E. WOERNER.

OIL PUMP.

APPLICATION FILED AUG. 29, 1908.

956,016. **Patented Apr. 26, 1910.**

Fig. 1

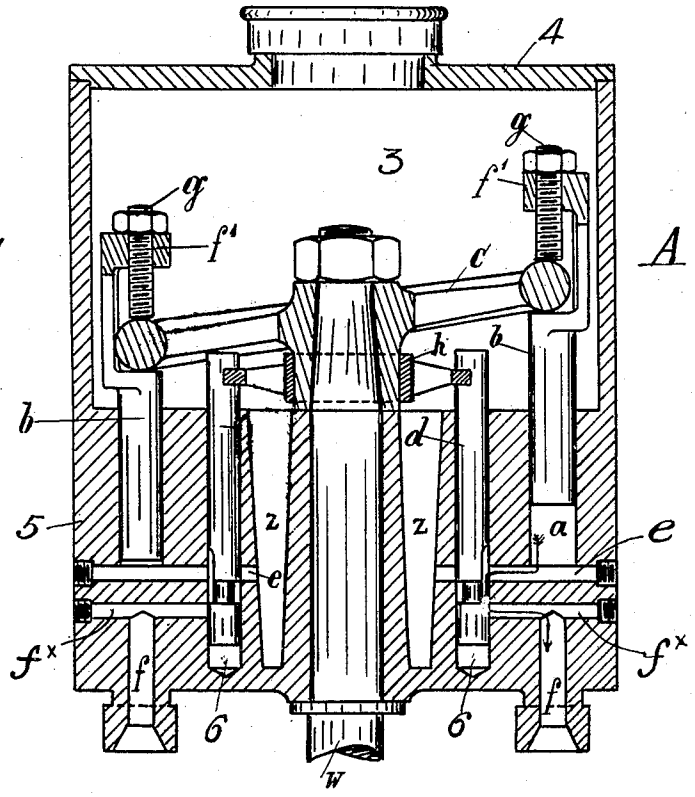
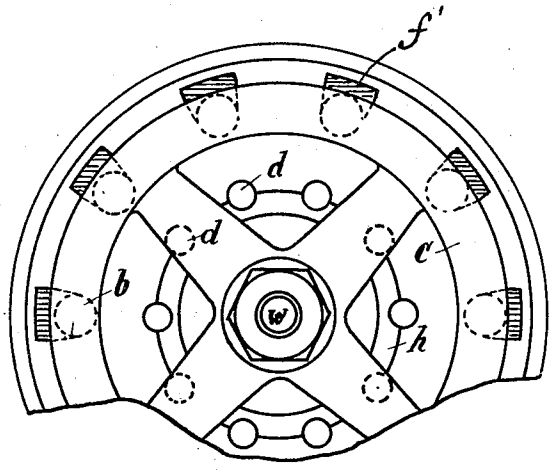


Fig. 2



Witnesses
F. Soilleux.

Inventor
Eugen Woerner
by Munn & Co
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UNITED STATES PATENT OFFICE.

EUGEN WOERNER, OF CANNSTATT, GERMANY.

OIL-PUMP.

956,016. Specification of Letters Patent. Patented Apr. 26, 1910.

Application filed August 29, 1908. Serial No. 450,911.

To all whom it may concern:

Be it known that I, EUGEN WOERNER, a subject of the German Emperor, and resident of Cannstatt, Germany, have invented an Improved Oil-Pump, of which the following is a specification.

The present invention relates to an oil pump of the type wherein a circularly arranged series of pistons is actuated by a cam wheel that is set obliquely on its shaft, that is, having its plane arranged at an angle to a plane normal to the driving shaft.

The object of the invention is to improve and simplify the construction of a pump of this kind, and more particularly to furnish an improved arrangement of the piston valves that control the fluid passing into and out of the several cylinders.

According to this invention, the piston valves and their associated oil passages are not only arranged in a novel and superior way, whereby a maximum efficiency of the pump will be obtained, but the piston valves are also operated through improved means which are made to conform in their general outlines to the piston operating means, that is to say, I have found it advisable to operate the piston valves by an inclined cam wheel similar to the main cam wheel and preferably concentric therewith and on the same shaft, the piston valves being arranged in a circular series within the series of cylinders, as will appear more clearly from the following description.

In the accompanying drawing:—Figure 1 is a vertical central section through an oil pump constructed in accordance with the invention, and Fig. 2 is a top plan view of a portion of the pump, with the cover removed.

In the drawing, A denotes the pump casing, which is provided at its upper part with a chamber 3 to which oil is fed through a cover 4, and at the bottom of the casing there is arranged a solid block 5 in which a number of cylinders and passages are formed, as will appear hereinafter. Through the base block 5 there extends in vertical direction into the pump casing, a shaft w, and around the bearing of said shaft there is formed in the base block a well z which communicates with laterally extending passages e. These passages communicate with corresponding cylinders a that are arranged in a circular series in the base block and formed by boring out the latter, as indicated. Working in these cylinders are corresponding pistons b, the upper ends of which are formed to engage the rim of a cam wheel C that is locked to the upper end of the shaft w, said cam wheel being inclined with respect to said shaft, that is, having its plane inclined with respect to a plane normal to the shaft. The connection of each piston B with the cam wheel is preferably effected by means of a stirrup f' formed on the upper end of the piston where it projects into the chamber 3, said stirrup carrying a set screw g, the lower end of which may be clamped down on the upper surface of the cam wheel rim, as indicated.

The piston valves d that control fluid passing into and out of the cylinders a, are arranged in a circular series within the series of pistons, and said valves operate in bores or passages 6 that are located parallel to the cylinders a, between the latter and the well z, said bores or passages intersecting the lateral passages e that lead from the well. These valves permit the oil to be sucked from the well out through the lateral passages e and into the cylinders a, and they also set up communication between the cylinders a and corresponding outlets f that are formed in the base block 5, said outlets having horizontal branches f^x parallel to the passages e and debouching into the bores or passages 6.

As previously intimated, the piston valves d are operated in substantially the same way that the pistons b are operated, and to this end there is applied to the shaft w, preferably by means of the hub of the main cam wheel C, a small cam wheel h that is also obliquely set with respect to the shaft and acts at its rim on the piston valves d.

In the operation of the device, the rotation of the cam shaft w, and therefore of the cam wheel C, results in the alternate working up and down of the pump pistons b, the gyration of the cam wheel producing this effect, as will be understood. Hence, the pistons all take different positions so that when those at one side of the pump cause a suction, those on the other side cause a pressure in their corresponding cylinders. The highest point of the smaller cam wheel h is, in the embodiment shown, located 90° in advance of the highest point of the main

cam wheel C, and hence when the parts are in the position shown in Fig. 1, with a piston at one side raised and a piston at the opposite side lowered, the two corresponding piston valves *d* will be located at the same height, and produce the same controlling effect in connection with their associated oil passages *e*, *f*.

Assuming the parts to be in the position indicated in Fig. 1, if the driving shaft *w* is rotated toward the right the left piston *b* will be raised and the corresponding right piston lowered, and at the same time the left hand piston valve *d* will be raised, which will result in opening the corresponding passage *e* and closing the corresponding passage *f*×, the piston valve being approximately cut away, as indicated, to effect this end. The pump piston *b* at the left will then cause a suction in its cylinder, and the oil will pass from the drain or well *z* through the passage or channel *e* and into the pump cylinder, whence it will be pumped out subsequently. At the same time this effect is being produced at the left of the pump, the piston valve *d* at the right will be lowered to establish communication between the corresponding cylinder *a* and the outlet passage *f*, and the corresponding piston *b* in descending will force the oil out of the cylinder *a* and out through the passages or channels *e* and *f*, as indicated by the arrow, to the place of use. The pump pistons that are intermediate the two pump pistons in question will, of course, take the positions explained, at different times, the result being that the oil will be forced successively out of the outlets of the circular series of cylinders.

When it is necessary to remove the pump piston *b*, this can be done by unscrewing the screws *g* in their stirrups, as will be obvious, and it will also be apparent that the set screws permit the connection between the pistons and cam wheel to be regulated as may be required.

Without limiting myself to the precise construction shown, I claim:—

1. In an oil pump, the combination of a series of cylinders, pistons working therein, a circular series of reciprocating piston valves, and an obliquely set cam wheel to operate said piston valves.

2. In an oil pump, the combination of a circular series of pump cylinders, pump pistons operating therein, a circular series of sliding piston valves, and inclined cam wheels to operate the pistons and the piston valves.

3. In an oil pump, the combination of a circular series of pump cylinders, pistons operating therein, a circular series of reciprocating piston valves, a shaft, an inclined cam on said shaft to operate the pump pistons, and a second inclined cam on the shaft to operate the piston valves.

4. In an oil pump, the combination of an outer circle of pump cylinders, an inner circle of valve passages or bores, pistons working in the cylinders, valves working in the passages or bores, a cam shaft, and inclined concentric cam wheels on the shaft to operate the pistons and the valves respectively.

5. In an oil pump, the combination of a circular series of pump cylinders, pistons working therein, a circular series of valve passages, valves operating therein, an inclined cam to operate the pistons, and a cam to operate the valves, having an inclination different from that of the first-named cam.

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

EUGEN WOERNER.

Witnesses:
THEODOR CONZ,
CONRAD SCHWEICKHARDT.

Correction in Letters Patent No. 956,016.

It is hereby certified that in Letters Patent No. 956,016, granted April 26, 1910, upon the application of Eugen Woerner, of Cannstatt, Germany, for an improvement in "Oil-Pumps," an error appears in the printed specification requiring correction as follows: Page 2, line 17, the word "approximately" should read *appropriately;* and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 17th day of May, A. D., 1910.

[SEAL.]

C. C. BILLINGS,
Acting Commissioner of Patents.