having two parallel side members and a cross member connecting the upper ends of said side members, said side members having alined openings at their outer ends, a cylindrical member rotatably mounted within said alined openings, a push rod adjustably threaded through said cylindrical member between said side members, said cylindrical member having an axial bore therein extending from said push rod outwardly to one end thereof, a pressure block in said axial opening, an abutment nut within said axial bore spaced from said pressure block, and a spring interposed between said pressure block and said abutment nut to force said block against said push rod so as to hold said rod against rotary movement within said cylindrical member.

9. An oil pump, comprising a casing, a pump element within said casing including a piston plunger, actuating mechanism also within said casing including a push rod for actuating said piston plunger in one direction, means to cause movement of said plunger in the opposite direction, a rotatable member carried by said casing into which the upper end of said push rod extends, connection between said rotatable member and said push rod for allowing said push rod limited movement lengthwise with respect to said rotatable member but compelling said push rod to rotate with said rotatable member, and means carried by said rotatable member to actuate said push rod independently of said actuating mechanism.

10. An oil pump, comprising a casing, a pump element within said casing, an actuating element also within said casing, means for operating said actuating element, a push rod adjustably threaded through said actuating element and adapted for operating said pump element, and a unitary structure accessible from the exterior of said casing for adjusting said push rod within said actuating element or for actuating said push rod manually independent of the actuation of said actuating element.

11. An oil pump, comprising a casing, a pump element within said casing, an actuating lever fulcrumed at one end and having a support at its other end, slightly rotatable during the movement of said actuating lever, means for operating said actuating lever, a push rod adjustably threaded through said rotatable support, a rotatable element mounted in the top of said casing and receiving the

upper end of said push rod, said push rod having a pin extending therefrom and said rotatable element having a slot receiving the projecting portion of said pin.

12. An oil pump, comprising a casing, a pump element within said casing, actuating mechanism including a push rod for operating said pump element, and a longitudinally movable actuator rod alined with said push rod and normally spaced therefrom, said actuator rod being non-operable by said push rod.

13. An oil pump, comprising a casing, a pump element within said casing, actuating mechanism including a push rod for actuating said oil pump, a rod guide in one wall of said casing, an actuator rod within said rod guide co-axial with said push rod and adapted for reciprocating movement, said actuator rod being non-operable by said push rod, and means for normally holding said actuator rod in spaced relation to said push rod.

14. An oil pump, comprising a casing, a pump element within said casing, a push rod alined with said pump element for actuating the same, an actuating element carrying said push rod, means for operating said actuating element, a rod guide in the top wall of said casing, an actuator rod mounted for movement in said rod guide and having an annular groove provided with a downwardly-tapered portion and an upwardly facing shoulder, and a spring-pressed retainer pin in said rod guide normally entered in said groove and held against said shoulder.

15. An oil pump, comprising a casing, a pump element within said casing, an actuating lever also within said casing, a rod support carried by said lever, a push rod adjustable within said rod support and adapted for co-action with said pump element, and means alined with said push rod for adjusting the same within said rotatable rod support from the exterior of said casing and for actuating said push rod manually during the actuation of said actuating lever or when actuation of said actuating lever is stopped.

16. An oil pump, comprising a casing, a plurality of pump elements within said casing, an actuating element for each pump element having a rod support rotatably mounted thereon, a push rod adjustably threaded through each rod support and adapted to actuate one of said pump elements, a single operating element for actuating said actuating elements, a tubular element receiving one end of each push rod and rotatable in a wall of said casing, a pin and slot connected between each push rod and its receiving tubular element to allow the push rod to move lengthwise therein but compel said push rod to rotate with said tubular element, a manually operable actuator rod reciprocable within each tubular element and co-axial with and

normally spaced from one of said push rods, and means for holding each actuator rod in spaced relation to its co-axial push rod.

17. An oil pump, comprising a casing, a pump element within said casing, a push rod for actuating said pump element, an actuating element into which said push rod is threaded for adjustment, a rotatable element in the top wall of said casing co-axial with said push rod, connection between said push rod and said rotatable element whereby said rod may reciprocate independent of said rotatable element and whereby said push rod is caused to be rotated upon rotating said rotatable element, and means carried by said rotatable element non-operable by said push rod for manually actuating said push rod during the actuation of said actuating element or when actuation of said actuating element is stopped.

18. An oil pump, comprising a casing, a pump element within said casing, a push rod for actuating said pump element, a rotatable element carried by a wall of said casing co-axial with said push rod and into which one end of said push rod extends, a pin and slot connection between said push rod and said rotatable element, an actuator rod within said rotatable element co-axial with said push rod and normally spaced therefrom, a radial bore in said rotatable element threaded along its outer portion, an elongated knob threaded into the threaded portion of said radial bore and having an axial bore therein, a retainer pin within the radial bore of said rotatable element, and a spring within said radial bore and the bore of said elongated knob exerting pressure against said retainer pin and forcing the latter against said actuator rod to hold the same in spaced relation to said push rod.

19. An oil pump, comprising a casing, a pump element within said casing, an actuating lever fulcrumed at one end, a rotatable rod support mounted in the other end of said actuating lever, a push rod adjustably threaded through said rod support and adapted to actuate said pump element, pins passed through said push rod in spaced relation and having opposite ends thereof extending from said rod to limit the range of adjustment of said push rod within said rotatable rod support, and means for rotating said push rod within said rod support.

20. An oil pump, comprising a casing, a pump element within said casing, an actuating element also within said casing, a push rod adjustably carried by said actuating element and adapted to actuate said pump element, a tubular member rotatably mounted in a wall of said casing and having slots at diametrically opposite points, a pin extending through said push rod and projecting therefrom into said slots, said tubular member having an enlargement at the exterior of said

casing providing a shoulder bearing against the outer surface of said wall, said tubular member having also an annular groove, a spring ring fitted into said groove, a collar surrounding said tubular member and bearing against said spring ring in spaced relation to said wall, and a spiral spring surrounding said tubular member and bearing with one end against the inner surface of said wall and with its other end against said collar.

21. An oil pump, comprising a casing, a pump element within said casing having an inlet nipple and a piston plunger, a sleeve nut threaded into said inlet nipple, a stop device clamped between said nipple and sleeve nut and extending upwardly therefrom, said stop device having stop ears lying in the path of said piston plunger, a spring acting to move said piston plunger in one direction and normally retain the same against said stop ears, a push rod co-axial with said piston plunger and adapted to move the same in the opposite direction, and an actuating element in which said push rod is adjustably mounted.

22. An oil pump, comprising a casing, a pump element within said casing having a cylinder, an inlet nipple extending therefrom and a piston plunger reciprocable therein, a collar threaded onto the upper end of said piston plunger, a spring surrounding said cylinder and exerting pressure upwardly against said collar, a sleeve nut threaded into said inlet nipple, a stop device clamped between said inlet nipple and said sleeve nut and extending upwardly therefrom, said stop device having stop ears in the path of said collar adapted to be engaged by said collar to limit the upward movement of said piston plunger, an actuating lever fulcrumed at one end, means for mechanically actuating said lever, a push rod adjustably threaded through the other end of said lever and co-axial with said piston plunger, and means accessible from the exterior of said casing for adjusting said push rod within said actuating lever to regulate the downward stroke of said piston plunger.

23. An oil pump, comprising a casing having aligned openings in opposite walls, a bearing in each of said openings and extending outwardly therefrom, each bearing being in the form of a stuffing box, an operating shaft having opposite cylindrical ends journaled in said bearings, and an enlarged non-cylindrical portion between said bearings forming shoulders in contact with the inner ends of said bearings, spaced cams on the non-cylindrical portion of said operating shaft, spacing sleeve on said operating shaft between said cams and between the end cams and said bearings, actuating levers fulcrumed at one end and adapted to be operated by said cams, pump elements within said cas-

ing, and means between said actuating levers and said pump elements to cause actuation of said pump elements when said actuating levers are actuated.

24. An oil pump, comprising a casing, a pump element within said casing having a cylinder provided with an inlet nipple and a piston plunger within said cylinder, a sleeve nut threaded into said nipple, a stop element mounted on said sleeve nut and clamped between the same and said nipple, said stop element being formed of sheet metal fashioned to provide side members and a connecting cross member and said side members having stop ears extending therefrom adapted to be engaged by said piston plunger to limit the movement of the same in one direction, and means to move said piston plunger in the opposite direction.

25. An oil pump, comprising a casing having an opening in its bottom and an opening in one of its side walls, a pump element comprising a casing having an axial bore, a lateral inlet passage and a lateral outlet passage, said axial bore being alined with the opening in said bottom and said outlet passage being alined with the opening in said side wall, a plunger piston within said axial bore, means for actuating said plunger piston, a cap sleeve threaded into the lower end of said axial bore and having an externally threaded boss extending through the opening in said bottom, a nut applied to said externally-threaded boss and bearing against the under side of said bottom, a sighting device at the outside of said side wall connected at one end with said outlet passage, an outlet pipe within said casing connected to the other end of said sighting device, and a feed pipe connected with said outlet pipe.

26. An oil pump comprising a casing, a pump element within said casing having a casting provided with an axial bore enlarged at its lower end and having the enlarged portion of said bore internally threaded, said casting having an oil inlet and an oil outlet communicating with the exterior of said casing, a cap sleeve threaded into the enlarged lower portion of said axial portion and resting against the bottom of said casing, a piston plunger within the upper end of said axial bore, an equalizing valve within the lower end of said axial bore and extending into said cap sleeve, an equalizing passage between said outlet passage and the enlarged lower portion of said axial bore, a spring serving to force said equalizing valve upwardly, and means for actuating said piston plunger.

27. An oil pump, comprising a casing, a pump element within said casing, mechanically-operated actuating mechanism for said pump element including an adjustable push rod adapted to actuate said pump element, a freely fulcrumed lever carrying said push

rod and an actuator for operating said lever,  
and means accessible from the exterior of  
the casing for manually operating said push  
rod without interfering with the mechanical  
operation of said actuator, said means being  
5 non-operable by said push rod.

In testimony whereof I affix my signature.

ADOLPH W. F. MANZEL.

10

15

20

25

30

35

40

45

50

55

60

65