L. SAUSSARD.

VALVELESS PUMP.

APPLICATION FILED APR. 5, 1920.

1,410,129.

Patented Mar. 21, 1922.

3 SHEETS—SHEET 1.

fig. 1

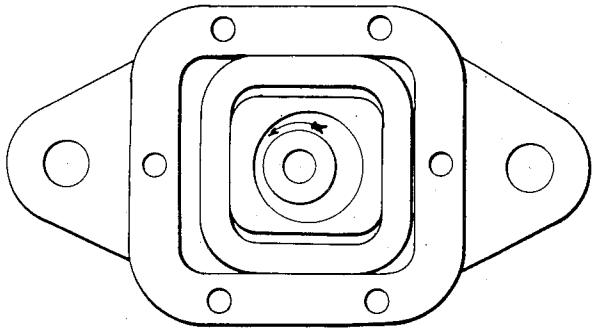


fig 2

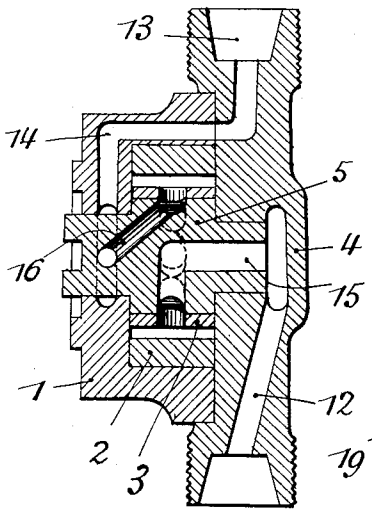


fig. 3

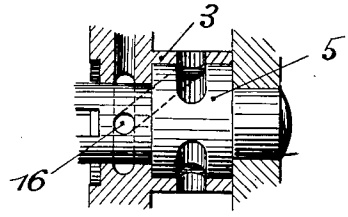
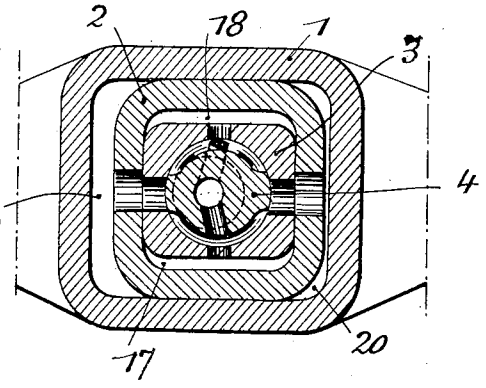


fig. 4



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3 SHEETS—SHEET 2.

Fig. 6

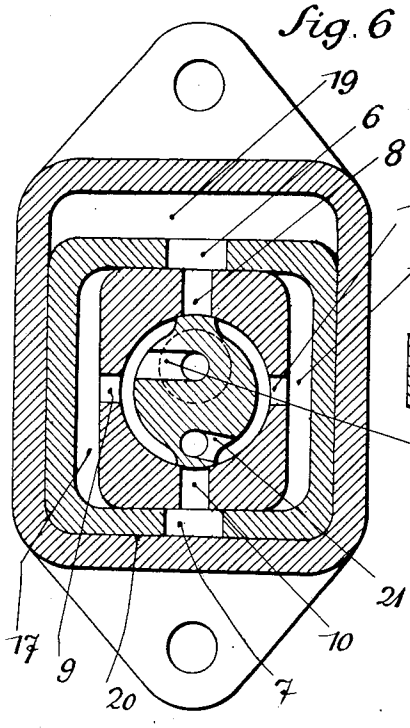


Fig. 7

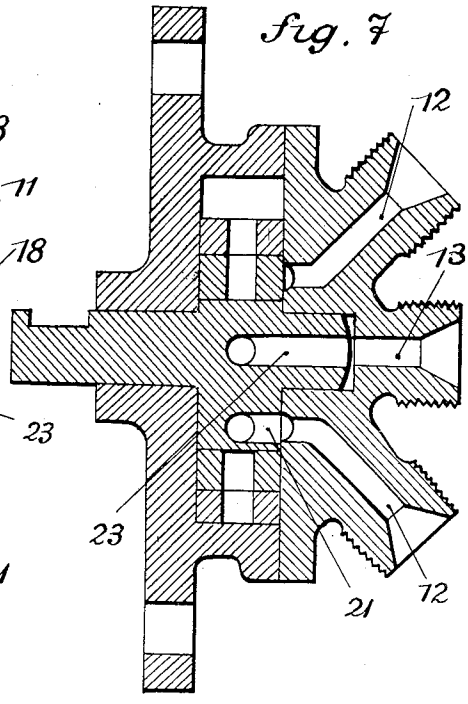


Fig. 5

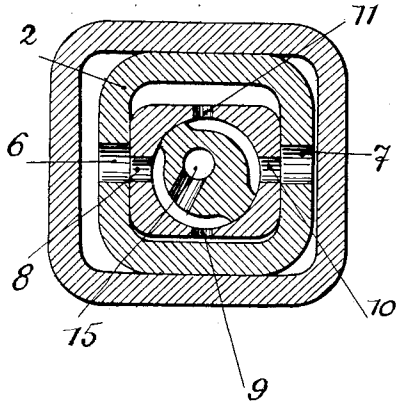
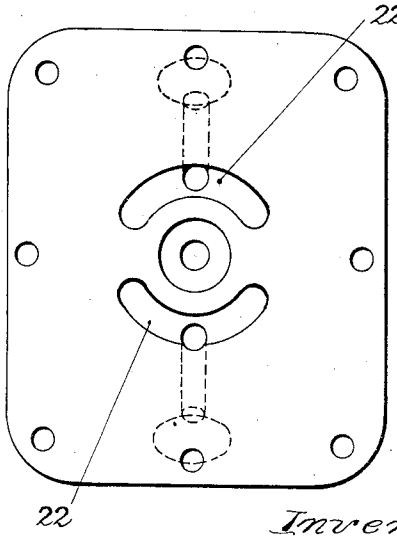


Fig. 8



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3 SHEETS—SHEET 3.

fig. 9

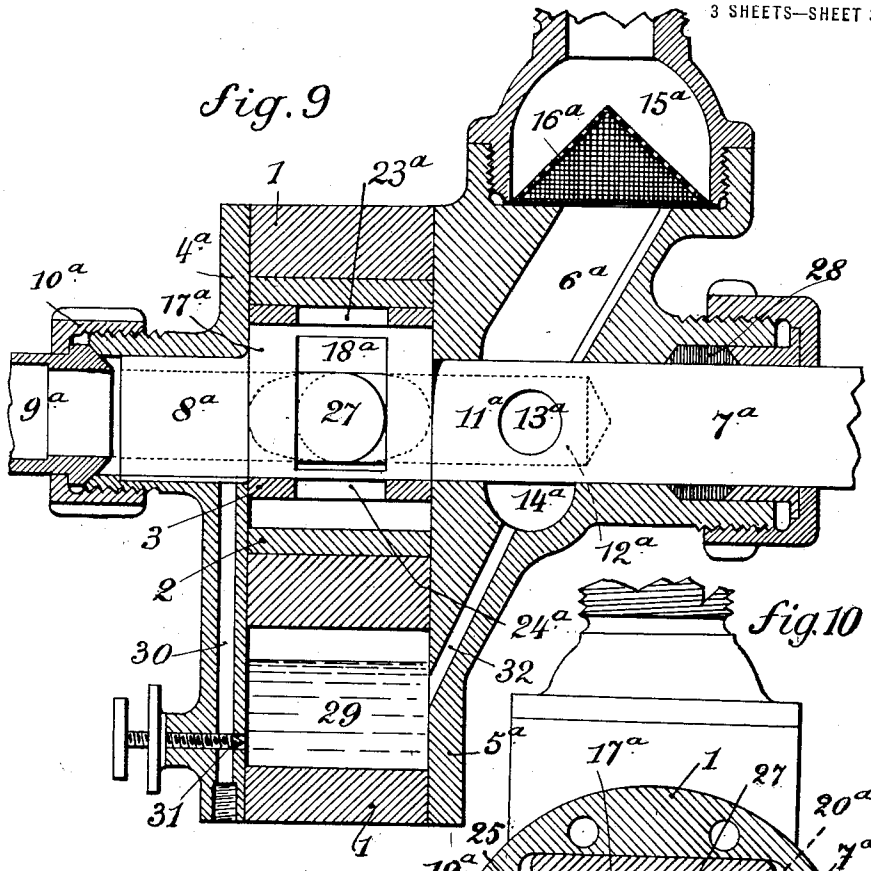


fig. 10

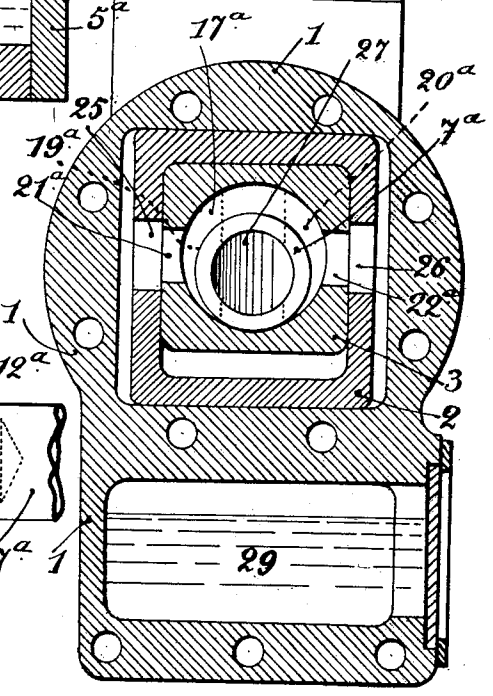
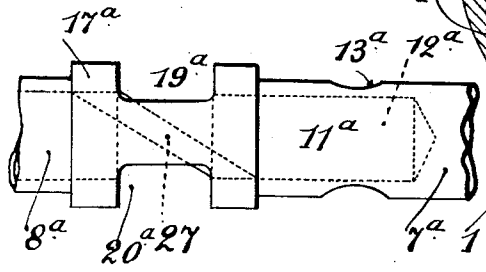


fig. 11



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UNITED STATES PATENT OFFICE.

LOUIS SAUSSARD, OF PARIS, FRANCE.

VALVELESS PUMP.

1,410,129. Specification of Letters Patent. Patented Mar. 21, 1922.

Application filed April 5, 1920. Serial No. 371,303.

To all whom it may concern:

Be it known that I, LOUIS SAUSSARD, a citizen of the Republic of France, residing at Paris, Seine Department, No. 4 Rue de Varize, in the Republic of France, engineer, have invented certain new and useful Improvements in Valveless Pumps, which is fully set forth in the following specification.

The present invention relates to improvements in valveless pumps, and is chiefly applicable to lubrication pumps.

One of the principal features of the invention consists in the fact that the intake and delivery are effected by means of the variations in volume of a plurality of box-shaped members slidable one within the other and along different directions.

The following description and the accompanying drawings are given only by way of example.

Fig. 1 is an elevation of an oil pump according to the invention, with the cover removed.

Figs. 2 and 3 represent respectively a total vertical section and a partial vertical section of the same pump.

Figs. 4 and 5 represent a vertical section perpendicular to the preceding, of the same pump considered at two different moments of its operation.

Figs. 6 and 7 show vertical sections perpendicular to each other, of a second oil pump also designed according to the invention.

Fig. 8 is an elevation of the cover of this pump as seen from the inside.

Figs. 9 and 10 are respectively longitudinal and transverse sections of another constructional form of the pump according to the invention.

Fig. 11 is a plan view of the top portion of the shaft of this pump.

The oil pump which is represented in the first five figures consists of a fixed rectangular box-shaped member 1 having slidable therein with little friction a second rectangular member 2 also containing mounted therein and slidable in a direction perpendicular to the movement of the member 2, a rectangular box-shaped member 3. The outer box-shaped member 1 is closed by means of the cover 4.

The interior space of the box 3 is of cylindrical section.

This box member is operated by means of the eccentric 5.

The intermediate box member 2 contains in its free walls the ports 8, 9, 10 and 11.

The cover plate contains a delivery duct 12 and a suction or intake duct 13 which is extended by the duct 14 provided in the box member 1.

The eccentric contains a duct 16 which is obliquely disposed with reference to the axis and causes the interior box member 3 to communicate respectively with the delivery duct 12 and the duct 14.

The outer and intermediate box members are so constructed in such manner that each shall contain two spaces, one of which increases in volume while the second decreases in volume. For the spaces whose volume diminishes, the delivery takes place through the duct 15. The pump is therefore of the double-acting type.

At 17, 18, 19 and 20 are represented the various spaces filled with oil which are situated at the top and bottom of the box member 2 and to the left and right of the box member 1.

Supposing the operation to commence while in the position shown in Fig. 4, and with the eccentric rotating in the clockwise direction, the pump will operate as follows:

During the first quarter of revolution the box-shaped member 3 will move downwardly and the box-shaped member 2 to the left. In the spaces 17 and 19, delivery takes place through the passages 9, 15, 12 and 6, 8, 15, 12, while suction will be effected in the spaces 18 and 20 through the passages 13, 14, 16, 11 and 13, 14, 16, 10, 7.

During the second quarter of revolution the box-shaped member 3 will move upwardly and the box-shaped member 2 to the left. Suction will be effected in the spaces 17 and 20 through the passages 13, 14, 16, 9 and 13, 14, 16, 10, 7, while delivery takes place in the spaces 18, 19 through the passages 11, 15, 12 and 6, 8, 15, 12.

During the third quarter of revolution, the box-shaped member 3 will move upwardly and the member 2 to the right. Suction takes place in the spaces 17 and 19 through the passages 13, 14, 16, 9 and 13, 14, 16, 8, 6 while delivery will be effected in the spaces 18, 20 through the passages 11, 15, 12 and 7, 10, 15, 12.

During the fourth quarter of revolution, the box-shaped member 3 will move downwardly and the member 2 to the right.

Delivery takes place in the spaces 17, 20

through the passages 9, 15, 12 and 7, 10, 15, 12, while suction will be effected in the spaces 18, 19 through the passages 13, 14, 16, 11 and 13, 14, 16, 8, 6.

The present pump possesses the following principal advantages. Its operation is not of an abrupt nature such as is found in valve-operated pumps, and all the spaces are utilized, which allows of obtaining the maximum output. The construction is of a simple character and the pump will not get out of adjustment while working.

Figs. 6, 7 and 8 represent an alternative form of the invention.

In this apparatus the cover piece is provided with two delivery ducts 12, which allow of practically effecting for example the delivery of oil to two different operating devices, such for instance as the motor and the change-speed box, in case the pump is employed upon an automobile.

The eccentric is provided with a duct 21 which during the rotation is successively in communication with two slots 22 each of which having opening therein one of the ducts 12, in such manner that the delivery takes place successively through these two ducts. Suction or intake is effected through a right-angled duct 23 disposed in the eccentric in order to cause communication between the inner box member 3 and the suction duct 13.

The ports 6, 7, 8, 9, 10 and 11 and the spaces 17, 18, 19 and 20 have the same functions as in the foregoing pump.

The operation of these two pumps is also similar in character.

In the last-described pump, the eccentric has a counter-clockwise rotation.

In the foregoing constructional forms, the disposition of the several ducts does not permit of giving these a sufficient diameter to provide for high outputs. On the contrary, the constructional form represented in Figs. 9 to 11 can be realized for a considerable output, and can be employed for pumping or compressing air or gas, or in general for all fluids. It also comprises a lubricating device which affords good preservation of the working parts, as well as the perfect tightness of the joints around the shaft.

In this design of pump, the shaft carrying the operating eccentric is formed of a tube, and is provided next the eccentric with an oblique partition dividing it into two conduits, one of these being used for the suction and the other for the delivery. This method allows the obtaining of sections of flow which depend only upon the diameter of the shaft itself.

A fixed box member 1 contains, slidable therein with little friction, a box member 2 which in turn contains a movable box member 3.

The box member 1 is closed on the one hand by a cover 4^a and on the other by a bottom piece 5^a containing a delivery duct 6^a.

A shaft 7^a is disposed to rotate in the members 4^a and 5^a; this shaft is hollow; and at its part 8^a adjacent to the cover piece it serves as a suction duct and rotates opposite to an intake conduit 9^a fixed upon the member 4^a by means of a screw cap 10^a. In its portion 11^a adjacent to the bottom piece 5^a, the shaft 7^a carries a hole 12^a which communicates with the outside by an orifice 13^a in the wall of the shaft. Opposite this hole 12^a, the bottom piece carries a recess or groove 14^a having opening into it the duct 6^a, in such manner that during the rotation of the shaft 7^a, the recess 12^a is always in communication with the delivery.

The duct 6^a opens preferably into the relatively large chamber 15^a in which the impurities are stopped by the fine wire gauze filter 16^a.

Opposite to the box member 3 the shaft 7^a carries an eccentric 17^a which acts during the rotation of the shaft to produce the required displacements of the box members 2 and 3.

This eccentric cam is cut out on each side of the longitudinal middle portion 18^a for the purpose of effecting communication between the interior of the shaft 7^a and the inside of the box member 3 through two lateral ports 19^a and 20^a.

The box member 3 is provided with the ports 21^a, 22^a, 23^a, and 24^a while the box member 2 carries the ports 25 and 26.

Within the shaft is disposed the oblique partition 27 which cuts off direct communication between the parts 8^a and 11^a of the shaft 7^a while allowing the fluid to flow from the part 8^a into the chambers formed by the box members 2 and 3 during the period in which the capacity of these chambers increases, while it can flow from the said chambers into the portion 11^a of the shaft during the period of decrease in the capacity of these chambers.

The operation of the box members 1, 2 and 3 is the same as in the preceding case, the intake being effected through 8^a and the delivery through 12^a and 6^a.

This form of pump can be employed for effecting the movement or compression of any fluid, either liquid or gas. In order to avoid leakage at the delivery end, it is advisable to employ a stuffing box 28 where the shaft 7^a passes through the bottom piece 5^a. On the other hand, at the intake side the air can be prevented from entering by the use of a very practical arrangement which will at the same time provide for the lubrication of the working parts. For this purpose an oil chamber 29 is provided within the lower part of the box member 1; this

chamber communicates through a duct 30 with the bearing which carries the end of the shaft on the intake side. A screw 31 with pointed end provides a suitable adjustment of the oil flow into the duct 30.

Moreover, a duct 32 connects the reservoir 29 with the recess or groove 14^a and thus allows the oil to flow back into the reservoir instead of being drawn into the delivery duct.

By this disposition, the oil drawn by suction through the duct 30 is spread over the bearing surfaces of the pump, and a part of the same is drawn in the direction of the fluid circulation until it is brought around the portion of the shaft which traverses the recess 14^a, whereupon it is projected by centrifugal force against the walls of this recess and then flows downwardly by its own weight to the bottom of the said recess. The continuous lubrication of the portion 8^a of the shaft will act to prevent all air from entering on this side.

In order to prevent the heating up of the pump, the walls of the box member 1 can be made of hollow construction and cooled by a water circulation.

Without departing from the principle of the invention, the delivery duct can be disposed along the extension of the shaft, this latter being then perforated as far as its end which opens into the beginning of the duct, or again, the shaft can be extended more or less into the interior of the delivery duct or even beyond the latter in order to have mounted thereon a pulley or other operating member.

It is of course understood that instead of causing the shaft and its eccentric to rotate with the stationary box-shaped member, it will be practicable, without changing the method of operation, to effect the rotation of the box-shaped member upon the stationary shaft or again to rotate the box member and the shaft in opposite directions.

Claims:

1. A pump containing, in combination, an outer box-shaped member having a chamber of prismatic form, a second box-shaped member slidable within the said chamber and constituting a piston, the interior of this latter chamber having a prismatic form, a third box-shaped member slidable within the chamber of the second box-shaped member perpendicularly to the direction in which the first box-shaped member is guided, the interior of the second box-shaped member having a circular section, and a shaft provided with an eccentric portion which is adapted to fit within the interior of the said second box-shaped members, the said box-shaped members having ducts disposed in their walls for fluid intake and delivery, and the said shaft also possessing intake and delivery ducts, substantially as described and for the purpose hereinbefore set forth.

2. A pump containing, in combination, an outer box-shaped member having lateral walls, a box-shaped member slidable within the first box-shaped member in a single direction, a box-shaped member slidable within the second box-shaped member perpendicularly to the direction of movement of the latter, the interior of the third box-shaped member having a circular section, a shaft provided with a portion which is adapted to fit within the said circular part, the walls of the said box-shaped members and the shaft being provided with ducts for fluid intake and delivery, the intake and delivery ducts within the said shaft being situated along the axis of the shaft, and the said shaft having therein an obliquely-disposed partition separating the said intake and delivery ducts, the walls of the shaft also containing ports opening on the one hand respectively into the said ducts and on the other hand opening at the periphery of the said eccentric portion of the shaft, substantially as described and for the purpose hereinbefore set forth.

3. A pump containing, in combination, an outer box-shaped member having a chamber of prismatic form, a second box-shaped member slidable within the said chamber and constituting a piston, the interior of this latter chamber having a prismatic form, a third box-shaped member slidable within the chamber of the second box-shaped member perpendicularly to the direction in which the first box-shaped member is guided, the interior of the second box-shaped member having a circular section, and a shaft provided with an eccentric portion which is adapted to fit within the interior of the said second box-shaped member, the said outer box-shaped member possessing at its lower part an oil chamber and containing in its walls suitable openings having the said shaft journaled therein, together with ducts for the purpose of connecting the said oil chamber with the said ducts, substantially as described and for the purpose hereinbefore set forth.

In testimony, that I claim the foregoing as my invention I have signed my name in presence of a subscribing witness.

LOUIS SAUSSARD.

Witness:

MAURICE ROUX.