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ROTARY VANE PUMPS
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2 Sheets-Sheet 1

Fig. 1

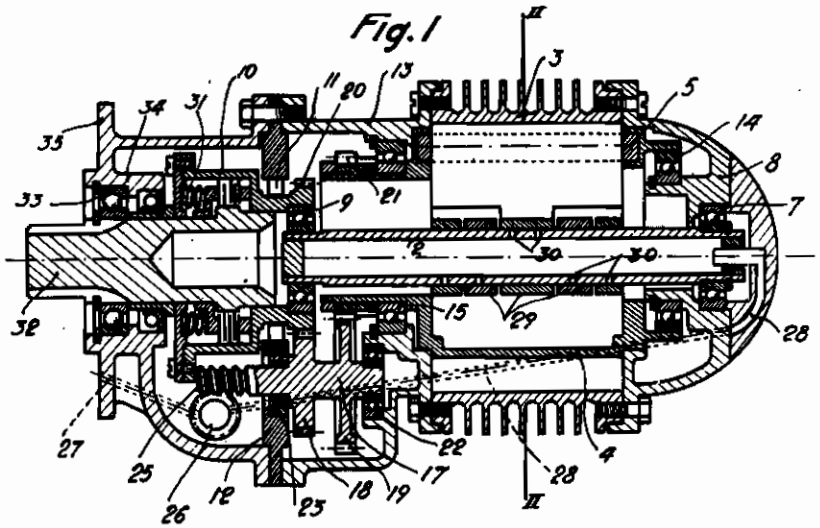

Fig. 2

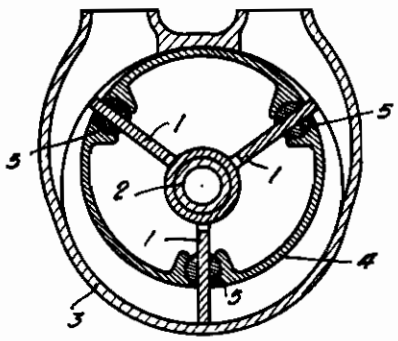

Fig. 3

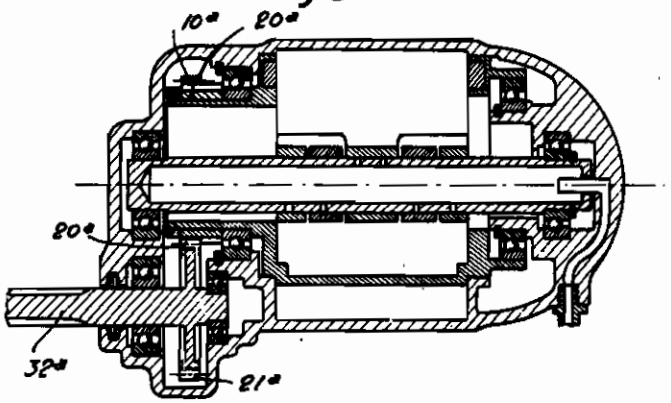

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Fig. 4

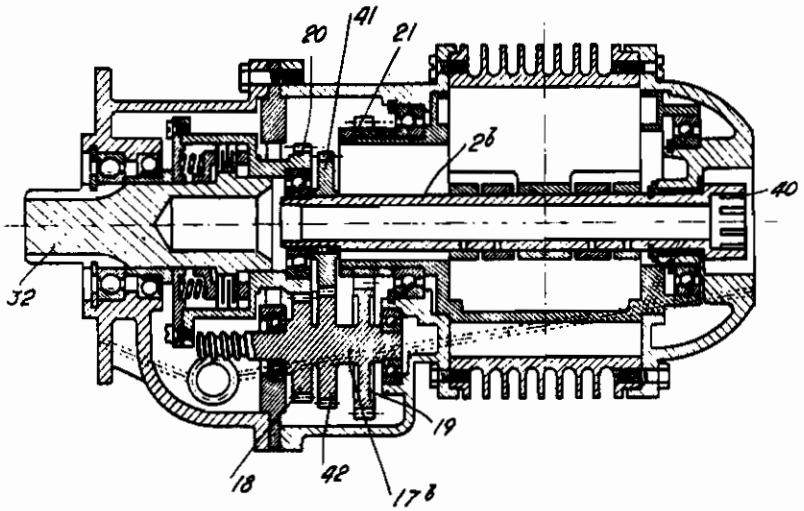
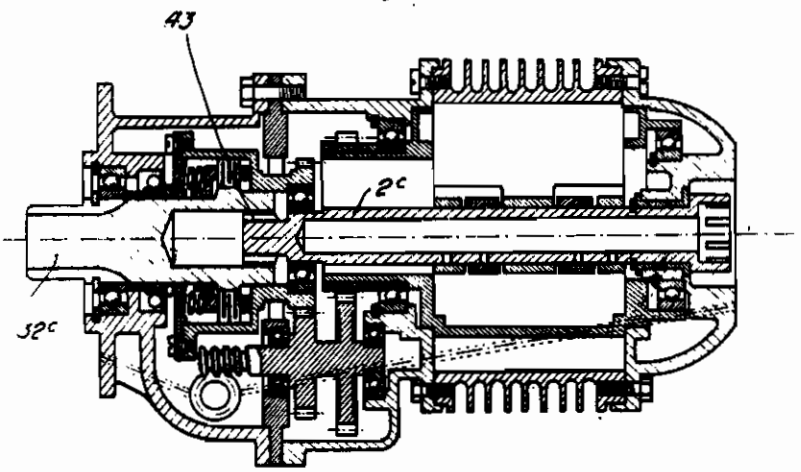


Fig. 5



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ALIEN PROPERTY CUSTODIAN

ROTARY VANE PUMPS

Charles Raymond Waselge, Saint-Etienne (Loire), France; vested in the Alien Property Custodian

Application filed December 30, 1942

My invention relates to rotary vane pump or compressor for air or other gases of the kind having radial vanes mounted on a shaft co-axial to the casing of the pump for the convenience hereinafter termed barrel, and driven by a rotor arranged excentrically to the barrel.

The main object of my invention is to improve this type of pump more particularly of the design used in the case when conditions of weight, purity of the air and safety of working have a primordial importance as is the case in their use on board aircraft.

It has been in fact verified that in already known pumps of that kind, there occurred jammings of the vanes in their guides and in the barrel, along with a heating of the eyes of the vanes as soon as one tried to rotate those pumps at high speed. I have been led into considering that those inconveniences resulted on the one hand from a bending of the shaft of the vanes under the action of the centrifugal force and on the other hand, from the insufficient lubrication of vanes on their shaft, lubrication which it is impossible to increase without charging the air with an unacceptable quantity of oil.

Another object of my invention is to oppose the bending of the shaft of the vanes and to increase the rotation speed of the pump.

A still further object of my invention is to remedy the heating of the eyes of the vanes.

Other objects of my invention are brought out more fully in the description and claims. By way of in no means limitative example various embodiments of a pump according to my invention have been schematically represented in the accompanying drawing.

In this drawing:

Fig. 1 is a longitudinal section of a pump.

Fig. 2 a transversal section according to the line II—II of Fig. 1.

Figs. 3, 4 and 5 are similar views to Fig. 1 with modifications.

In the examples illustrated, the pump belongs to the type comprising radial vanes 1, here three in number, freely engaged on a shaft 2 coaxial with the barrel 3 having an air inlet and an air outlet (Fig. 2). A hollow rotor 4 is excentrically mounted in the barrel 3 (the shaft 2 being arranged within the said rotor 4). At the periphery of the rotor 4 are formed lodgings for guides 5 each of them being mounted for free rotation upon itself in its lodging around an axis parallel with those of the rotor 4 and of the barrel 3. Each guide 5 is provided with a diametral slot in which a vane 1 is slidably mounted with light friction.

In the embodiment shown in Fig. 1, the shaft 2 crosses the rotor through and through and is supported, on either side of the latter, on the one hand in a ball bearing 7 lodged in an end plate 8 mounted at the end of the barrel 3 and on the other hand in a ball bearing 9 lodged in a rotating member 10 itself supported by a roller bearing 11 fitted into a transversal partition 12 which is mounted to the end of a casing part 13 fixed on the other extremity of the barrel 3.

The rotor 4 is also supported at its two extremities by ball-bearings 14 and 15 respectively supported by the end plate 8 and the casing part 13.

The rotating member 10 serves as a driving member of rotor 4 by means of a gearing comprising an intermediary shaft 17 carrying two wheels 19 and 19 of different diameters the smaller of which 18 is in gear with a toothing 20 presented by a member 10 and the other 19 with a toothing 21 supported by the rotor 4. Therefore this gearing forms a multiplicator of speed. The shaft 17 is fitted on ball-bearings 22 and 23 respectively supported by casing part 13 and partition 12 and extends on the other side of the latter where it presents a worm gear 25 which operates an oiling pump 26 to which leads an inlet canalization 27 for oil under pressure and from where runs a pipe 28 to go and terminate at the extremity of the hollow shaft 2 to secure the lubrication of the eyes 29 of the vanes, though the means of transversal holes 30 provided in this hollow shaft 2.

Besides, this member 10 serves as a casing to a torque limiting device 31 whose driving piece is an end of a shaft 32 centred on the one hand in member 10 and on the other hand in a roller bearing 33 supported by a cover plate 34 fixed at the end of the casing 13 above partition 12. It will be noticed that in this disposition, the gears are enclosed in casing part 13 on a same side of partition 12 whereas the torque limiting device 31 and the oiling pump are on the other side, inside the cover plate 34. The latter bears, for the fixing of the pump in its place, a cheek 35 perpendicular to the rotation axis. The pump is operated by means of the end of the shaft 32 which projects outside cover plate 34.

The operation of the rotor 4 by the described mechanism is obvious and the remaining working of such a kind of pump is already well-known.

The modification represented on Fig. 3 differs chiefly from the preceding one by the fact that

the driving shaft **32***a* is excentrically arranged with reference to the barrel and operates the rotating member **10***a* through the medium of a single pair of gears **20***a*, **21***a* without an intermediary shaft. Though no torque limiting device has been represented in this case, it is possible to interpose one, similar to that of Fig. 1, between shaft **32***a* and gear **20***a*.

In the further modification shown on Fig. 4, the shaft **2***b* comprises, at the opposite end of the driving shaft **32**, coupling means **40** here formed by splines, which allow to couple another apparatus directly on the pump. The shaft **2***b* is rotated by a toothed wheel **41** fixed upon it and in gear with another wheel **42** fixed on shaft **17***b*. Preferably the ratio of gearing **41**—**42** differs very slightly from that of gearing **19**—**21** so that there be a slow relative rotation between this shaft **17***b* and the eyes of the vanes.

The embodiment on Fig. 5 differs from the preceding one by the fact that the shaft **2**c is driven directly by the shaft **32***c* and comprises, to that purpose, means **43**, coupling it directly with this shaft **33**, formed for instance by splines.

CHARLES RAYMOND WASEIGE.