

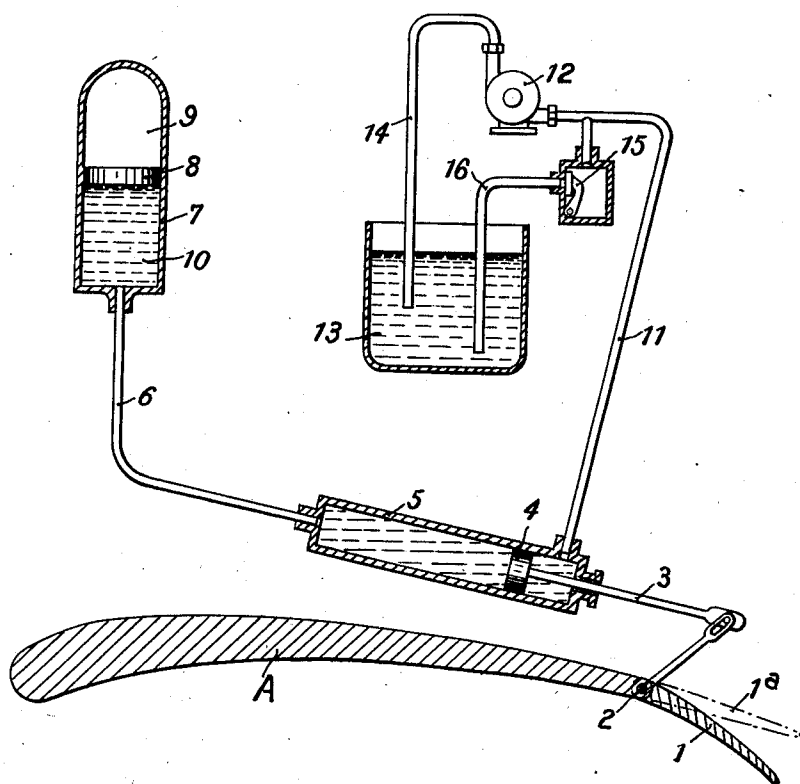
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DEVICE FOR THE AUTOMATIC CONTROL OF CAMBER FLAPS AND THE LIKE FOR AIRPLANES

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UNITED STATES PATENT OFFICE

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DEVICE FOR THE AUTOMATIC CONTROL OF
CAMBER FLAPS AND THE LIKE FOR AIR-
PLANESRené Lucien Levy, Montrouge, France, assignor
to Société d'Inventions Aeronautiques et Mec-
aniques S. I. A. M., Fribourg, (Suisse)Application February 13, 1936, Serial No. 63,805
In France April 5, 1935

1 Claim. (Cl. 244—42)

This invention is intended to ensure, on board
airplanes, the setting in action of a camber flap
or of any other super-lifting member, fitted up
in such a manner that the action of the relative
wind tends to restore it to neutral position.

The device characterizing the invention has
the following advantages:

1. The pilot causes the setting in action of the
flaps by the simple opening of a valve, these flaps
being raised, when necessary, by a hydraulic pres-
sure supplied, for instance, by the main installa-
tion on board, or by a special pump.

2. The hinge moment resulting from the re-
action of air on the flap is rigorously limited to a
definite value, so that any increase of this stress
(which might result either from an increase of
speed of the airplane, or from a gust of wind)
immediately causes retraction of the flap, the
duration of this retraction being moreover auto-
matically limited to that of the cause which de-
termined it.

The pilot can thus set the flaps in action what-
ever may be the speed of the airplane. The flaps
will leave the neutral position only when the
speed of the airplane will be lower than or equal
to a definite value, and, moreover, their position
will, at every instant, be the resultant of the
stress of the reaction of air with the permanent
stress to which they are subjected owing to the
device.

Likewise, when the pilot desires the airplane to
fly off, the flaps are, when the airplane is sta-
tionary, set to the maximum of their displace-
ment; in proportion as the airplane takes up
speed by rolling, the flaps are gradually retracted
for assuming the position most favourable for
flying off.

By the device described in the United States
patent application filed on April 11, 1935, under
Serial No. 15,908, for "System for controlling the
evolutions of a movable object in a fluid", in the
name of the applicant, results of the same nature
can be obtained by sending in the cylinder, desig-
nated by reference number 23 in Fig. 4 of this
patent application, air under a definite pressure
by means of a distributor allowing at will, either
to admit air under this pressure or to allow it to
escape for retracting the flaps.

However, this arrangement has an incon-
venience in that it requires the presence of a
source of compressed air on board, and, conse-
quently, in that it does not allow utilization of
the flaps when there is a failure in the supply of
compressed air.

The device according to the present invention
is free of these inconveniences, as it is character-
ized by the fact that the energy necessary for
causing downward movement of a flap has been

stored during the preceding retraction of this
flap, so that the setting in action of the latter
for downward movement is independent of any
source of energy external to the device.

The invention is diagrammatically illustrated
in the accompanying drawing:

The flap 1 (operative position)—1^a (retracted
position)—pivoted at 2 at a suitable point of the
wing A, is controlled by the rod 3 of a piston 4
movable in a hydraulic cylinder 5, which com-
municates, through a conduit 6, with a hydro-
pneumatic accumulator 7, known per se. It is to
be noted that this accumulator encloses a piston
8 surmounted by a cushion of compressed air 9,
whilst the lower chamber 10 of the accumulator,
underneath the piston, is filled with liquid, the
latter also filling up the cylinder 5.

Through a conduit 11, this cylinder is con-
nected, at the rear of piston 4, with a pump 12
sucking the liquid from a tank 13 through a con-
duit 14. A valve 15, interposed in a pipe 16,
allows, when it is opened, of putting the conduit
11 directly in communication with the tank 13.

In its set or operative position, the flap 1 is
held by the pressure existing in the accumulator
7, the valve 15 being open. The pressure in the
accumulator 7 is determined in such a manner
that the flap 1 automatically retracts when the
speed of the airplane reaches a definite value.

For retracting the flap, the pilot closes the valve
15 and sets the pump 12 in action. The liquid
delivered by the latter into conduit 11 pushes
back piston 4: the flap retracts and, at the same
time, the pressure increases in accumulator 7.
The energy thus supplied to the accumulator dur-
ing the retracting operation of the flap will be
used during the next downward movement of the
flap since at this moment, owing to the fact that
the valve 15 is opened, it is the accumulator which
will supply the energy necessary for this down-
ward movement.

What I claim as my invention and desire to se-
cure by Letters Patent is:

A device for the control of an airplane camber
flap, or the like, comprising: a hydraulic cylinder,
a piston movable in said cylinder, a hydro-pneu-
matic accumulator, a pipe line connecting this
cylinder with said tank on one side of said piston,
a liquid tank connected to said cylinder on the
other side of the piston, a valve interposed in the
pipe line connecting the cylinder to the tank,
a source of hydraulic pressure allowing to move
said piston in the direction corresponding to the
increase of the pressure in said accumulator, and
means for connecting said piston to the camber
flap for actuating the latter in one direction and
in the other.

RENÉ LUCIEN LEVY.