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PUMP FOR AIRCRAFT MACHINERY

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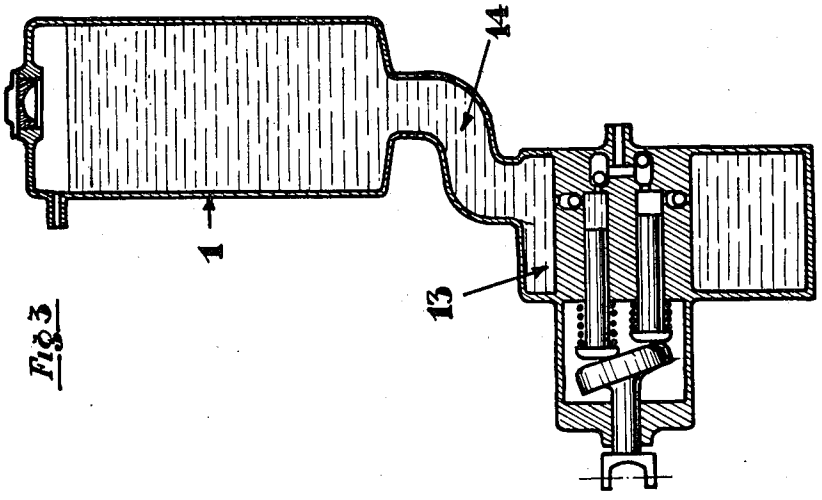


Fig. 3

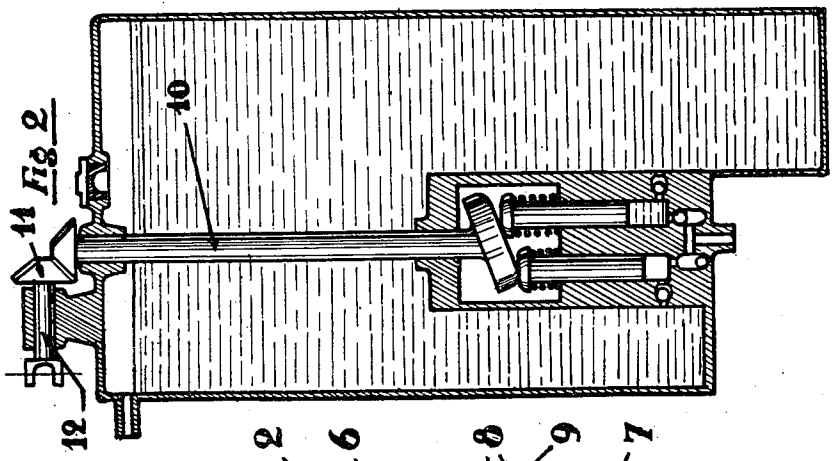


Fig. 2

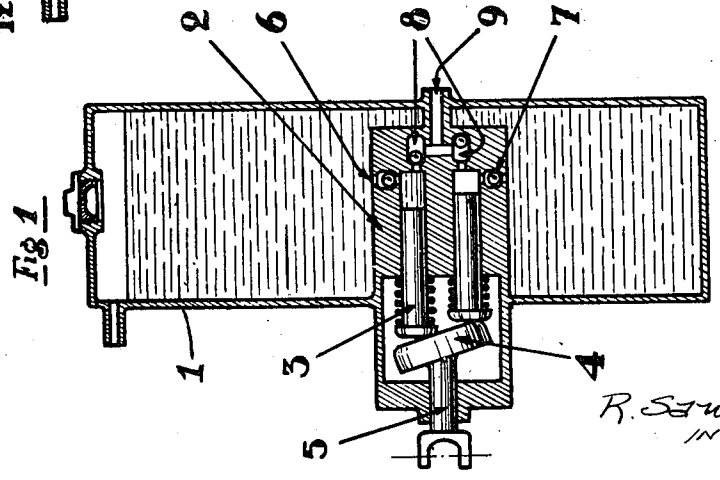


Fig. 1

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PUMP FOR AIRCRAFT MACHINERY

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2 Claims. (Cl. 103—162)

The present invention relates to pumps employed on airplanes for feeding liquid, and especially oil, to the various hydraulic control apparatus.

Such control apparatus generally require very high pressures of operation, for instance averaging 100 kgs. per sq. cm. and, as a rule, these pressures are obtained through the use of pumps provided with short stroke plunger pistons. Consequently, it is absolutely necessary to feed oil which is absolutely free from air, even in the form of small bubbles. It is therefore necessary automatically to evacuate the air that may have been introduced into the cylinders.

When the feed of these pumps takes place through pipes of small cross section, stopping may result from the presence of air in said pipes. I may indicate, by way of example, that, when an airplane is flying upside down, the oil reservoir is also turned upside down and the air present in the upper part of the reservoir penetrates into the communication pipes and may produce a stopping of the pump.

On the other hand, if, in order to avoid the drawback just above mentioned, it was endeavoured to employ on an airplane the well known solution consisting in immersing the pump at the bottom of the oil tank or reservoir, another drawback would be met with, resulting from the fact that, as the airplane often flies in a laterally inclined position and even sometimes flies on the back, the air normally located at the upper part of the tank then passes into the lower part or on the sides and penetrates into the inlet orifices of the pump, thus causing it to stop.

The object of the present invention is to provide a pump which avoids these drawbacks and permits an efficient and safe running of the system without any risk of accidental stopping.

According to an essential feature of the present invention, the pump is wholly immersed in the mass of oil contained in a fluidtight reservoir, and the inlet ports of the pump are all located in the same region of the reservoir, this region being such that, whatever be the position of the airplane, and therefore of the reservoir, these inlet ports of the pump are always below the level of the oil in the reservoir.

The pump may be located directly in the reservoir or the latter may include an auxiliary chamber communicating with the remainder of the reservoir through a pipe of large section. The inside of the pump communicates with the oil present in the reservoir through orifices opening directly into the mass of oil. In this way, any amount of air, small as it may be, present in the cylinders has a tendency to rise through the mass of oil toward the portion of the reservoir occupied by air, which avoids any danger of said air disturbing the feed of the pump and its working. On the other hand, it will be noted that, whatever be the position of the reservoir, oil always covers the feed orifices of the pump.

Other features of the present invention will result from the following detailed description of some specific embodiments thereof.

Preferred embodiments of the present invention will be hereinafter described with reference to the accompanying drawing, given merely by way of example, and in which:

Fig. 1 is a sectional view of a pump and the reservoir thereof, arranged according to a first embodiment of the present invention;

Fig. 2 is a similar view of another embodiment of the invention;

Fig. 3 is a similar view of still another embodiment including a special chamber for the pump communicating with the remainder of the reservoir through a conduit of large section.

In Fig. 1, reference character 1 designates a reservoir filled with oil, and 2 a pump located in said reservoir.

The pump shown in this figure is of the type including a plurality of plunger pistons disposed along a circumference and coacting with an inclined plate 4 driven by a shaft 5. The inside of the cylinder opens through orifices 6 into the inside of the reservoir in the portion thereof filled with oil. I have shown at 7 the balls forming check valves located in the feed conduits through which oil enters the pump. I have shown at 8 the balls forming check valves past which oil is discharged under pressure through conduits 9 to the distribution system.

The embodiment of Fig. 2 differs from that of Fig. 1 merely by the different arrangement of the pump which, in this case, is located vertically instead of being arranged horizontally, and by the drive which, in this case, is obtained through a shaft 10 extending through the reservoir and driven through a system of bevel pinions 11 by a second shaft 12, the whole of the pump being immersed in the oil of the reservoir.

Finally, in the embodiment of Fig. 3, the pump is disposed in a special chamber 13 communicating, through a tube of large section 14, with the remainder of the reservoir 1.

In all these examples, oil arrives directly into the cylinders of the pump without passing through a conduit of narrow section in which

air might accumulate. Therefore, in these three embodiments, the air bubbles rise freely through the mass of oil and cannot disturb in any way the working of the pump.

In a general manner, while I have, in the above description, disclosed what I deem to be practical and efficient embodiments of the present invention, it should be well understood that I do not wish to be limited thereto as there might be changes made in the arrangement, disposition and form of the parts without departing from the principle of the present invention as comprehended within the scope of the appended claims.

What I claim is:

1. For use on an airplane, a pumping system which comprises, in combination, an oil reservoir including a main part, a special chamber, and a passage of large section interconnecting said main part and said chamber, a minimum amount of oil in said reservoir, a single action pump of the high pressure and short stroke type having inlet means opening directly into said chamber, the location of said inlet means in said chamber and said minimum amount of oil being so interrelated as to ensure the constant full immersion of said inlet means in said oil whatever be the position of said system, and inlet means to said main part of the reservoir adapted to permit of feeding it with oil while the pump is in operation, so as to maintain said minimum amount of oil in said reservoir.

2. For use in an airplane, a pumping system which comprises, in combination, an oil reservoir including a main part, a special chamber, and a passage of large section interconnecting said main part and said chamber, a minimum amount of oil in said reservoir, and a pump of the high pressure and short stroke type wholly immersed in the oil present in said chamber, said pump including at least two cylinders provided with inlet ports opening directly into said chamber and all located in the same region thereof, the location of said inlet ports in said chamber being so chosen, on account of the minimum amount of oil present in said reservoir, that said ports are always immersed in the oil present in said chamber, whatever be the position of said reservoir.

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