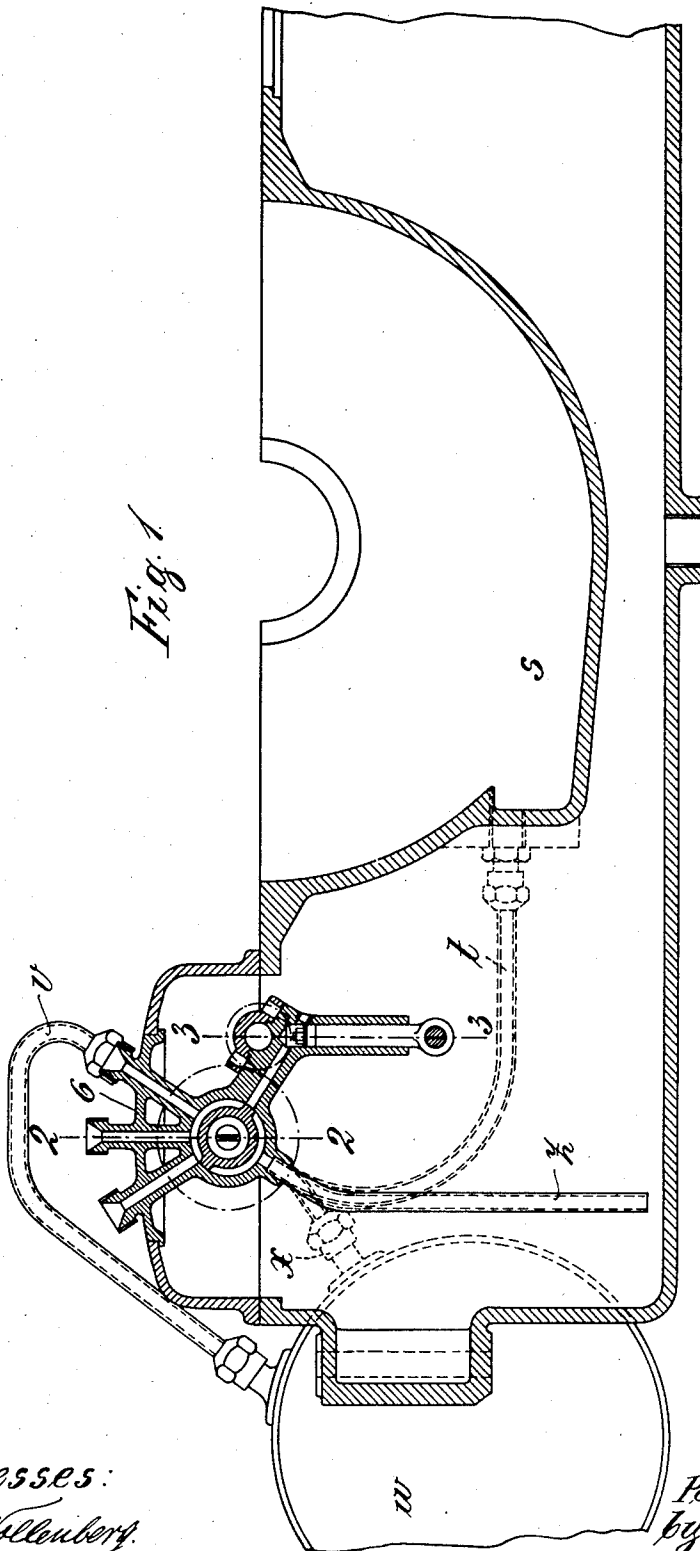


P. DAIMLER.
LUBRICATING SYSTEM.
APPLICATION FILED SEPT. 4, 1907.

1,013,644.

Patented Jan. 2, 1912.

5 SHEETS—SHEET 1.



Witnesses:
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5 SHEETS—SHEET 2.

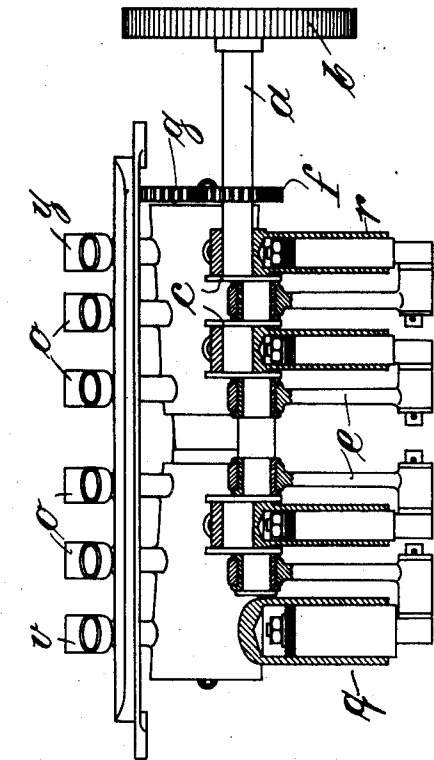


Fig. 3

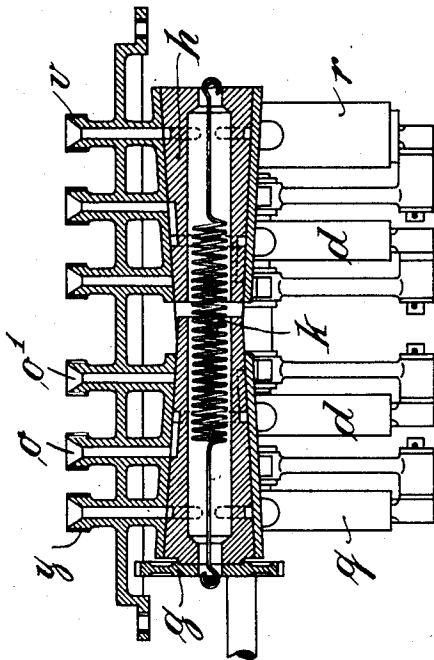


Fig. 2

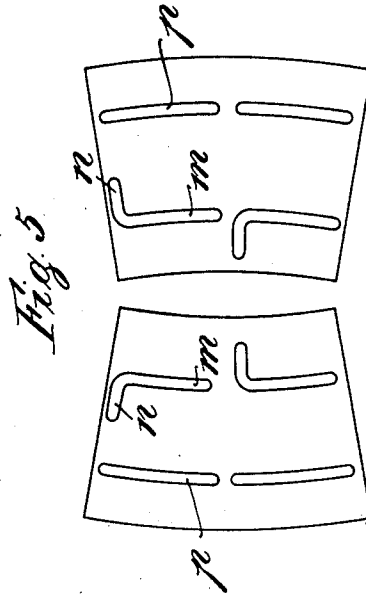


Fig. 5

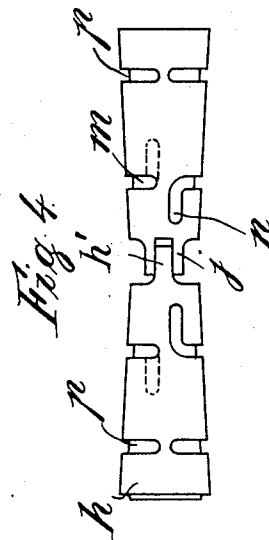


Fig. 4

Witnesses:
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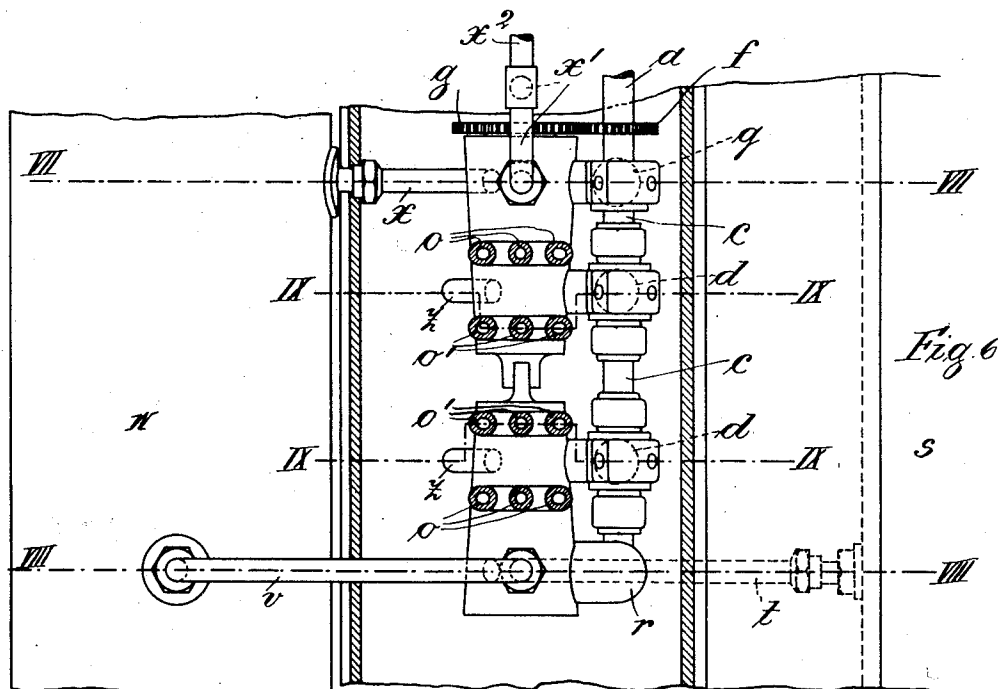
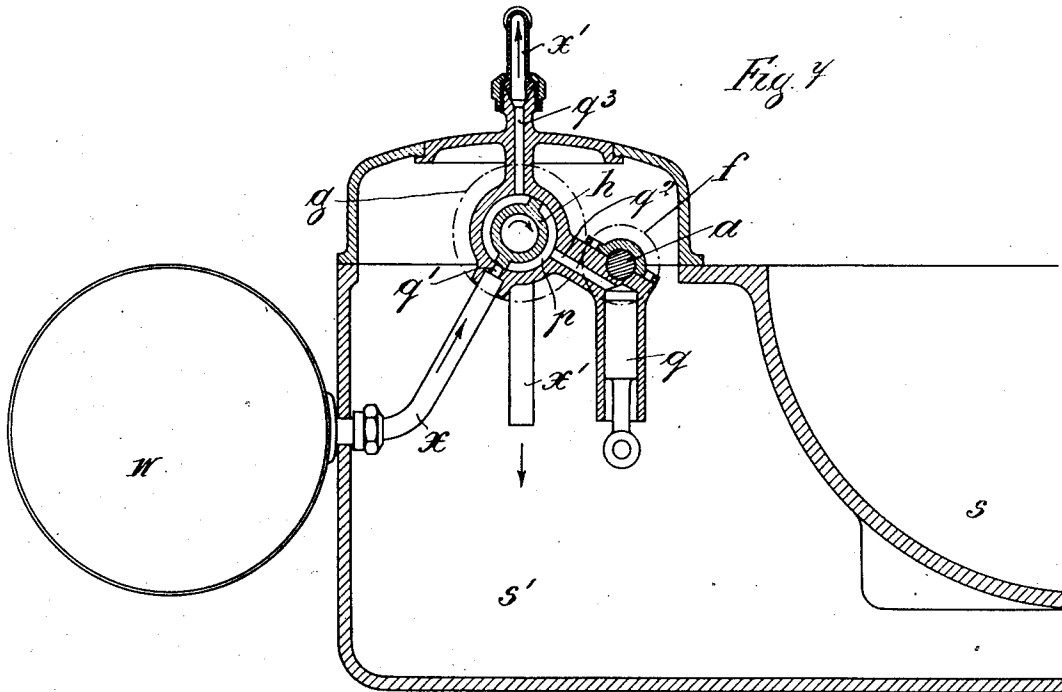
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5 SHEETS—SHEET 3.



Witnesses:
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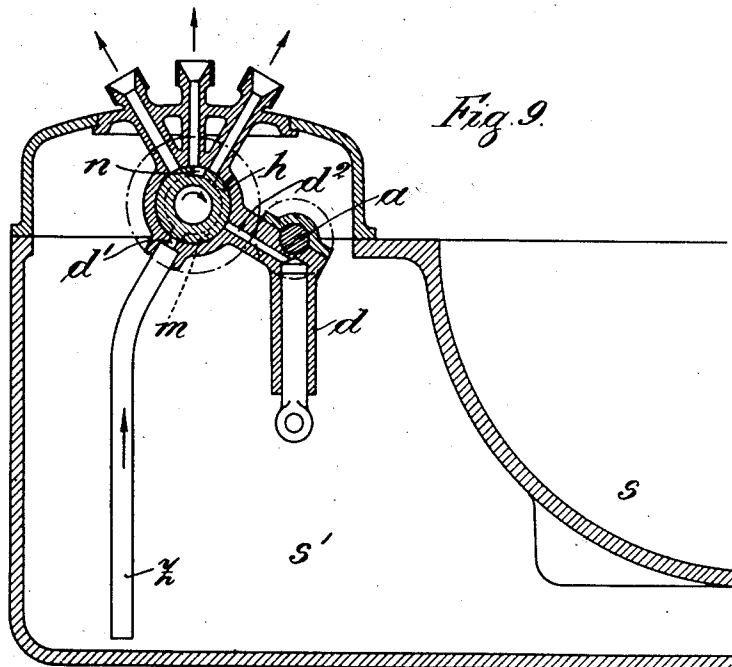
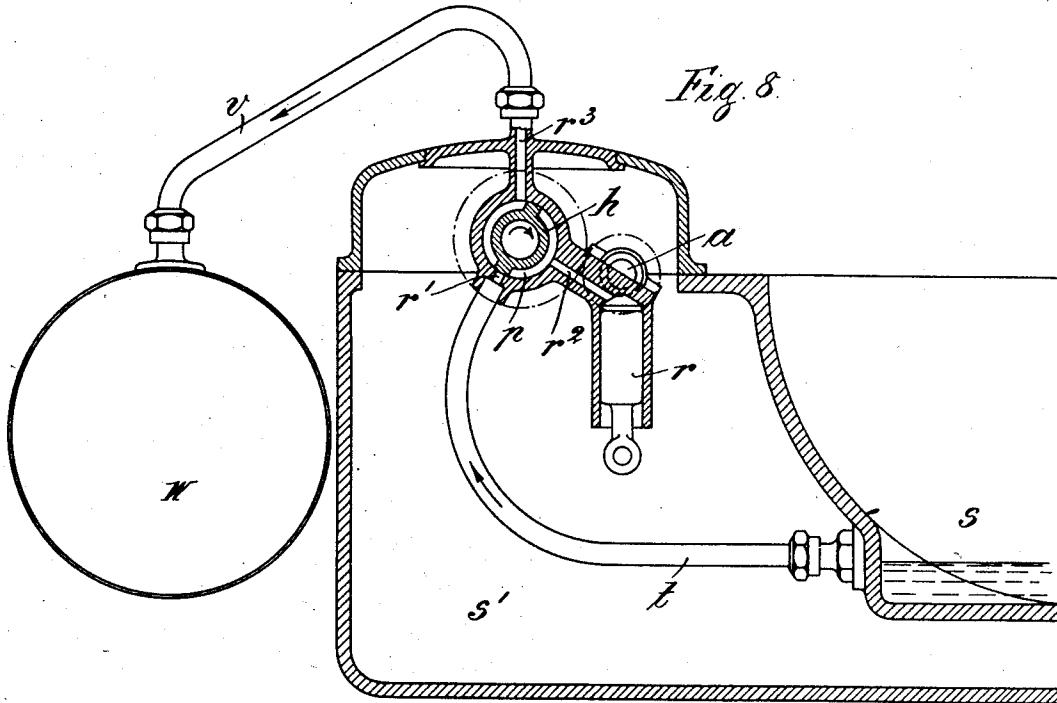
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1,013,644.

Patented Jan. 2, 1912.

5 SHEETS—SHEET 4.



Witnesses:
Corinne Myers.
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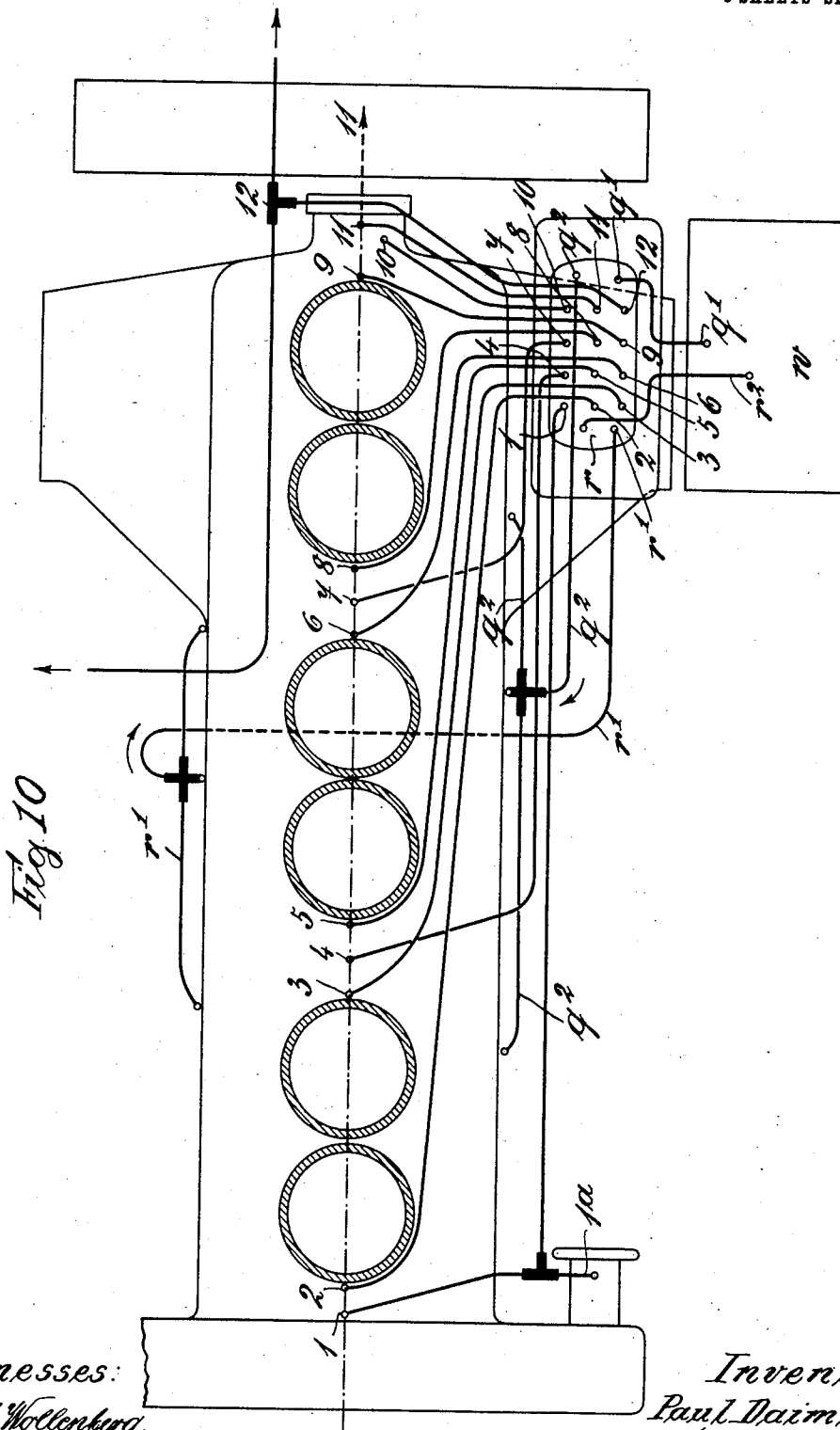
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P. DAIMLER.
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APPLICATION FILED SEPT. 4, 1907.

1,013,644.

Patented Jan. 2, 1912.

5 SHEETS—SHEET 5.



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UNITED STATES PATENT OFFICE.

PAUL DAIMLER, OF UNTERTÜRKHEIM, GERMANY, ASSIGNOR TO THE FIRM OF DAIMLER
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LUBRICATING SYSTEM.

1,013,644.

Specification of Letters Patent.

Patented Jan. 2, 1912.

Application filed September 4, 1907. Serial No. 391,317.

To all whom it may concern:

Be it known that I, PAUL DAIMLER, a subject of the King of Württemberg, and resident of Untertürkheim, in the Kingdom of Württemberg, German Empire, have invented a certain new and useful Lubricating System, of which the following is an exact specification.

This invention relates to a lubricating device or system such as is used with multiple cylinder engines where the crank pit of the engine receives the waste oil which is subsequently drawn from said crank pit passed through a filter and forced again into the parts of the engine in which it is desired to be used. In such apparatus it is extremely desirable that separate pumps should be used for operating upon the waste oil and the filtered cooled and purified oil. The pump operating upon the waste oil is naturally of large size and the parts are thereby not so liable to be choked by means of impurities passing through the pump.

According to the present invention a waste oil pump is employed for drawing off the waste oil and forcing the same into a cooler and purifier from which it is drawn by means of a smaller clean oil pump and delivered into a separate tank whence it is withdrawn and distributed to the various points to be lubricated by one or more lubricating pumps, all of said pumps being preferably controlled by means of a common rotary valve.

In the accompanying drawings which illustrate one suitable form of the present invention, Figure 1 is a partial cross section through an engine frame provided with a lubricator device according to the present invention. Fig. 2 is a section on a line 2—2 of Fig. 1 with the pipes removed, Fig. 3 is a section on a line 3—3 of Fig. 1 with the pipes removed, Fig. 4 is an outside view of the common rotary valve, Fig. 5 is a development of the valve surface showing the shape of the ports. Fig. 6 is a plan partly in section of the lubricating device, Fig. 7 is a section on the line VII—VII of Fig. 6, Fig. 8 is a section on the line VIII—VIII of Fig. 6, Fig. 9 is a section on the lines IX—IX of Fig. 6, and Fig. 10 shows in somewhat diagrammatic view the course of the flow of the oil in its circuit.

Referring to the drawing a shaft *a* driven by means of a wheel *b* is provided with

cranks *c c* arranged to drive the plungers of two pumps *d* and pumps *q* and *r* by means of connecting rods *e*. Connected to the shaft *a* there is also a gear wheel *f* gearing with a gear wheel *g* on the rotary valve *h* which is formed of two conical parts oppositely arranged with their narrow ends toward one another, the left hand part in Fig. 4 being shown as provided with a projection *h'* engaging in a recessed boss *j* on the right hand part. The two halves are drawn toward one another and against the tapered walls of the valve casing by means of a spring *k*. The gear wheels *f* and *g* are proportioned so as to cause the rotary valve *h* to rotate once for each two rotations of the shaft *a*. The valve parts *h* are each provided with a set of two L-shaped grooves *m n*. The parts *m* being arranged circumferentially while the parts *n* are arranged axially. The grooves *n* extend on opposite sides of the groove parts *m* so as to register with two different sets of delivery ports *o* and *o'* arranged one on each side of the central plane of each of the pumps *d*. One groove in a set therefore first serves on the suction stroke of a pump *d* to connect a suction port *d'* with a passage *d²* leading to the barrel of the corresponding pump *d* and then serves to connect the passage *d²* with each of the delivery ports in a set *o* on the delivery stroke of the same pump while the other groove in the same set performs the same functions but with respect to the other set of delivery ports *o'*.

On each outer extremity of the conical parts of the valve *h* there are provided two further grooves *p* which are arranged in one plane and control the operation of the pumps *q* and *r* respectively, being each adapted to connect the passage *q²* or *r²* leading to the barrel of the pump *q* or *r* with the corresponding suction port *q'* or *r'* and corresponding delivery port *q³* or *r³*. The pump *r* is made larger than the pump *q* and is arranged to draw waste oil from the crank chamber *s* through a pipe *t* connected to the suction port *r'* and arranged at a suitable height so as to preserve the required depth of oil in the bath *s*. The force pump *r* delivers the waste oil through a pipe *v* connected to the delivery port *r³* into a cooler and filter *w*. From the cooler and filter *w* purified and cooled oil is drawn, through a pipe *x* connected to the suction port *q'*, by

means of the pump q , from which it is delivered through a pipe x' connected to the delivery port q^8 into the tank s' formed in the base plate of the engine. The pipe x' may be extended so as to conduct the oil to other tanks if desired as shown at x^2 . The oil is withdrawn from the tank s' through pipes z connected to the suction ports d' by the two pumps d , d and distributed thereby to the spots where it may be required for lubrication through the sets of delivery ports o and o' .

As shown each set of delivery ports o o' for the two pumps d comprises three such ports. The number in each set may be increased or diminished as required. It is obvious also that the number of pumps d may be varied. With this arrangement the waste oil in the crank chamber s is first removed therefrom down to a predetermined level by the pump r and forced into the cooler and filter w as diagrammatically shown in Fig. 10. After passing through the cooler and filter w it is transferred by the pump q to the clean oil tank s' , whence it is again transferred by the two pumps d d to the points to be lubricated through the two sets of delivery ports o and o' .

I claim:

1. A lubricating device comprising in combination a pump for drawing off waste oil, a cooler and filter into which said pump discharges said waste oil, a smaller pump pumping the cooled and purified oil to the machine parts, and a common rotary valve controlling said pumps.

2. A lubricating device comprising in combination a pump drawing off waste oil, a cooler and purifier into which said pump discharges said waste oil, a smaller pump for taking the oil from the purifier, distributing pumps driven from the same shaft as said first mentioned pump and adapted to deal only with purified oil, and a common rotary distributing valve for said pumps, substantially as described.

3. A lubricating device comprising in combination a pump for drawing off waste oil, a cooler and filter into which said pump discharges said waste oil, distributing pumps for distributing purified oil to the required parts of the engine, a common driving shaft for all said pumps, a common rotary valve for all said pumps, driving gearing from said driving shaft to said rotary valve.

4. A lubricating device for use in engines comprising in combination with the engine frame and crank pit, a waste oil pipe leading from the maximum oil level in said crank pit, a pump with which said waste oil pipe connects, a filter and cooler into which said pump discharges, a smaller pump pumping the cooled and purified oil to the machine parts, a common rotary con-

trolling valve for said pumps, substantially as described.

5. A lubricating device comprising in combination a cooler and filter, a pump for drawing off waste oil and discharging it into said cooler and filter, a clean oil tank, a pump for removing the oil when cleaned and cooled from said cooler and filter and discharging the cleaned and cooled oil into said tank and means for removing the cleaned and cooled oil from said tank and distributing the same to the points to be lubricated.

6. A lubricating device comprising in combination a cooler and filter, a pump for drawing off waste oil, and discharging it into said cooler and filter, a clean oil tank, a pump for removing the oil when cleaned and cooled from said cooler and filter and discharging the cleaned and cooled oil into said tank, a pump for removing the cleaned and cooled oil from said tank and distributing the same to the points to be lubricated and a rotary distributing valve common to the said three pumps.

7. A lubricating device comprising in combination a cooler and filter, a pump for drawing off waste oil, and discharging it into said cooler and filter, a clean oil tank, a pump for removing the oil when cleaned and cooled from said cooler and filter and discharging the cleaned and cooled oil into said tank, a pump for removing the cleaned and cooled oil from said tank and distributing the same to the points to be lubricated, a rotary distributing valve common to the said three pumps, a driving shaft common to the said three pumps and means operated by said shaft for rotating said valve.

8. A lubricating device comprising in combination a cooler and filter, a waste oil pump adapted to draw off waste oil and discharge it into said cooler and filter, a clean oil tank, a clean oil pump for removing the oil from said cooler and filter and discharging it into said tank, a lubricating pump for distributing the clean oil from said tank, a rotary valve casing, a passage in said casing leading to each of said pumps, a suction port in said casing for each of said pumps, a delivery port in said casing for each of said pumps, a rotary valve in said casing adapted to connect the said passage of each pump with the corresponding suction port and delivery port alternately and means for operating said pumps and said valve.

9. A lubricating device comprising in combination a cooler and filter, a waste oil pump adapted to draw off waste oil and discharge it into said cooler and filter, a clean oil tank, a clean oil pump for removing the oil from said cooler and filter and discharging it into said tank, a lubricating pump for distributing the clean oil from said tank, a rotary valve casing, a passage in said cas-

ing leading to each of said pumps, a suction port in said casing for each of said pumps, a delivery port in said casing for said waste oil pump and for said clean oil pump, a plurality of delivery ports in said casing for said lubricating pump, a rotary valve in said casing adapted to connect said passage of said waste oil pump and of said clean oil pump with the corresponding suction port and delivery port alternately and to connect said passage of said lubricating pump alternately with the corresponding suction port and each of the delivery ports of the last-named pump in succession and means for operating said pumps and said valves.

10. A lubricating device comprising in combination a cooler and filter, a waste oil pump adapted to draw off waste oil and discharge it into said cooler and filter; a clean oil tank, a clean oil pump for removing the oil from said cooler and filter and discharging it into said tank, a lubricating pump for distributing the clean oil from said tank, a rotary valve casing, a passage in said casing leading to each of said pumps, a suction port in said casing for each of said pumps, a delivery port in said casing for said waste oil pump and for said clean oil pump, a plurality of delivery ports arranged in said casing on either side of said lubricating pump, a rotary valve in said casing adapted during one revolution to

twice connect alternately said passage of said waste-oil pump and of the said clean oil pump with the corresponding suction port and delivery port and to connect the said passage of said lubricating pump first alternately with the corresponding suction port and each in succession of the delivery ports arranged on one side of said lubricating pump and then alternately with the same suction port and each in succession of the delivery ports arranged on the other side of said lubricating pump, means for operating said pumps and means for rotating said valve once for each two reciprocations of said pumps.

11. In a lubricating device the combination with circulating and distributing pumps of an oppositely coned valve casing, a transversely divided correspondingly coned valve in said casing adapted to act as distributor for each of said pumps, means for insuring simultaneous rotation of the two portions of said valve, a spring tending to draw the two portions of said valve together and into contact with said casing and means for rotating said valved portions.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

PAUL DAIMLER.

Witnesses:

ROBERT UHLAND,
ERNEST ENTENMANN.