

Nov. 19, 1940.

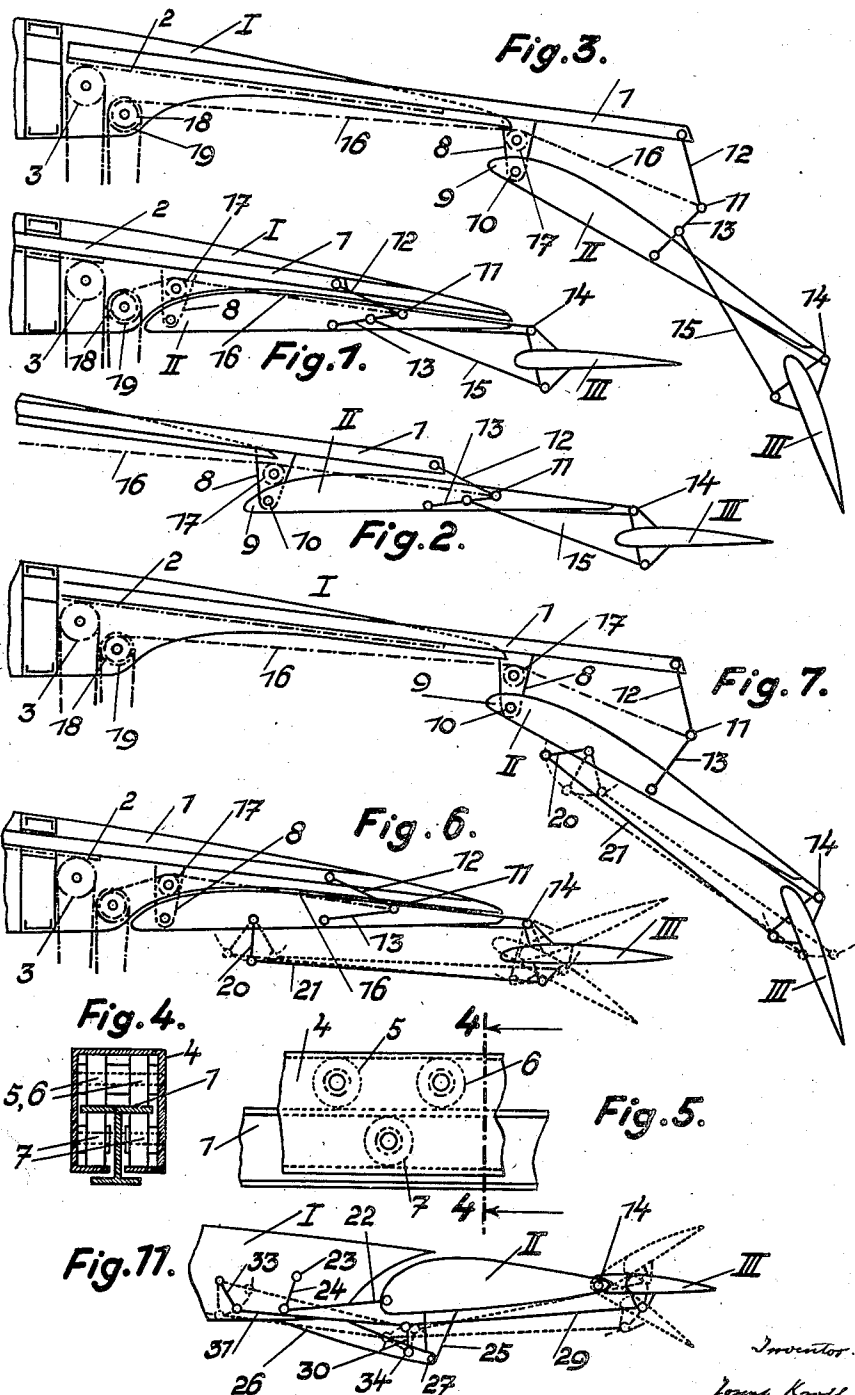
J. KSOLL

2,222,435

AIRPLANE SUPPORTING PLANE

Filed July 12, 1938

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

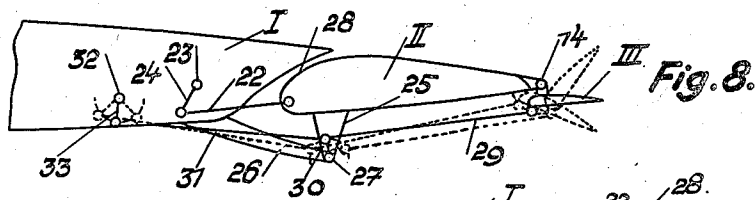


Fig. 9.

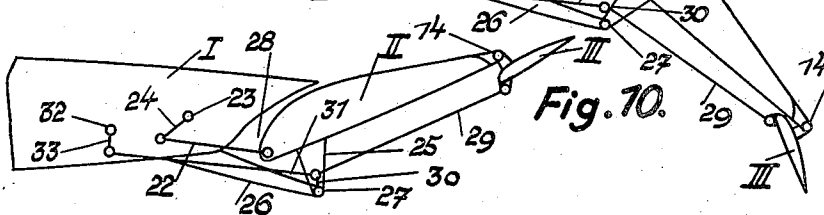
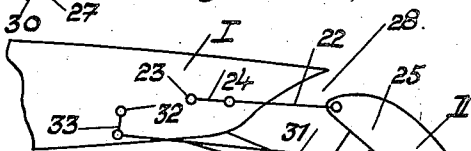


Fig. 13.

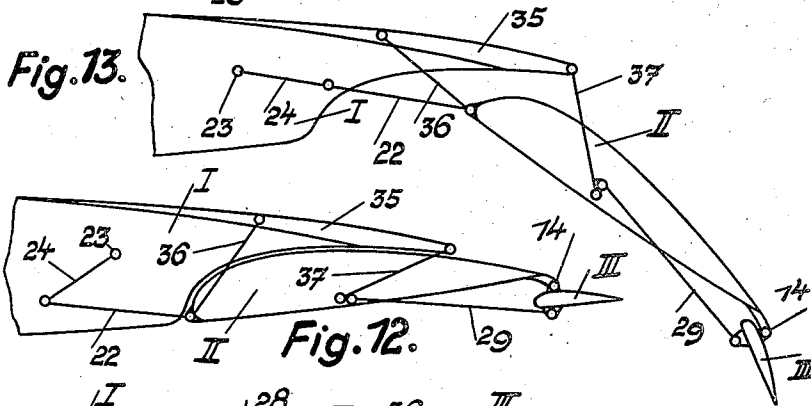


Fig. 12.

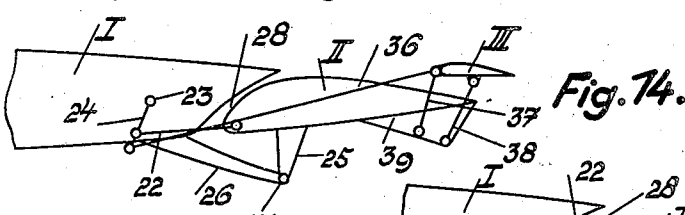


Fig. 14.

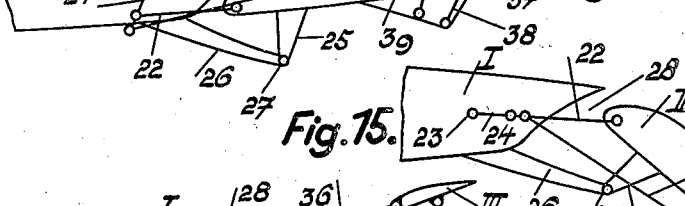


Fig. 15.

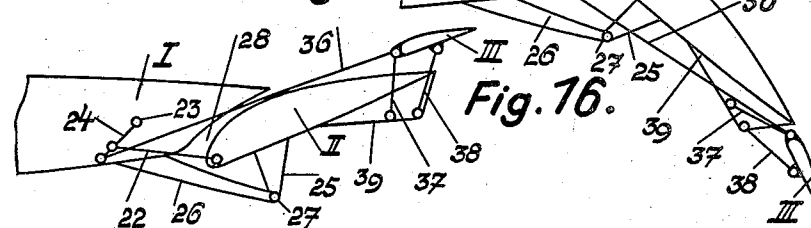
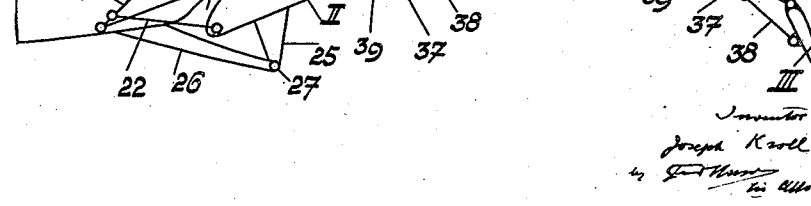


Fig. 16.



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Fig. 18.

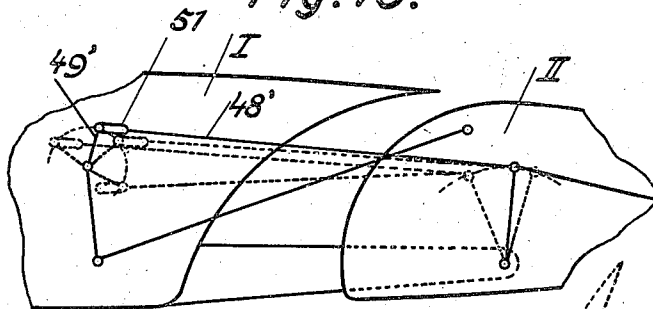


Fig. 17.

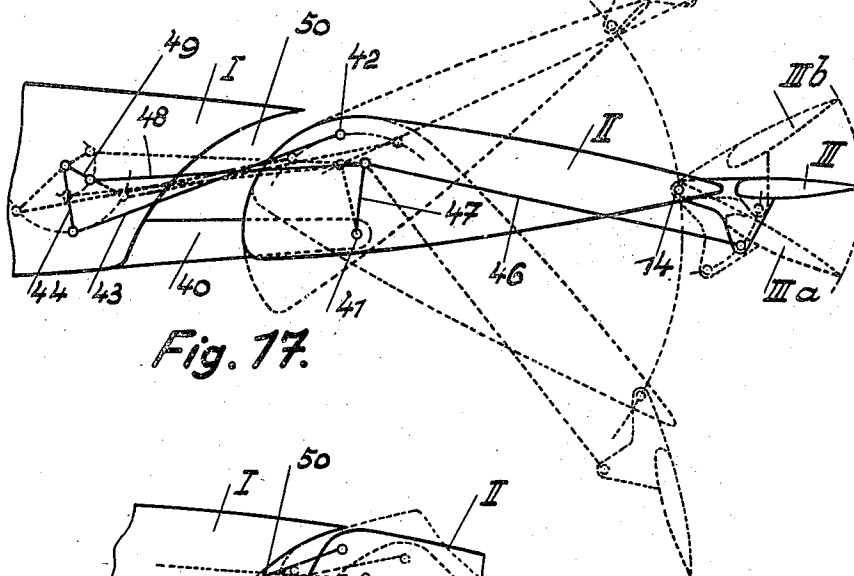
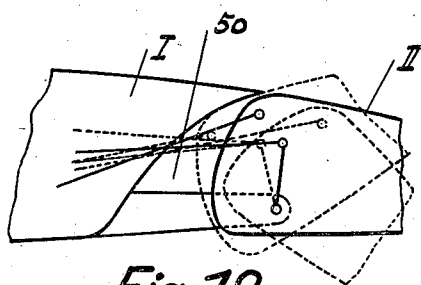


Fig. 19.



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UNITED STATES PATENT OFFICE

2,222,435

AIRPLANE SUPPORTING PLANE

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In Germany July 17, 1937

12 Claims. (Cl. 244—42)

As the inventor has recognized and as has recently also been discovered by other parties, a flap arranged outside the normal profile underneath the same and whose nose projects under the trailing edge of the normal profile does not influence the characteristic aerodynamic properties of the normal profile. On the other hand, a considerable increase in lift results when the flap is swung downwards.

The inventor utilizes this effect of the flap arranged outside the normal profile. In an airplane wing with a main adjustable surface rearwardly shiftable, or rearwardly shiftable and at the same time rotatable, or only rotatable by an adjusting mechanism, and with a flap carried by the main adjustable surface and participating in the movement thereof and if necessary also independently rearwardly shiftable, or rearwardly shiftable and at the same time rotatable or only rotatable independently of the main adjustable surface by a separate adjusting mechanism, it is possible to provide according to the invention an arrangement such that the main adjustable surface in inoperative position supplements the airplane wing to form a normal profile, whereas the flap in inoperative position is located outside the normal profile, and at the same time to construct the controlling device of the flap in such a manner that, when the main adjustable surface is positively adjusted relatively to the airplane wing, the flap on its part is or can be positively adjusted relatively to the main adjustable surface. By such an adjustment of the two adjustable parts a considerable increase in the camber of the supporting surface and consequently an increase in the lift coefficient is attained, particularly when the main adjustable surface and therewith the flap are not only swung downwards but at the same time shifted rearwardly or shifted rearwardly and downwardly. At the same time, in the event of the main adjustable surface being rotatably mounted on the wing, it is advisable to construct the rear end of the wing and the front end of the main adjustable surface so that there is a nozzle shaped gap between the two even when they are in inoperative position or at least turned into their downward position, thereby attaining a further increase of lift. Furthermore, in order to render the airplane wing also suitable for the purpose of lateral control, it is advisable in this instance to make the main adjustable surface also upwardly rotatable in negative adjustment to the airplane wing, and to construct the adjusting mechanism of the flap

so that, when the main adjustable surface is set in negative position relatively to the airplane wing, the flap for its part assumes the, or is brought into the negative position relative to the main adjustable surface.

It is known in connection with airplane supporting planes with Flettner rudders to oscillatably mount on an oscillatable main adjustable surface a small flap located in inoperative position within or outside the normal profile. As, however, the arrangement serves for reducing the forces necessary for the movement of the control or for balancing turning moments occurring on the airplane, the flap, when the main adjustable surface is swung in one direction, must be swung in the opposite direction. In the construction according to the invention, however, the control is so arranged that the main adjustable surface and the flap always swing in the same direction, that is for example when the main adjustable surface is positively set relative to the wing, the flap is or can also be positively set relative to the main adjustable surface.

Several embodiments of the invention are illustrated diagrammatically by way of example in the accompanying drawings, in which:

Figs. 1 to 3 illustrate the first form of construction in side elevation,

Fig. 4 shows a detail in section on line 4—4 of Fig. 5,

Fig. 5 is a side view of Fig. 4,

Figs. 6 and 7 are side views of a second form of construction,

Figs. 8 to 10 show a third form of construction in side elevation,

Fig. 11 is a side elevation of a fourth form of construction,

Figs. 12 and 13 illustrate a fifth form of construction,

Figs. 14 to 16 show a sixth form of construction,

Fig. 17 shows a seventh form of construction,

Figs. 18 and 19 each show a detail of the last mentioned form of construction in modified construction, Fig. 18 being shown on a larger scale than Figs. 17 and 19.

In all the figures of the drawings I designates the wing, II the main adjusting surface and III the subsidiary adjustable surface hereinafter referred to as the "flap" which participates in the movements of the main adjustable surface II. The parts of the supporting plane are connected in the usual manner by several similar adjusting mechanisms of constructions hereinafter de-

scribed arranged one behind the other transversely to the airplane wing.

Fig. 1 shows the first form of construction of the airplane wing with the main adjustable surface and flap in inoperative position. The main adjustable surface II supplements the wing I to a normal profile. The flap III is connected with the main adjustable surface and is in its inoperative position outside the normal profile, in this instance behind and below the same, and whereby its nose can engage in front of the rear edge of the aileron. The main adjustable surface II is carried by a longitudinally shiftable bar I arranged on the wing I. The bar I has on its underside a rack 2 meshing with a pinion 3 arranged on the wing I and adapted to be rotated in a suitable manner from the pilot's seat. The construction may correspond for example to Figs. 4 and 5 in that a box rail 4 is mounted on the wing and carries guide rollers 5, 6, 7 which serve as guide for the bar I of I cross-section. A bearing 8 for a transverse axle 10 extending through the nose 9 of the main adjustable surface II is fixed on this bar I. Furthermore the bar I and the main adjustable surface II are connected by a pair of levers 12, 13 oscillatably connected by a pivot axle 11 and between which a spring, omitted from the drawings for the sake of clearness, is arranged for maintaining the levers in the position shown in Fig. 1. The main adjustable surface II has on its rear end an axle 14 about which the flap III can oscillate. The under side of flap III is connected to the lever 13 by a link 15. A rope 16 attached to the pivot axle 11 is conducted over a roller 17 mounted on the bearing 8 and passes to a rope drum 18 on which it winds and is attached. The rope drum 18 is freely rotatable about its axle in clockwise direction but can be turned back by hand, for example by means of a wheel 19 adapted to be coupled therewith and to be rotated from the pilot's seat.

Fig. 1 shows the parts in the position of rest. By turning the pinion 3 in clockwise direction the bar I and consequently the main adjustable surface II and flap III are shifted rearwards into the position shown in Fig. 2, without altering their mutual position and their position relative to the bar I. An abutment, not shown on the drawings, limits the shifting movement. During the rearward shifting of the parts the rope 16 unwinds from the rope drum 18 which rotates in clockwise direction. If this drum is turned back by hand, the pivot axle 11 is pulled forward against the action of the spring interposed between the two levers 12, 13 with the result that the levers 12, 13 are spread apart and the main adjustable surface II and flap III brought into the position shown in Fig. 3.

The form of construction illustrated in Figs. 6 and 7 differs from that shown in Figs. 1 to 3 in that the link 15 is lacking and in its stead an oscillatable adjusting lever 20 is arranged on the main adjustable surface II and connected by a link 21 to the underside of the flap III. The lever 20 can, by suitable control mechanism leading to the cockpit, be swung to the right or left irrespective of the position of the main adjustable surface II, whereby the flap III is set upwards or downwards. Therefore, the flap III participates in the shifting and also in the turning of the main adjustable surface II, but is independently movable relative to the main adjustable surface II irrespective of the position of the latter. This

form of construction is therefore particularly suitable for the lateral control.

In the form of construction according to Figs. 8 to 10 the flap III is behind and under the normal profile formed by the wing I and the main adjustable surface II in inoperative position (Fig. 8) its nose engaging in front of the rear end of the main adjustable surface; it participates in the displacement of the main adjustable surface II and is also individually movable so that also this form of construction is suitable for lateral control. The main adjustable surface II is, on the one hand, connected with a control lever 24 rotatable about an axle 23 on the wing I by a link 22 engaging the aileron head, and on the other hand it has a bracket 25 loosely oscillatable about an axle 27 carried by a bracket 26 on the wing I. By turning the control lever 24 in counter clockwise direction the main adjustable surface II can be moved out of the inoperative position shown in Fig. 8 into the position shown in Fig. 9, the gap 28 present between the wing I and main adjustable surface II in inoperative position being considerably enlarged. Furthermore, owing to the gap 28 existing between wing I and main adjustable surface II in inoperative position, the control lever 24 can also be turned in clockwise direction and then the main adjustable surface II moved from the position of Fig. 8 into that of Fig. 10.

The flap III is oscillatably mounted by means of an upper bracket on an axle 14 on the tail end of the main adjustable surface II and connected to a one-armed lever 30, oscillatable about the axle 27, by means of a link 29 extending along the underside of the main adjustable surface II. This lever is also connected by means of a link 31 with a second control lever 33 oscillatable about an axle 32 arranged on the wing I, which lever 33 remains stationary during the oscillation of the control lever 24 for adjusting the main adjustable surface II. Thus, the flap III is positively adjusted during the adjustment of the main adjustable surface II so that when the main adjustable surface II is swung downwards and thus set positively relatively to the airplane wing, the flap will also be positively adjusted to the main adjustable surface and when the latter is moved upwards and thus set negatively to the wing, the flap will also be set negatively to the main adjustable surface. However, if the control lever 24 is locked, after it has been used to bring the main adjustable surface II into any desired position, the flap III can be adjusted also independently of the main adjustable surface II by swinging the control lever 33 in clockwise or counterclockwise direction, as is illustrated for example in Fig. 8 by the positions of the flap III indicated in broken lines. Owing to the individual adjustability of the flap III independently of the adjustability of the main adjustable surface II, the form of construction described is, as already mentioned, also suitable for the purpose of lateral control.

The construction illustrated in Fig. 11 differs from that shown in Figs. 8 to 10 only in that the flap III is located behind the main adjustable surface II and the lever 30 is oscillatable about an axle 34 carried by the bracket 26. When the control lever 33 is stationary, and the control lever 24 is swung in clockwise or anti-clockwise direction to set the main adjustable surface II downwards (in positive adjustment to the airplane wing) or upwards (in negative adjustment to the airplane wing), the flap III is also set

positively or negatively to the main adjustable surface, and the extreme positions of the two surfaces then correspond to those shown in dash lines in Fig. 17.

In the construction according to Figs. 12 and 13 the main adjustable surface II is suspended by two links 37, 38 from an upper bracket 35 of the wing I. The lower end of the front link is connected by a connecting rod 22 with the control lever 24 oscillatable about the axle 23 on the wing I. In inoperative position (Fig. 12) there is only a narrow gap between the wing I and the main adjustable surface II, which gap prevents the control lever 24 from turning in clockwise direction and consequently a movement of the main adjustable surface II in upward direction. The control lever 24 can therefore only be turned in counter clockwise direction, and the main adjustable surface II then moves out of the position shown in Fig. 12 into that shown in Fig. 13. In this instance the flap III, when the parts are in inoperative position, is located under the normal profile formed by the wing I and the main adjustable surface II and is oscillatable about the axle 14 arranged on the tail end of the main adjustable surface II or on a bracket at the rear thereof. The flap III is hingedly connected by a link 29 on its under side with the foot end of the rear link 38. In the form of construction described the flap III is also adjusted during the adjustment of the main adjustable surface II, but is not independently movable.

In the form of construction illustrated in Figs. 14 to 16 the flap III in inoperative position is located above the tail end of the main adjustable surface II. As in the form of construction shown in Figs. 8 to 10 and 11 the control lever 24 oscillatable about the axle 23 is provided on the wing I and connected to the nose of the main adjustable surface II by the link 22. This main adjustable surface, by means of the lower bracket 25, is loosely rotatable about the axle 27 mounted in the bracket 26 on wing I. On the control lever 24 a second link 36 is hingedly mounted which extends to the nose end of flap III. This flap is carried by two links 37, 38 whose lower ends are articulated in a second lower bracket 39 of the main adjustable surface II. When the parts are in inoperative position there is a gap 28 between the main adjustable surface II and the wing I. If the control lever 24 is swung in counterclockwise direction the parts move from the position shown in Fig. 14 into that shown in Fig. 15, in which the main adjustable surface II is turned downwards and the flap III, which was formerly above the tail end of the main adjustable surface, is now located behind and below the tail end and set positively to the main adjustable surface. If the control lever 24 is swung in clockwise direction the parts move out of the position shown in Fig. 14 into that shown in Fig. 16, without considerably altering the position of the flap III relatively to the main adjustable surface II.

The form of construction shown in Fig. 17 which is also suitable for lateral control is similar to that shown in Fig. 11 but apart from the differently constructed control, the main adjustable surface II is not rotatable about an axle mounted outside the main adjustable surface but about an axle 41 extending through the main adjustable surface and mounted in a bracket 40 on wing I. The main adjustable surface II has a pin 42 which is connected to one end of a lever 44 by a link 43. This lever 44 is keyed on an axle 45

mounted in the wing I. By turning the lever 44 or its axle 45 in one or other direction the main adjustable surface is swung downwards or upwards.

The flap III is rotatably mounted on the axle 14 arranged at the rear end of the main adjustable surface II. The flap III is connected by a link 46 to the end of a lever 47 loosely mounted on the axle 41 and this lever is in turn connected by a link 48 to a lever 49 mounted on the axle 45 of wing I.

If the two levers 44 and 49 are rigidly connected or keyed on their axle 45, the main adjustable surface II with the flap III will be set downwards or upwards into the positions shown in dotted lines in Fig. 17, by swinging the lever 44 or turning its axle 45 in counterclockwise or clockwise direction. When the main adjustable surface II is set downwards, that is positively to the wing, the flap III is below the rear end of the main adjustable surface set positively thereto and when the main adjustable surface is set upwards that is negatively to the wing, the flap is above the rear end of the main adjustable surface set negatively thereto.

As can be seen, there is a nozzle gap 50 between the front end of the main adjustable surface and the rear end of the wing irrespectively of the position of the main adjustable surface. However, the rear bordering surface of the wing I and the front bordering surface of the main adjustable surface II may be so constructed, that the nozzle gap 50 is closed when the main adjustable surface II is swung upwards.

In the form of construction illustrated in Fig. 17 the flap is positively swung downwards or upwards during the swinging of the main adjustable surface. This results in the levers 44 and 49 always swinging together either directly or indirectly in that they are both mounted on the same axle 45. However, the lever 49 may be detachably connected to the lever 44 or the axle 45 so that the lever 49 can be adjusted independent of the lever 44. By swinging the two interconnected levers 44 and 49 the main adjustable surface II and flap III can be swung downwards or upwards into the positions shown in dot-dash lines and then, after the connection between the two levers 44 and 49 has been disengaged the lever 49 can be swung alone that is independent of the lever 44 with the result that the flap is set relative to the main adjustable surface remaining at rest.

A possibility of oscillation of the lever 49, independently of the possibility of lever 44 to oscillate, also appears necessary when, as is desirable for high speed flight, the flap III is to be adjusted out of its inoperative position in downward or upward direction into the position IIIa or IIIb (Fig. 17) when the main adjustable surface II is in its inoperative position. If such an adjustability of the flap is desired, it is advisable for attaining a sufficiently large angle of rotation of the flap III, that the position of the lever 49 can be altered and consequently also that of the link 48 relatively to the inoperative position of the lever 47 for the duration of the high speed flight. For example, sufficiently large angles of oscillation could be attained for the flap III, if the lever 49 were to be in the position 49' (Fig. 18) and the link 48 in the position 48'. As, however, the link must be of greater length in the position 48' than in the position 48, this construction requires an adjustability of the lever end in the longitudinal direction of the link rod. This

requirement may be accounted for, for instance, in that the link rod 48 has at the point of connection with the lever end a longitudinal slot 51 in which the lever end can be suitably shifted in preserving its hinge connection with the link rod brought into the position 48' and can be locked for the duration of the high speed flight.

In the construction shown in Fig. 19 the rear bordering surface of the airplane wing I and the front bordering surface of the main adjustable surface II are so shaped, that the gap 50 between them is closed at its upper side when the main adjustable surface II is in inoperative position and remains closed when the main adjustable surface is swung upwards, but opens and becomes operative as a nozzle gap when the main adjustable surface is swung downwards.

When the surfaces are used as flaps they are merely swung downwards with respect to the wings; when used for lateral control the surfaces of one wing are moved opposite to the surfaces of the other.

I claim:

1. In a tripartite airplane supporting wing composed of a fixed part, of a main adjustable surface arranged at the trailing end of the fixed part and of a flap arranged at the trailing end of the main adjustable surface, a control connecting the main adjustable surface with the fixed part for varying the angular position of the main adjustable surface relative to the fixed part by turning the main adjustable surface about a horizontal transverse axis, a mechanism operatively connecting the flap with a precedent wingpart for adjusting the flap together with the main adjustable surface for varying the angular position of the flap relative to the main adjustable surface by turning the flap about a horizontal transverse axis, the mechanism being so constructed, that the main adjustable surface relative to the fixed part and the flap relative to the main adjustable surface can be turned in the same sense, i. e. that by positive adjustment of the main adjustable surface relative to the fixed part the flap can assume a positive adjustment relative to the main adjustable surface whilst by negative adjustment of the main adjustable surface relative to the fixed part the flap can assume a negative adjustment relative to the main adjustable surface, the fixed part, the main adjustable surface and the flap being of such configuration and respective arrangement that, when the main adjustable surface and the flap are in their unadjusted initial position, the fixed part and the main adjustable surface form an airfoil of normal profile whilst the flap is situated outside this normal profile.

2. In a tripartite airplane supporting wing composed of a fixed part, of a main adjustable surface arranged at the trailing end of the fixed part and of a flap arranged at the trailing end of the main adjustable surface, a control connecting the main adjustable surface with the fixed part for varying the angular position of the main adjustable surface relative to the fixed part by turning the main adjustable surface about a horizontal transverse axis, a mechanism operatively connecting the flap with a precedent wingpart for adjusting the flap together with the main adjustable surface, for to and fro shifting the flap and for varying its angular position relative to the main adjustable surface by turning the flap about a horizontal transverse axis, the mechanism being so constructed, that the main adjustable surface relative to the fixed part and

the flap relative to the main adjustable surface can be turned in the same sense, i. e. that by positive adjustment of the main adjustable surface relative to the fixed part the flap can assume a positive adjustment relative to the main adjustable surface whilst by negative adjustment of the main adjustable surface relative to the fixed part the flap can assume a negative adjustment relative to the main adjustable surface, the fixed part, the main adjustable surface and the flap being of such configuration and respective arrangement that, when the main adjustable surface and the flap are in their unadjusted initial position, the fixed part and the main adjustable surface form an airfoil of normal profile whilst the flap is situated outside this normal profile.

3. In a tripartite airplane supporting wing composed of a fixed part, of a main adjustable surface arranged at the trailing end of the fixed part and of a flap arranged at the trailing end of the main adjustable surface, a control connecting the main adjustable surface with the fixed part for shifting to and fro the main adjustable surface and for varying its angular position relative to the fixed part by turning the main adjustable surface about a horizontal transverse axis, a mechanism operatively connecting the flap with a precedent wingpart for adjusting the flap together with the main adjustable surface and for varying the angular position of the flap relative to the main adjustable surface by turning the flap about a horizontal transverse axis, the mechanism being so constructed, that the main adjustable surface relative to the fixed part and the flap relative to the main adjustable surface can be turned in the same sense, i. e. that by positive adjustment of the main adjustable surface relative to the fixed part the flap can assume a positive adjustment relative to the main adjustable surface whilst by negative adjustment of the main adjustable surface relative to the fixed part the flap can assume a negative adjustment relative to the main adjustable surface, the fixed part, the main adjustable surface and the flap being of such configuration and respective arrangement that, when the main adjustable surface and the flap are in their unadjusted initial position, the fixed part and the main adjustable surface form an airfoil of normal profile whilst the flap is situated outside this normal profile.

4. In a tripartite airplane supporting wing composed of a fixed part, of a main adjustable surface arranged at the trailing end of the fixed part and of a flap arranged at the trailing end of the main adjustable surface, a control connecting the main adjustable surface with the fixed part for shifting to and fro the main adjustable surface and for varying its angular position relative to the fixed part by turning the main adjustable surface about a horizontal transverse axis, a mechanism operatively connecting the flap with a precedent wingpart for adjusting the flap together with the main adjustable surface, for shifting to and fro the flap and for varying its angular position relative to the main adjustable surface by turning the flap about a horizontal transverse axis, the mechanism being so constructed, that the main adjustable surface relative to the fixed part and the flap relative to the main adjustable surface can be turned in the same sense, i. e. that by positive adjustment of the main adjustable surface relative to the fixed part the flap can assume a positive adjustment relative to the main adjustable surface whilst by negative ad-

justment of the main adjustable surface relative to the fixed part the flap can assume a negative adjustment relative to the main adjustable surface, the fixed part, the main adjustable surface and the flap being of such configuration and respective arrangement that, when the main adjustable surface and the flap are in their unadjusted initial position, the fixed part and the main adjustable surface form an airfoil of normal profile whilst the flap is situated outside this normal profile.

5. In a tripartite airplane supporting wing composed of a fixed part, of a main adjustable surface arranged at the trailing end of the fixed part and of a flap arranged at the trailing end of the main adjustable surface, a control connecting the main adjustable surface with the fixed part for varying the angular position of the main adjustable surface relative to the fixed part by turning the main adjustable surface about a horizontal transverse axis, a mechanism operatively connecting the flap with a precedent wingpart for adjusting the flap together with the main adjustable surface for varying the angular position of the flap relative to the main adjustable surface by turning the flap about a horizontal transverse axis, the mechanism being so constructed, that the main adjustable surface relative to the fixed part and the flap relative to the main adjustable surface can be turned in the same sense, i. e. that by positive adjustment of the main adjustable surface relative to the fixed part the flap can assume a positive adjustment relative to the main adjustable surface whilst by negative adjustment of the main adjustable surface relative to the fixed part the flap can assume a negative adjustment relative to the main adjustable surface, the fixed part, the main adjustable surface and the flap being of such configuration and respective arrangement that, when the main adjustable surface and the flap are in their unadjusted initial position, the fixed part and the main adjustable surface form an airfoil of normal profile whilst the flap is situated outside this normal profile and that already in this unadjusted initial position of the main adjustable surface a nozzle gap is formed between both these surfaces.

6. In a tripartite airplane supporting wing composed of a fixed part, of a main adjustable surface arranged at the trailing end of the fixed part and of a flap arranged at the trailing end of the main adjustable surface, a control connecting the main adjustable surface with the fixed part for varying the angular position of the main adjustable surface relative to the fixed part by turning the main adjustable surface about a horizontal transverse axis, a mechanism operatively connecting the flap with a precedent wingpart for adjusting the flap together with the main adjustable surface, for shifting to and fro the flap and for varying its angular position relative to the main adjustable surface by turning the flap about a horizontal transverse axis, the mechanism being so constructed, that the main adjustable surface relative to the fixed part and the flap relative to the main adjustable surface can be turned in the same sense, i. e. that by positive adjustment of the main adjustable surface relative to the fixed part the flap can assume a positive adjustment relative to the main adjustable surface whilst by negative adjustment of the main adjustable surface relative to the fixed part the flap can assume a negative adjustment relative to the main adjustable surface, the fixed part, the main adjustable

surface and the flap being of such configuration and respective arrangement that, when the main adjustable surface and the flap are in their unadjusted initial position, the fixed part and the main adjustable surface form an airfoil of normal profile whilst the flap is situated outside this normal profile and that already in this unadjusted initial position of the main adjustable surface a nozzle gap is formed between both these surfaces.

7. In a tripartite airplane supporting wing composed of a fixed part, of a main adjustable surface arranged at the trailing end of the fixed part and of a flap arranged at the trailing end of the main adjustable surface, a control connecting the main adjustable surface with the fixed part for shifting to and fro the main adjustable surface and for varying its angular position relative to the fixed part by turning the main adjustable surface about a horizontal transverse axis, a mechanism operatively connecting the flap with a precedent wingpart for adjusting the flap together with the main adjustable surface and for varying the angular position of the flap relative to the main adjustable surface by turning the flap about a horizontal transverse axis, the mechanism being so constructed, that the main adjustable surface relative to the fixed part and the flap relative to the main adjustable surface can be turned in the same sense, i. e. that by positive adjustment of the main adjustable surface relative to the fixed part the flap can assume a positive adjustment relative to the main adjustable surface whilst by negative adjustment of the main adjustable surface relative to the fixed part the flap can assume a negative adjustment relative to the main adjustable surface, the fixed part, the main adjustable surface and the flap being of such configuration and respective arrangement that, when the main adjustable surface and the flap are in their unadjusted initial position, the fixed part and the main adjustable surface form an airfoil of normal profile whilst the flap is situated outside this normal profile and that already in this unadjusted initial position of the main adjustable surface a nozzle gap is formed between both these surfaces.

8. In a tripartite airplane supporting wing composed of a fixed part, of a main adjustable surface arranged at the trailing end of the fixed part and of a flap arranged at the trailing end of the main adjustable surface, a control connecting the main adjustable surface with the fixed part for shifting to and fro the main adjustable surface and for varying its angular position relative to the fixed part by turning the main adjustable surface about a horizontal transverse axis, a mechanism operatively connecting the flap with a precedent wingpart for adjusting the flap together with the main adjustable surface, for shifting to and fro the flap and for varying its angular position relative to the main adjustable surface by turning the flap about a horizontal transverse axis, the mechanism being so constructed, that the main adjustable surface relative to the fixed part and the flap relative to the main adjustable surface can be turned in the same sense, i. e. that by positive adjustment of the main adjustable surface relative to the fixed part the flap can assume a positive adjustment relative to the main adjustable surface whilst by negative adjustment of the main adjustable surface relative to the fixed part the flap can assume a negative adjustment relative

to the main adjustable surface, the fixed part, the main adjustable surface and the flap being of such configuration and respective arrangement that, when the main adjustable surface and the flap are in their unadjusted initial position, the fixed part and the main adjustable surface form an airfoil of normal profile whilst the flap is situated outside this normal profile and that already in this unadjusted initial position of the main adjustable surface a nozzle gap is formed between both these surfaces.

9. In a tripartite airplane supporting wing composed of a fixed part, of a main adjustable surface arranged at the trailing end of the fixed part and of a flap arranged at the trailing end of the main adjustable surface, a control connecting the main adjustable surface with the fixed part for varying the angular position of the main adjustable surface relative to the fixed part by turning the main adjustable surface about a horizontal transverse axis, a mechanism operatively connecting the flap with a precedent wingpart for adjusting the flap together with the main adjustable surface for varying the angular position of the flap relative to the main adjustable surface by turning the flap about a horizontal transverse axis, the mechanism being so constructed, that the main adjustable surface relative to the fixed part and the flap relative to the main adjustable surface can be turned in the same sense, i. e. that by positive adjustment of the main adjustable surface relative to the fixed part the flap can assume a positive adjustment relative to the main adjustable surface whilst by negative adjustment of the main adjustable surface relative to the fixed part the flap can assume a negative adjustment relative to the main adjustable surface, the fixed part, the main adjustable surface and the flap being of such configuration and respective arrangement that, when the main adjustable surface and the flap are in their unadjusted initial position, the fixed part and the main adjustable surface form an airfoil of normal profile whilst the flap is situated outside this normal profile and that by the positively adjusted flap relative to the main adjustable surface a nozzle gap is formed between both these elements.

10. In a tripartite airplane supporting wing composed of a fixed part, of a main adjustable surface arranged at the trailing end of the fixed part and of a flap arranged at the trailing end of the main adjustable surface, a control connecting the main adjustable surface with the fixed part for varying the angular position of the main adjustable surface relative to the fixed part by turning the main adjustable surface about a horizontal transverse axis, a mechanism operatively connecting the flap with a precedent wingpart for adjusting the flap together with the main adjustable surface, for shifting to and fro the flap and for varying its angular position relative to the main adjustable surface by turning the flap about a horizontal transverse axis, the mechanism being so constructed, that the main adjustable surface relative to the fixed part and the flap relative to the main adjustable surface can be turned in the same sense, i. e. that by positive adjustment of the main adjustable surface relative to the fixed part the flap can assume a positive adjustment relative to the main adjustable surface whilst by negative adjustment of the main adjustable surface relative to the fixed part the flap can assume a negative adjust-

ment relative to the main adjustable surface, the fixed part, the main adjustable surface and the flap being of such configuration and respective arrangement that, when the main adjustable surface and the flap are in their unadjusted initial position, the fixed part and the main adjustable surface form an airfoil of normal profile whilst the flap is situated outside the normal profile and that by the positively adjusted flap relative to the main adjustable surface a nozzle gap is formed between both these elements.

11. In a tripartite airplane supporting wing composed of a fixed part, of a main adjustable surface arranged at the trailing end of the fixed part and of a flap arranged at the trailing end of the main adjustable surface, a control connecting the main adjustable surface with the fixed part for shifting to and fro the main adjustable surface and for varying its angular position relative to the fixed part by turning the main adjustable surface about a horizontal transverse axis, a mechanism operatively connecting the flap with a precedent wingpart for adjusting the flap together with the main adjustable surface and for varying the angular position of the flap relative to the main adjustable surface by turning the flap about a horizontal transverse axis, the mechanism being so constructed, that the main adjustable surface relative to the fixed part and the flap relative to the main adjustable surface can be turned in the same sense, i. e. that by positive adjustment of the main adjustable surface relative to the fixed part the flap can assume a positive adjustment relative to the main adjustable surface whilst by negative adjustment of the main adjustable surface relative to the fixed part the flap can assume a negative adjustment relative to the main adjustable surface, the fixed part, the main adjustable surface and the flap being of such configuration and respective arrangement that, when the main adjustable surface and the flap are in their unadjusted initial position, the fixed part and the main adjustable surface form an airfoil of normal profile whilst the flap is situated outside this normal profile and that by the positively adjusted flap relative to the main adjustable surface a nozzle gap is formed between both these elements.

12. In a tripartite airplane supporting wing composed of a fixed part, of a main adjustable surface arranged at the trailing end of the fixed part and of a flap arranged at the trailing end of the main adjustable surface, a control connecting the main adjustable surface with the fixed part for shifting to and fro the main adjustable surface and for varying its angular position relative to the fixed part by turning the main adjustable surface about a horizontal transverse axis, a mechanism operatively connecting the flap with a precedent wingpart for adjusting the flap together with the main adjustable surface, for shifting to and fro the flap and for varying its angular position relative to the main adjustable surface by turning the flap about a horizontal transverse axis, the mechanism being so constructed, that the main adjustable surface relative to the fixed part and the flap relative to the main adjustable surface can be turned in the same sense, i. e. that by positive adjustment of the main adjustable surface relative to the fixed part the flap can assume a positive adjustment relative to the main adjustable surface whilst by negative adjustment of the main ad-

justable surface relative to the fixed part the flap can assume a negative adjustment relative to the main adjustable surface, the fixed part, the main adjustable surface and the flap being of such configuration and respective arrangement 5 that, when the main adjustable surface and the flap are in their unadjusted initial position, the fixed part and the main adjustable surface form an airfoil of normal profile whilst the flap is situated outside this normal profile and that by the positively adjusted flap relative to the main adjustable surface a nozzle gap is formed be- 5 tween both these elements.

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