

Feb. 16, 1926.

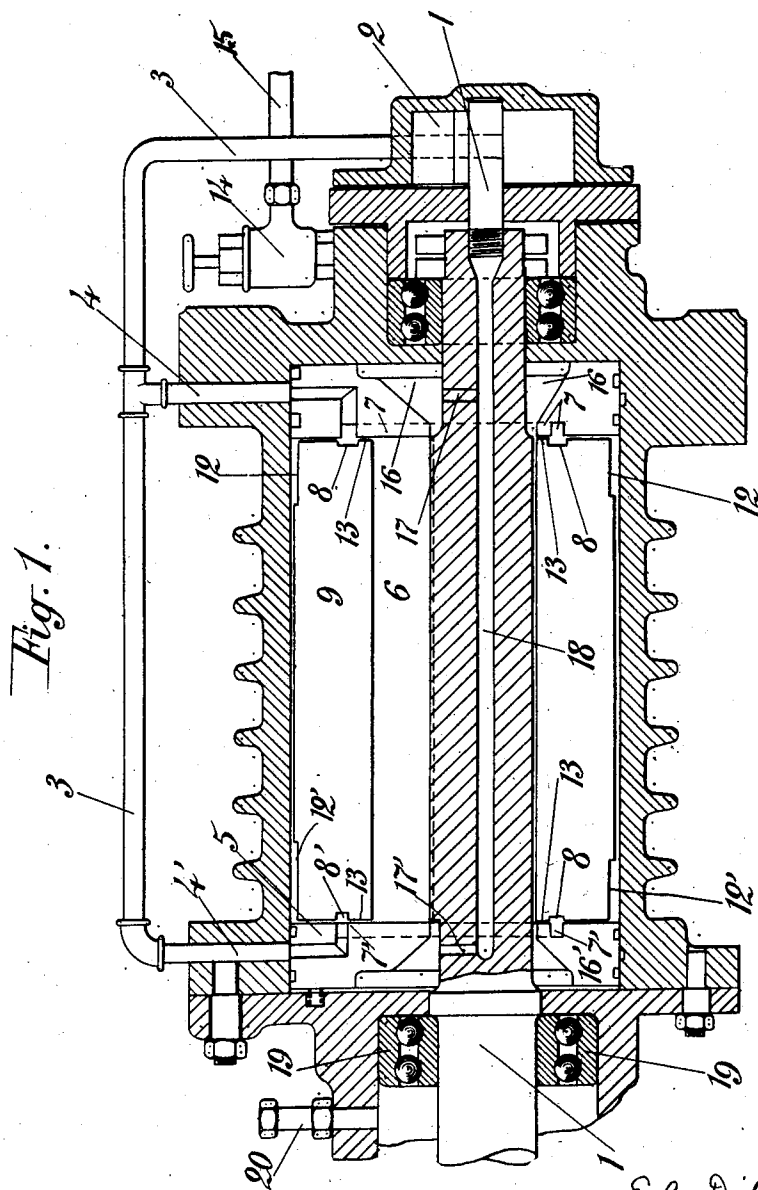
1,573,683

E. A. DIFFINGER.

ROTARY PUMP

Filed Jan. 30, 1924

2 Sheets-Sheet 1



E. A. Diffinger,
Inventor

By Robt. Robb Hill
attorneys

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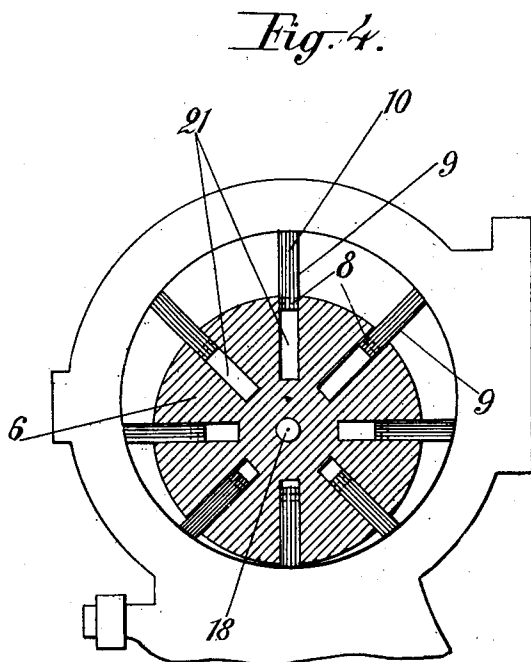
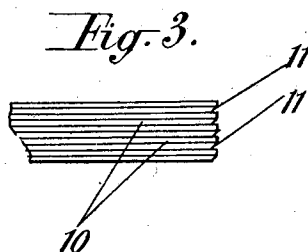
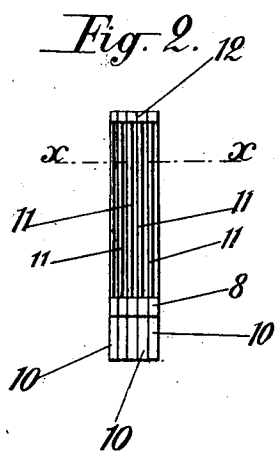
E. A. DIFFINGER

1,573,683

ROTARY PUMP

Filed Jan. 30, 1924

2 Sheets-Sheet 2



E. A. Diffinger
Inventor

By Ross Robb Still
attorney

Patented Feb. 16, 1926.

1,573,683

UNITED STATES PATENT OFFICE.

EUGÈNE ARSÈNE DIFFINGER, OF PARIS, FRANCE, ASSIGNOR OF ONE-HALF TO
ETABLISSEMENTS P. COLOMBIER FILS, OF PARIS, FRANCE.

ROTARY PUMP.

Application filed January 30, 1924. Serial No. 689,488.

To all whom it may concern:

Be it known I, EUGÈNE ARSÈNE DIFFINGER, a citizen of French Republic, residing at Paris, France, 86 Cours de Vincennes, have invented certain new and useful Improvements in Rotary Pumps, of which the following is a specification.

This invention relates to two improvements in rotary pumps, especially those having floating blades.

Although these improvements are applicable to all rotary pump systems, they have been studied and will be described as especially applicable to the compressor described in the application for French patent lodged on the 26th of October, 1923, by E. A. Diffinger, No. 26,850, for "rotary self regulating refrigerating group." In this application are shown slots in the rotor engaged by blades which are preferably inclined (that is to say, not radial) towards the direction of rotation.

This arrangement is advantageous for small compressors but in large apparatus I preferably employ radial slots. The friction at the ends of the blades against the cylinder wall is then greater and as on the other hand the centrifugal force is considerable, because of the weight and speed of the rotating parts, it follows that all the apparatus wears quicker and especially the cylinder wall.

According to the present invention, the balancing of the blades is obtained by forming an oil cushion under pressure which rotates with the blade between the extremity of each of the blades and the cylinder wall, and counteracts the centrifugal force by a resistance which can be regulated and thus the apparatus has a good mechanical efficiency and the rotating blades can, owing to the equilibrium obtained, play one upon the other, exactly as was foreseen in the specification previously referred to.

The first object of the invention is illustrated in Figure 1, which is an axial section of the compressor, and Figures 2 and 3 are detailed constructions, Figure 3 being a section through $x-x$ of Figure 2.

At the end of a shaft 1 of a compressor is mounted an auxiliary oil pump 2, a rotary pump for example, which forces the oil from the separator, not shown, into a pipe 3 which has two arms 4, 4', each of which opens between a compensator 5 and rotor 6 into an

annular passage 7, 7', which itself opens into the grooves 8, 8', formed in the ends of the blades 9. In order that the oil may flow towards the outer ends, each of the joined ribs 10, which form the blades, is chamfered at 11 to form a groove so as to form, between the ribs, a system of small interstitial passages (Figures 2 and 3) which allows the oil to flow in a radial direction as far as the oil grooves 12, 12'. These latter are formed by cutting away the ribs at the outer ends of the blades and over a length determined by experiment. Thus the pressure of the oil supplied by the pump 2 as far as the grooves 12, 12', can equally be regulated so as to form and keep in these grooves, which rotate with the blades, a reservoir of oil under sufficient pressure to balance the centrifugal force. This balancing of the blades is reinforced by the reaction of the oil flowing in the ports 8, 8', in the pipe 13. It may be observed that in the application No. 26,850/23 there is provided a supply of oil under pressure acting on the rear face of the blades to press them on to the cylinder, in which case the pressure of the column of oil from the separator is sufficient.

In this type of compressor which is the subject of the present application, this pressure would on the contrary be insufficient to assure the balancing of the blades, hence, the necessity for a pump which is an essential feature of the invention.

A second object is to ensure a uniform and permanent lubrication of all the rotary parts. In order to obtain this, the circulation of oil is carried out precisely as shown in Figures 1 to 4, Figure 4 being an axial section of a compressor.

A valve or a diaphragm 14 regulates the pressure of the oil as it enters from a tube 15 of a separator when forming part of a refrigerating group, to suit the side compensators 5 which bear against the ends of the blades. The maximum pressure, necessary for obtaining a seal and reducing the friction, is generally several kilograms.

The oil completely fills a chamber 16, and by a passage 17 leading to the axis of the rotor, also fills a channel 18 formed in the rotor and communicating by the passage 17' with another chamber 16' at the end of the compensator; owing to this arrangement all the rotary parts are in an oil bath.

The oil passes through the bearings 19

of the rotor, thence through a passage 20, which conducts it to the suction end of the compressor, whence it passes through the slots 21 in the rotor and is drawn in between the ribs and produces a perfect lubrication of all parts. On the other hand the oil joint thus formed makes a perfect seal and considerably diminishes the friction, and it must be understood that the application of these two improvements, which have just been described, are not limited to rotary self regulating refrigerating groups, the subject of the former patent, but it can be applied to all systems of rotary pumps having independent or other blades for use with gas or liquid. The improvements allow, in all cases, a perfect lubrication of the blades and other rotary parts, and minimizes the wear of the cylinder caused by the inertia of the blades, owing to the ease with which the blades move in the slots. In particular, the process of balancing will be useful when applied to pumps having a fixed base.

Having thus described my invention, what I claim as new is:

1. In a rotary pump, a cylinder, a rotor therein, and blades formed of a plurality of joined plates reduced at their opposite ends to provide channels extending to the outer edge of the blades, said edge being recessed at each end to communicate with said channels.

2. In a rotary pump, a cylinder, a rotor therein, freely mounted blades disposed in longitudinal seats in said rotor, compensators at opposite ends of said blades having oil passages therethrough communicating

with said blades, and a pump actuated by the rotor shaft and connected to maintain an oil pressure about said blades.

3. In a rotary pump, a cylinder, a rotor therein, blades mounted in said rotor and formed with a series of channels upon their opposite ends communicating with an intersecting groove, and oil feed passages at opposite ends of the cylinder communicating with said groove.

4. In a rotary pump, a cylinder, a rotor therein having its shaft mounted in heads at opposite ends of the cylinder and provided with a central lubricating passage, independently movable blades disposed in seats extending longitudinally of the rotor, said blades being provided with oil passages at their opposite ends and upon the outer edge thereof, and compensators at the opposite ends of said rotor provided with oil passages communicating with the blade seats.

5. In a rotary pump, a cylinder, a rotor therein having its shaft mounted in heads at opposite ends of the cylinder and provided with a central lubricating passage, independently movable blades disposed in seats extending longitudinally of the rotor, said blades being provided with oil passages at their opposite ends and upon the outer edge thereof, compensators at the opposite ends of said rotor provided with oil passages communicating with the blade seats, a rotary pump carried by the shaft of said rotor, and a conduit extending therefrom and communicating with the oil passages in the compensators.

EUGÈNE ARSÈNE DIFFINGER.