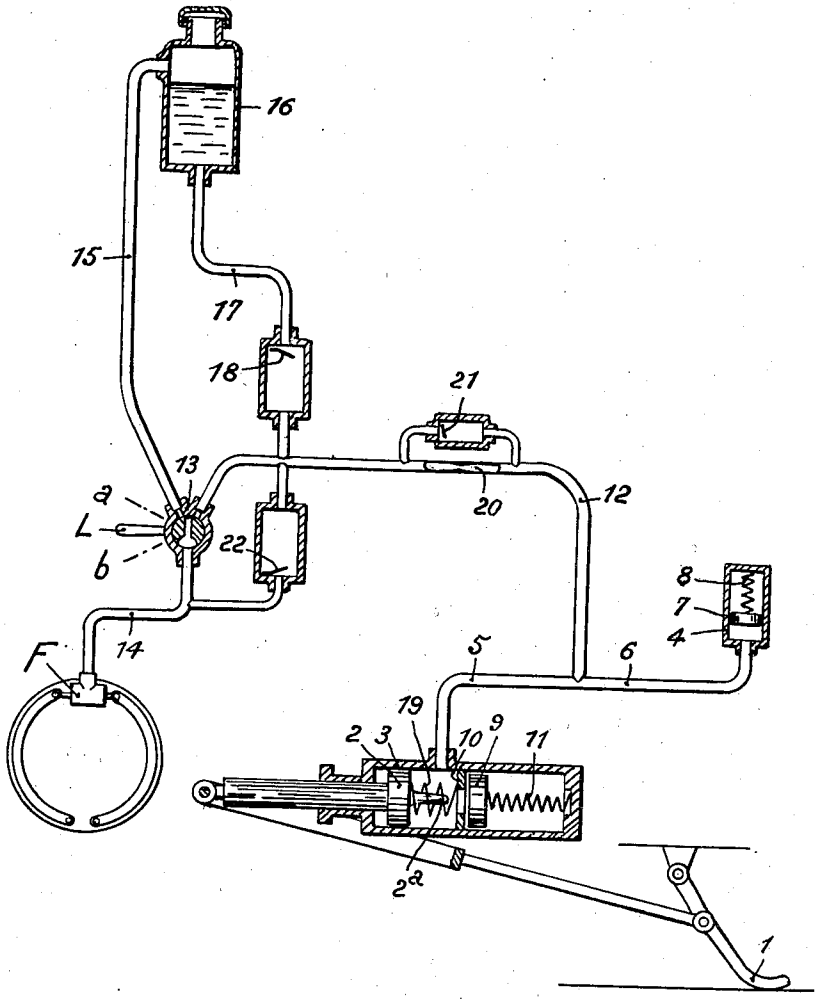
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HYDRAULIC APPARATUS FOR CONTROLLING BRAKES

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INVENTOR:

GEORGE L.R.J. MESSIER, DEC'D,
BY YVONNE L. MESSIER,
ADMX.

By: Marks & Clerk
Attys.

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HYDRAULIC APPARATUS FOR CONTROLLING BRAKES

George Louis René Jean Messier, deceased, late of Paris, France, by Yvonne Lucie Messier, born Bonnamy, administratrix, Paris, France

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2 Claims. (Cl. 244—2)

The present invention has for its object to assure the semi-automatic control of brakes upon the wheels of landing gears for aeroplanes.

It is applied to apparatus in which the brakes upon wheels properly so called are arranged in such a manner that the flow of liquid under pressure into the apparatus in a direct manner causes the application of the brakes.

The invention is characterized principally by the combination of parts hereinafter defined:

1, a reservoir of fluid under pressure;

2, a pump body the principal piston of which is connected to the skid of the aeroplane and which may be placed in communication with the devices directly controlling the brakes;

3, a distributing part, operated by the pilot and enabling him to place the controlling parts of the brakes into communication, either with the said pump body or with a reservoir of fluid;

4, an accumulator connected to the said pump body and receiving a part of the liquid driven back by the piston of the accumulator when the skid is applied to the ground;

5, in the pump body, a second piston which is under the action of an elastic device and which may be pressed back by the principal piston at a certain point in the travel of this latter.

The apparatus comprises likewise a set of valves permitting either the return of the liquid from the reservoir to the pump body or the rapid return of this liquid from the brakes towards the pump body and the immediate release of the brakes, as soon as the reaction of the ground no longer is felt by the skid, whatever may be the position of the control lever of the distributor.

Finally a constriction provided upon the tubing connecting the pump body to the brake assists in assuring the progressive action of braking.

The accompanying drawing shows a diagrammatic representation of the apparatus.

The generator part of the liquid under pressure is controlled by the reaction of the ground upon the skid. For this purpose the skid 1 is connected in any suitable manner to the piston 2 of a pump body 3, enclosing a suitable liquid.

When the skid 1 makes contact with the ground, the pressing inwards of the piston 2 causes the flowing back of the liquid from the pump body 3 towards an accumulator 4 connected to the said pump body by tubes 5—6.

The accumulator 4 may be constructed in any manner. For example, it may be composed of a cylinder in which a movable piston 7 is displaced when the liquid is flowing—compressing an elastic device 8, having certain characteristics.

This elastic device may be a spring, a cushion of compressed air or any other equivalent device.

When all the liquid has been driven out of the pump body 3, the piston 2 makes contact, for example by a projection 2^a carried by it, with a second piston 9, normally retained against a stop plate 10 by any elastic device 11. At this moment the two pistons 2 and 9 move together and the elastic device 11 assures the elasticity of the skid when running on the ground.

A tube 12, branched upon the tubes 5, 6 conducts the liquid under pressure, when the skid presses on the ground, towards a distributor 13.

This distributor enables the pilot to put the liquid into communication with a tube 14, leading to the brakes F, or with the feed tube 12 or with an escape tube 15 leading to a reservoir 16, in which the air may be retained at atmospheric pressure or at a different pressure.

When the pilot wishes to apply the brakes, he puts the lever L of the distributor 13 into the position *a* corresponding to the putting into communication of the tubes 12 and 14. In these conditions the braking is proportional to the pressure of the ground upon the skid so long as the pressure of the liquid does not attain the value that corresponds with the complete driving out of the liquid from the pump body 3.

After this instant the pressure does not increase whatever may be the value of the reaction of the ground upon the skid.

Each time that the skid leaves the ground, for example if it happens that the skid lifts during its travel over the ground, in course of landing, the liquid flows back by the tubes 14 and 12, towards the pump body 3, and the brakes are released, which reduces the risk of capsizing.

The skid being upon the ground, if the pilot wishes to release the brakes, he puts the lever L of the distributor 13, into the releasing position *b*, corresponding to the placing in communication of the tubes 14 and 15. The liquid from the brakes then passes away towards the reservoir 16.

On the following flight, a certain quantity of liquid from the reservoir 16, returns into the pump body 3 by means of the tube 17 and the valve 18.

This return is facilitated at the same time by the presence of a spring 19, which tends to return the piston 2 towards its initial position and by the decrease of pressure that then exists in the pump body 3.

A constricted passage 20 enables the rapidity of putting the brakes into action to be modified,

whilst a valve 21 assures a rapid release of the brakes, when the skid leaves the ground.

A valve 22, ensures under any circumstances and whatever may be the position of the distributor 13, the return of the liquid from the tube 14, towards the tube 12, when the reaction of the ground upon the skid no longer makes itself felt. All risk of capsizing by untimely braking is thus avoided.

The connection between the skid 1 and the piston 2 may be effected by a set of cables and pulleys in accordance with that having been the subject of French Patent No. 688,526 dated April 9, 1929.

The valve 18 may be replaced by a feeding device such as that which was the subject of an application for a patent in United States of America Sr. No. 641,305 filed November 4, 1932.

The tube 14 may be either connected directly to the brakes, or on the contrary, it may be mounted so as only to put the brakes in action by means of a control system enabling the pilot either to graduate the intensity of braking, without himself having to furnish the power or to obtain a separated or differential braking effect upon each wheel.

This system of control may be of the type forming the subject of United States Patent No. 1,822,900 dated September 15, 1931.

What is claimed is:

1. Device for the semi-automatic control of brakes on the wheels of landing gears for airplanes, comprising a reservoir of fluid under pressure, a pump barrel the primary piston of which is connected to the tail skid of the airplane, control members directly acting on the brakes for applying them, a communication between said pump barrel and these members, a distributor operated by the pilot and enabling him to put said control members in communication either with the pump barrel or with the reservoir of fluid under pressure, an accumulator connected to said pump barrel and receiving a portion of the liquid delivered by the primary piston when the tail skid of the airplane bears on the ground, a secondary piston movable in the pump barrel and which can be pushed back by the primary piston at a definite point of the stroke of the latter, and a resilient system acting on this secondary piston.

2. Device for the semi-automatic control of brakes on the wheels of landing gears for airplanes, comprising a reservoir of fluid under pressure, a pump barrel the primary piston of which is connected to the tail skid of the airplane, control members directly acting on the brakes for applying them, a communication between said pump barrel and these members, a distributor operated by the pilot and enabling him to put said control members in communication either with the pump barrel or with the reservoir of fluid under pressure, an accumulator connected to said pump barrel and receiving a portion of the liquid delivered by the primary piston when the tail skid of the airplane bears on the ground, a secondary piston movable in the pump barrel and which can be pushed back by the primary piston at a definite point of the stroke of the latter, a resilient system acting on this secondary piston, and a constricted passage on the main communication so as to transmit to the brakes only the mean pressure furnished by the tail skid without transmitting the slight variations of pressure due to the unevenness of the ground.

YVONNE LUCIE MESSIER,
BORN BONNAMY,
Administratrix of the Estate of George Louis René Jean Messier, Deceased.