AIRCRAFT CIRCULARS

NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

No. 194

THE COMPER "STREAK" SINGLE-SEAT AIRPLANE (BRITISH)

A Low-Wing Cantilever Monoplane

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The original "Streak" was designed with the idea of competing in the International Air Races which a committee attempted to organize at Portsmouth last year. Unfortunately, these races did not mature, and the "Streak" never, therefore, came out. This year it was again decided to compete in the contest for the Coupe Deutsch de la Meurthe, and on April 12, the airplane was flown successfully. Views of the "Streak" are shown in figures 1, 2, 3, and 4.

During the first flight of the "Streak", made by Flight Lieutenant Comper himself, the new airplane proved itself perfectly balanced, and it was found that control and stability were good. One possible exception was formed by the ailerons, which were found to be surprisingly sensitive; so much so, in fact, that flutter developed. In this connection it should be pointed out that the mass-balances designed for the ailerons had not yet been fitted.** The flutter occurred at high speed only, and modern theory indicates that in nearly all cases a tendency to flutter can be cured by mass-balances.

Structurally, the fuselage of the "Streak" consists of spruce longerons, rigidly braced by spruce struts in W form with three-ply gussets of ample size, and the whole is fabric covered (fig. 6). Modifications have, of course, been made to the bottom longerons in the center portion of the fuselage, where it is placed over the wing (figs. 7 and 8).

The fairing over the rear part of the fuselage is of doped fabric over a light framework of spruce stringers. Between the fireproof bulkhead and the pilot's windshield a sheet-aluminum cover over the main fuel tank forms the top front decking and continues an excellent line back from the engine fairing.

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*From Flight, April 19, 1934.

**In the May 3 issue of Flight, a photograph (fig. 5) is given, showing the installation of mass-balances on a narrow-chord aileron, eliminating this flutter.

The wing is made up as a complete unit with box-section plywood and spruce spars; an ingenious joint allows the webs to be continuous, although the center portion of the spar is horizontal and the outer portions of the wing beyond the landing-gear housings are turned up to give a 5° dihedral angle. The ribs have solid three-ply webs with double spruce booms, and the three-ply covering over the whole wing removes any necessity for separate drag bracing. The ribs on either side of the landing-gear recesses are of laminated spruce, and steel tubes carry the drag stresses in the region of these recesses. The aileron spars are channel section spindled from spruce, with a three-ply web across the jaws of the channel. The ribs are constructed much in the same way as those of the wing, and a three-ply covering is also used. Figures 1 and 9 show the small fiber gear wheels in the wing which transfer the motion of the aileron control cables from the control column via external rods and levers to the ailerons themselves.

The stabilizer has spindled spruce spars, spruce and plywood ribs and is fabric covered, the elevator also being of the same construction. The rudder and fin, however, have steel tube posts with flanged steel plate ribs, spot-welded to sleeves which are pinned to the posts, the leading edge and trailing edge also being steel tubes. The controls are by cross shafts, rocking levers, and cables, following normal practice. The tail skid is a straightforward one composed of leaf springs. In the pilot's cockpit a large dashboard carries the usual range of instruments, including one of the latest turn-and-bank indicators and a pitch level.

The drawing of the center section, which carries the pilot's controls, shows how well placed are items like the operating handle for the landing gears on the starboard side and the brake lever on the port side (fig. 10). In order to assist the pilot as much as possible without increasing the drag of the airplane, transparent windows have been let in either side of the fairing below the windshield, and by them his view is quite considerably enhanced.

The engine mounting, carrying the special Gipsy Major engine, is of square-section, welded-steel tubes. The fuel system consists of a central tank mounted in the fuselage in front of the pilot, carrying 29 gallons (132 liters), and two wing tanks in the center portion of the wing either side of the fuselage, having a capacity of $8\frac{1}{2}$ gallons (38.6 liters) capacity each. The engine is sup-

plied with fuel by dual pumps. The cowling around the engine is of sheet aluminum. It is particularly neat and gives the fore part of the airplane very clean lines, at the same time providing adequate cooling. The side panels of the cowling are on vertical hinges at the front end and are secured, as are the top and bottom detachable panels, by a new cowling clip. The oil tank, in keeping with Comper practice, is cooled by a direct-air inlet on the port side, carrying cold air from the outside of the airplane through a tube running through the middle of the tank, and exhausted by a vent placed where the starboard wing root joins the fuselage. The engine drives a Fairey metal propeller.

The landing gear differs but slightly from that fitted in the Comper "Mouse". Only one compression leg is fitted either side of each wheel, and these legs are of a well-known type. Figures 11, 12, and 13 explain clearly the manner in which the locking pins are withdrawn when it is desired to raise the landing gear. Each unit comprising the structure carrying the compression legs and ultimately the wheel itself is, of course, entirely separate from the other except that a cross shaft enables the sprocket and chain drive in the cockpit to raise and lower both wheels simultaneously.

CHARACTERISTICS

Dimensions:

Length, over-all	5.49 m	18 ft. 0 in.
Height, over-all	1.75 "	5 " 9 "
Span of wing	7.16 "	23 " 6 "
Mean chord	1.13 "	3 " 8.75 in.
Wheel track	1.57 "	5 " 2 in.
Aspect ratio	5.8 to 1	
Dihedral angle	5^{o}	
Angle of incidence	1.5^{o}	
Airfoil section	R.A.F. 34	

Areas:

Main wing with ailerons	7.43 m^2	80 sq.ft.
Ailerons, total	.92 "	9.9 "
Stabilizer and elevators	1.39 "	15.0 "
Fin	.27 "	2.9 "
Rudder	.31 "	3.3 "

Weights:

Tare weight	399.16 kg	880 lb.
Pilot	77.11 "	170 "
Fuel (209.11 liters = 46 gal.)	160.57 "	354 "
Oil (11.36 liters = 2.5 gal.)	11.34 "	25 "
Gross weight	648.18 "	1,429 "
Maximum permissible weight	680.39 "	1,500 "

Loadings:

Wing loading	91.54 kg/m^2	18.75 lb./sq.ft.
Power loading	5.76 kg/hp	9.73 lb./hp.

Fuel consumption:

At 2,400 r.p.m.	52.27 liters/h	11.5 gal./hr.

Performance:

No performance figures yet available.

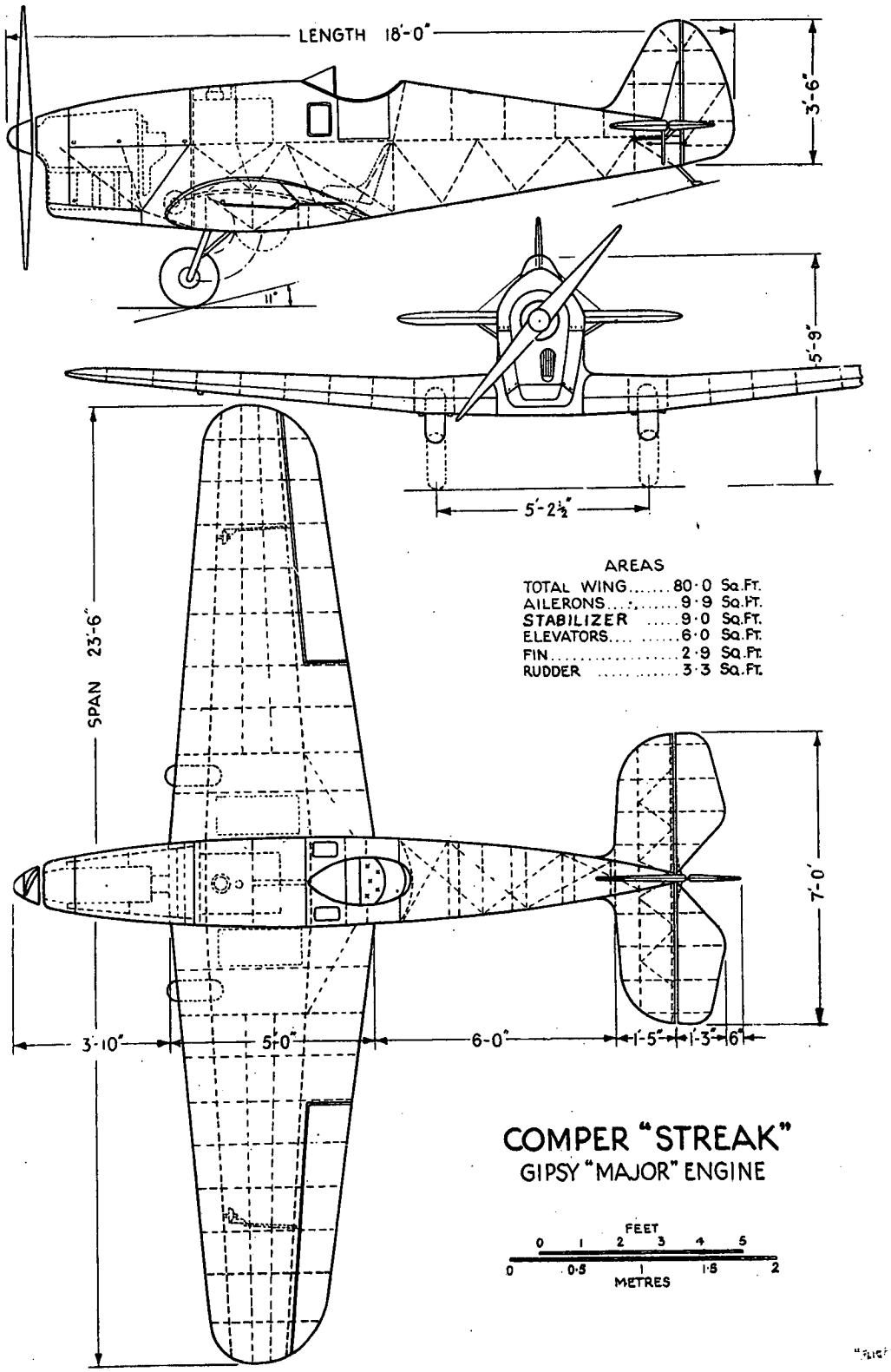


Figure 1.-General arrangement drawing of the Comper "Streak" airplane.

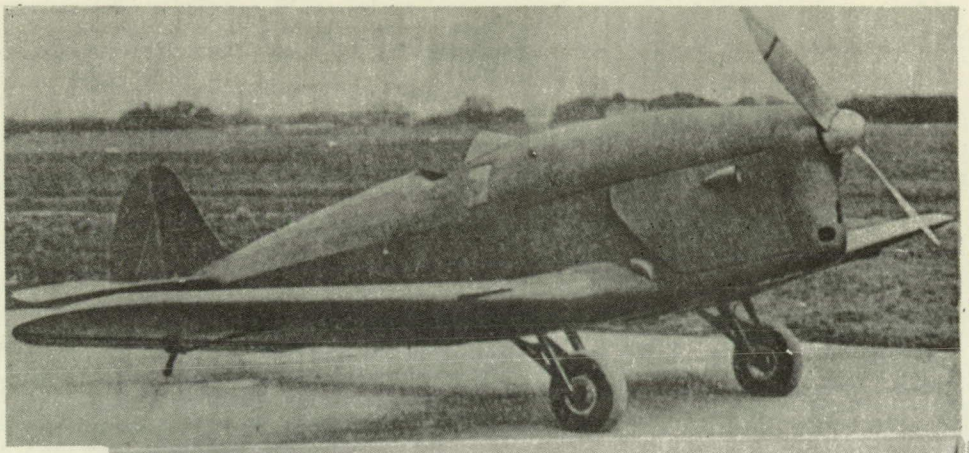


Figure 2.- View showing the racy lines of the Comper "Streak" airplane. "Flight"

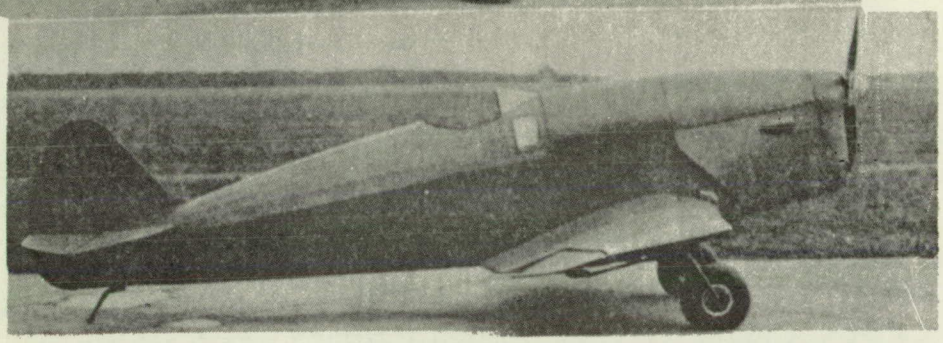


Figure 3.-The "Gipsy Major"engine of the Comper "Streak" airplane has been very cleanly faired in, but the cowling at the same time provides adequate cooling. "Flight"

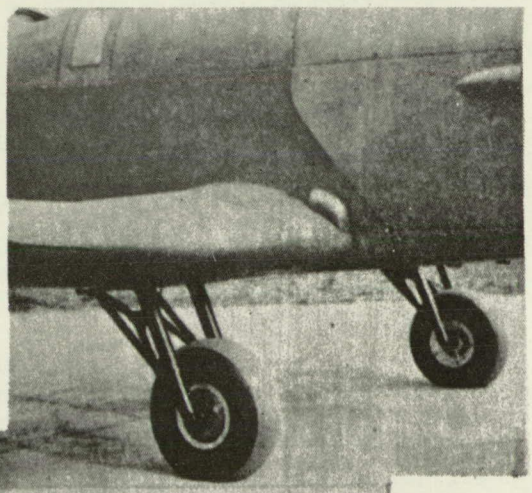


Figure 4.- The "Streak" is heavily fitted at the wing roots. Near the leading edge can be seen the exhaust for the cooling air which is led through the oil tank. The windows in the sides of the pilots cockpit should also be noted. "Flight"

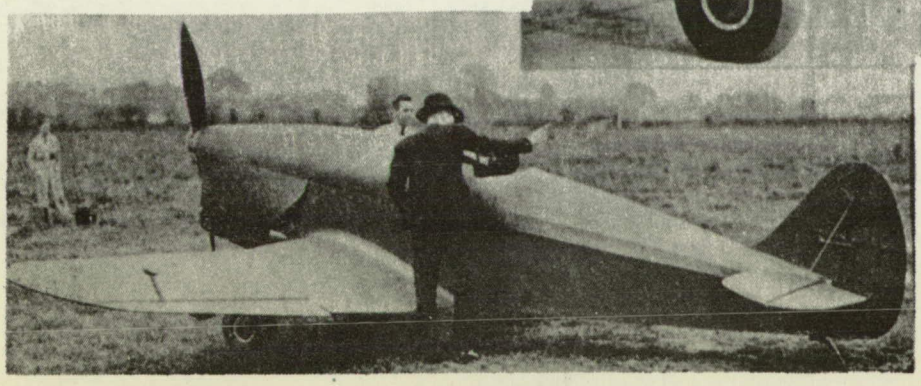


Figure 5.-By giving ailerons a very narrow chord and fitting mass-balances, as indicated, the aileron flutter has completely disappeared. "Flight"

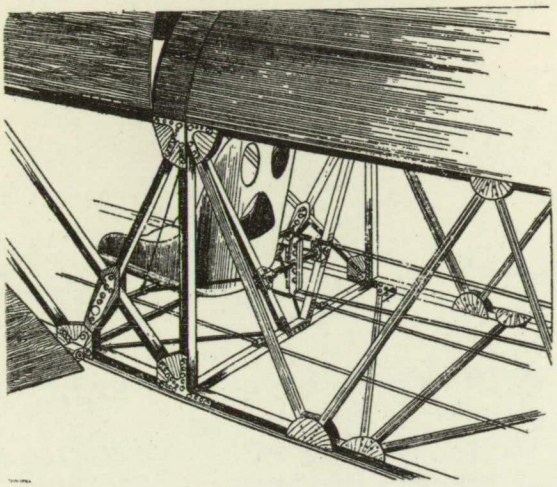
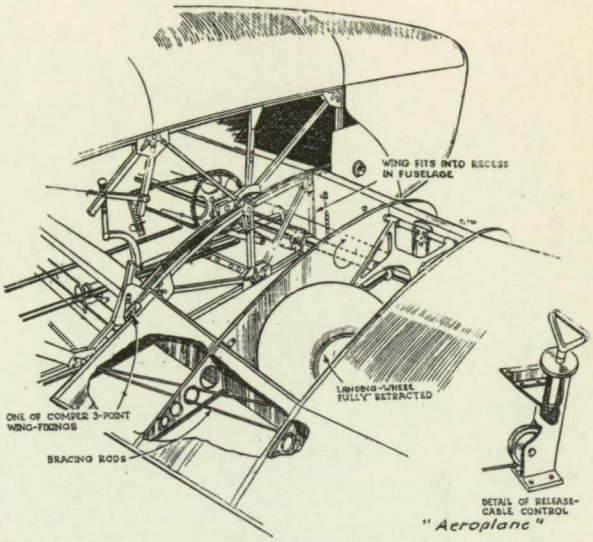
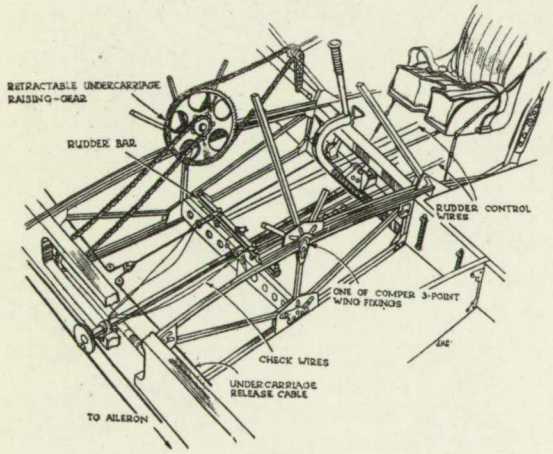


Figure 6.-Constructional details of the central portion of the fuselage. "Flight"



"Aeroplane"

Figure 7.



"Aeroplane"

Figures 7,8.-Details of the fuselage structure and the controls of the Comper "Streak" airplane seen from two angles.

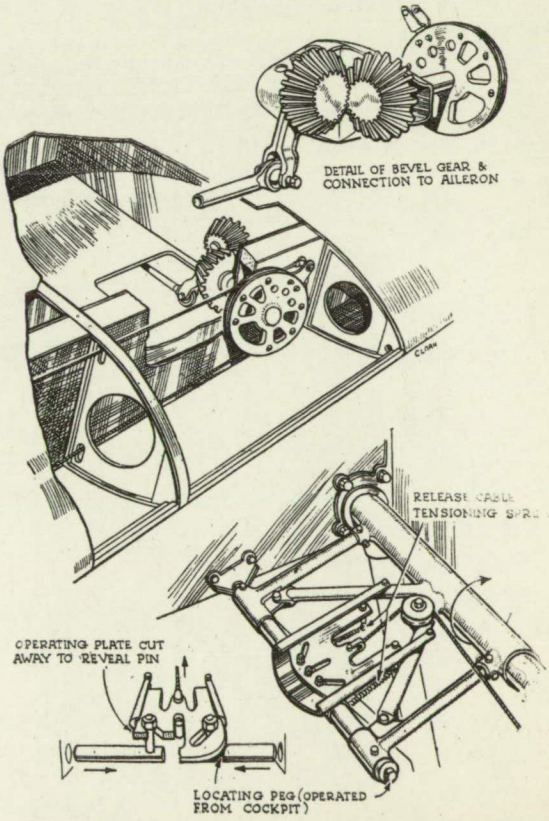


Figure 9.-The aileron control mechanism and the landing gear locking gear, the locations of which are shown in the schematic drawing, figure 13. "Aeroplane"

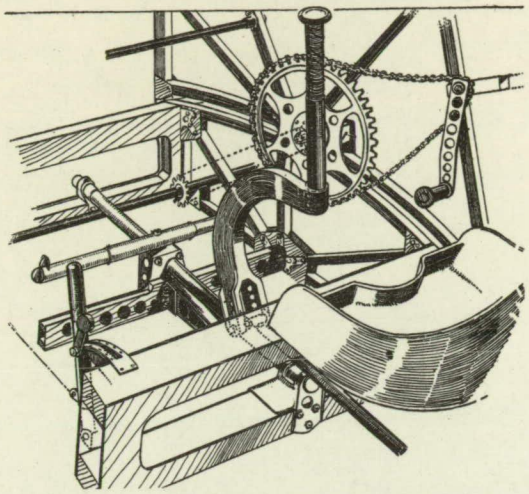


Figure 10.-The lever which raises and lowers the landing gear. "Flight"

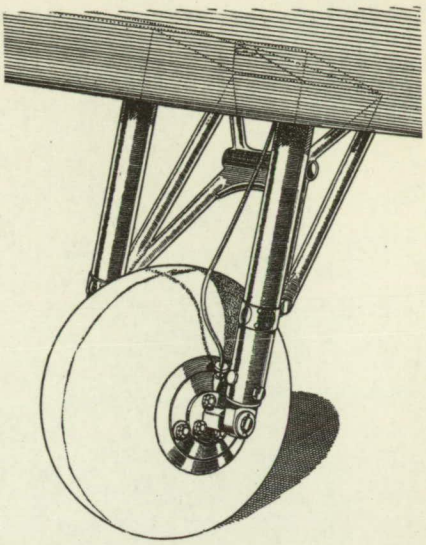


Figure 11.-A perspective sketch showing the general details of one side of the retractable landing gear. "Flight"

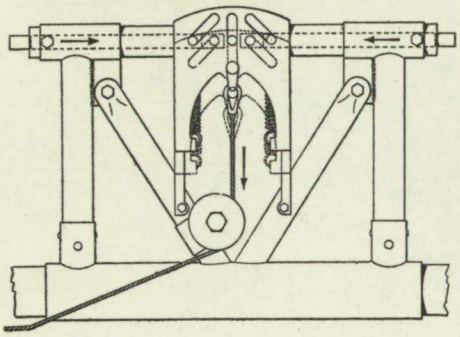


Figure 12.- The mechanism whereby the locking pins are withdrawn preparatory to raising the landing gear. "Flight"

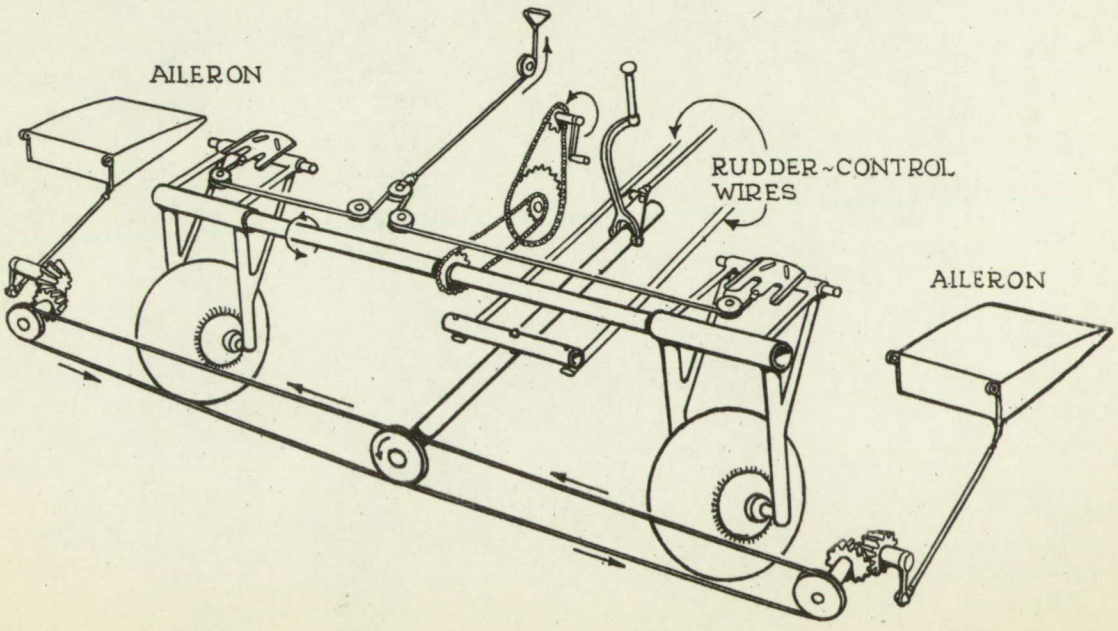


Figure 13.-Arrangement of aileron controls and landing gear raising-gear. "Aeroplane"