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BY A. P. C.

J. G. A. M. J. MEYER

FEEDING OF MOTORS

Filed Sept. 24, 1941

Serial No. 412,194

2 Sheets-Sheet 1

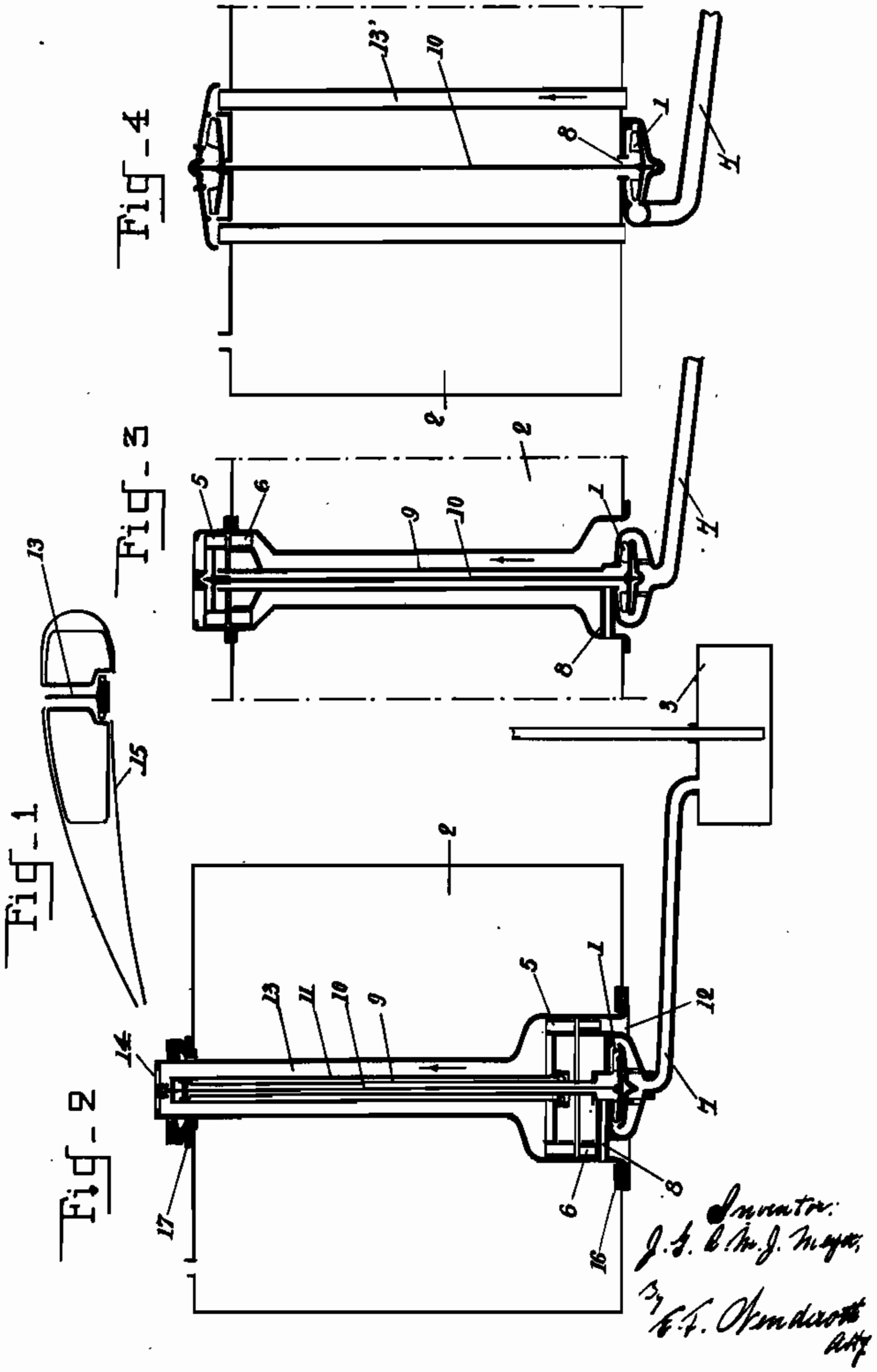

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Fig. 5.

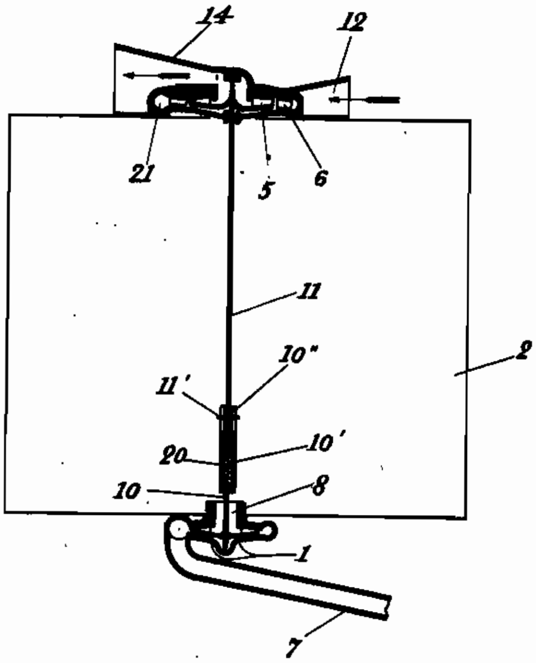
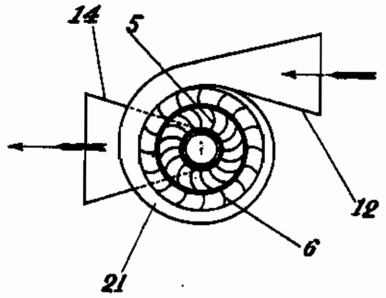


Fig. 6.



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ALIEN PROPERTY CUSTODIAN

FEEDING OF MOTORS

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The supply of fuel to pumping devices securing the flow of fuel to the carburettor of airplane motors is subject to a number of difficulties which are particularly encountered at high altitude and for the airplanes in which the tanks are substantially remote from the motor.

1. Influence of high altitude

The reduction of pressure which occurs as the airplane is ascending, causes the progressive evolution of the gases dissolved in the fuel at the level of the ground. The said gas bubbles accumulate in the higher parts of the conduits connecting the tanks to the header feeding the motor and cause within the said header voids producing obstruction effects which are so much more substantial that:

The loads available are lower,

The conduits connecting the tanks to the header are longer.

2. Influence of the arrangement of the tanks

The arrangements of the tanks, which are now placed in the wings for aerodynamic purposes, is located with respect to the header in unfavourable conditions of flow.

In fact, the difference in level between the header and the tank is necessarily very low.

Furthermore, in large airplanes the conduit connecting the tank to the header is rather long. Thus the flow of liquid takes place under small load and high resistance.

At the ground the said arrangements are able to secure the normal flow of the fuel until the header.

However, in flight, two phenomena take place: the one which has already been mentioned in the first heading increases the braking effect due to the length of the conduit, the other one, resulting from the inertia stresses due to the displacement of the airplane and which can in some cases be higher than the motive load and completely stop the flow.

The present invention has for its object to obviate said disadvantages and consists in imparting to the fuel flowing out from the tank an additional potential energy by means of an external source of power, without increasing the pressure within the tank and without obstructing the section of the passage of the fuel.

Namely, the liquid which is coming out from the tank, passes into a pump, which is preferably a centrifugal pump, driven by a turbine, which is for instance operated by a displacement of the air due to the forward motion of the airplane, preferably by the displacement of the air within a conduit connecting the suction side to the pressure side of the wing.

By way of example the accompanying drawings show:

Fig. 1 the section of the wing of an airplane modified according to an embodiment of the present invention.

Figs. 2 to 4 three examples of application of the said embodiment.

Fig. 5 a view of a fourth embodiment.

Fig. 6 a section of the turbine of said fourth embodiment.

In all of said figures 2 to 6, the liquid which is coming out from the tank 2 is brought by means of the conduits 8 in the suction chamber of a centrifugal pump, in which the rotor 1 imparts to the liquid an additional potential energy and forces it in the conduit 7, which supplies the said liquid to the header 3 of the feeding pump of the motor not shown.

In the case of figure 2, the rotor 1 is carried by a shaft 10 which is at its opposite end rigidly connected to a hollow shaft 11 carrying the vanes 5 of a turbine, upon which is acting the air current formed by the difference in the pressures of the air available between the ends of the conduit 13 connecting the pressure side to the suction side of the wing 15 (figure 1). The conduit 13 bears upon the pressure side of the wing on a flange 16 integral with the tank 2 and on the suction side of the said wing by means of a stuffing box 17. The pump, the turbine, the adjacent conduits and the various pivots, form a unit independent from the tank 2. The air penetrating by the conduits 12, is directed by the distributor 6 upon the vanes 5 of the turbine and escapes by the apertures 14.

In order to avoid the tight joints which would absorb too much power, the casing of the rotor of the pump 1 is provided with a balancing shaft 9 extending to a head which is higher than the head which the fuel can reach within the tank 1.

In the case of figure 3, the vanes 5 of the turbine are located at the upper end of the shaft 10, thus enabling to suppress the hollow shaft 11. The same references number show in figure 3 and in figure 2 the same parts.

In the case of figure 4, the vanes 5 of the turbine are, as in the case of figure 3 arranged at the top of the shaft 10, the turbine is of the peripheral admission type instead of being of the axial type, thus facilitating its construction. In this case, the air, instead of passing within a single conduit 13, flows within four conduits 13', arranged symmetrically in pairs about the shaft 10 which crosses the tank 2.

In the case of figures 5 and 6, the rotor 1 is carried by a shaft 10 ending in a hollow cylinder 10', provided with two slits 10''. Through the said slits 10'' is extending a rod 11', integral with the shaft 11 of the vane turbine 5, the said shaft 11 penetrating within the cylinder 10'. A spring 20, arranged within the cylinder 10', prevents the axial displacements of the shafts 10 and 11. The air current, generated by the motion of the airplane, penetrates by the funnel-shaped conduit 12, flows within the snail 21, feeding the distributor 6. The air drives the blades 5 of the turbine and flows out at the center by the conduit 14.

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