Jan. 6, 1925. 1,521,779

S. F. MARTIN

AEROPLANE WING ILLUMINATED SIGN ATTACHMENT

Filed Jan. 28, 1924 2 Sheets-Sheet 1

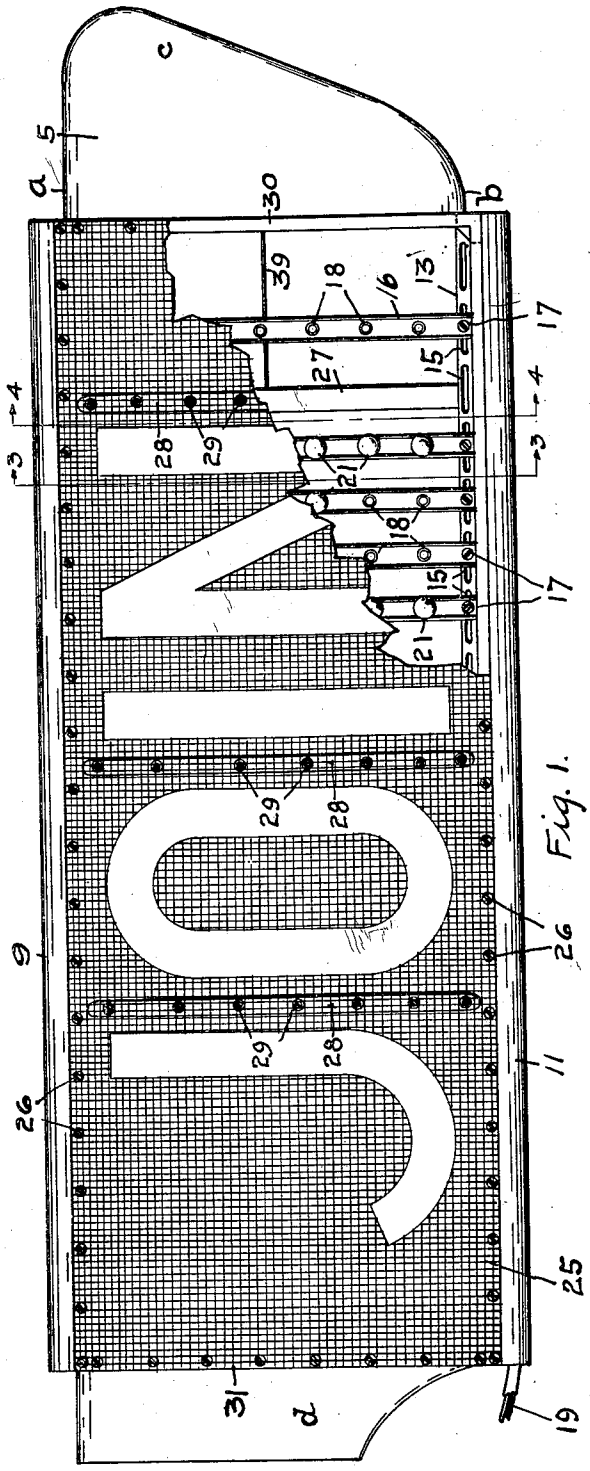


Fig. 1.

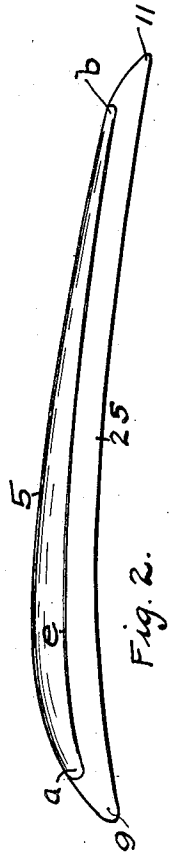


Fig. 2.

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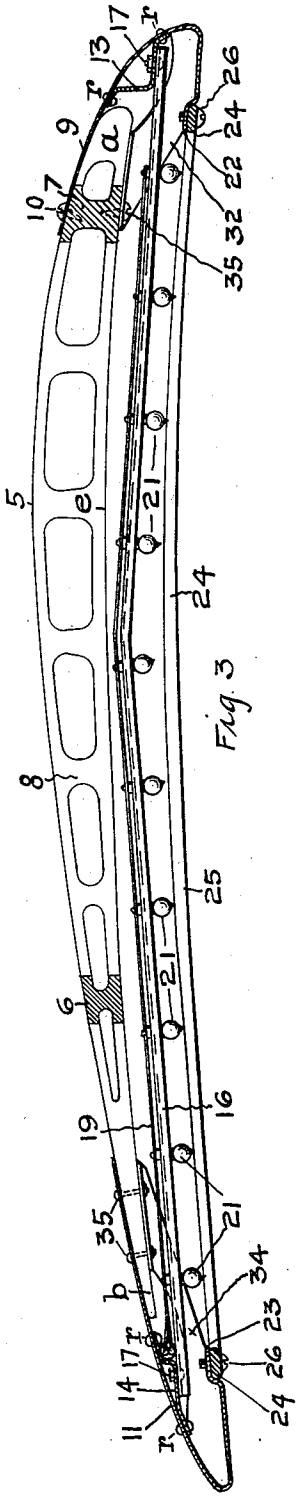


Fig. 3

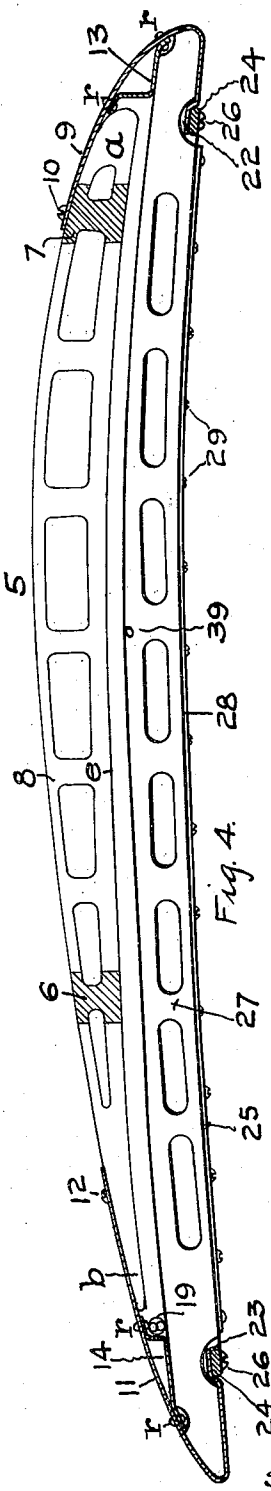


Fig. 4.

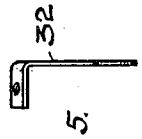


Fig. 5.

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Patented Jan. 6, 1925. 1,521,779

UNITED STATES PATENT OFFICE.

STANLEY F. MARTIN, OF INDIANAPOLIS, INDIANA, ASSIGNOR TO AERO-LIGHT CORPORATION, OF INDIANAPOLIS, INDIANA, A CORPORATION OF INDIANA.

AEROPLANE-WING ILLUMINATED-SIGN ATTACHMENT.

Application filed January 28, 1924. Serial No. 689,057.

To all whom it may concern:

Be it known that I, STANLEY F. MARTIN, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented new and useful Improvements in Aeroplane-Wing Illuminated-Sign Attachments, of which the following is a specification.

My invention relates to an improvement in aeroplane wing illuminated sign attachment and it is the primary purpose of my invention to provide means readily attachable to wings of aeroplanes for displaying illuminated characters and words that may be easily observed and read from the ground when the aeroplane is flying at safe altitudes.

Many attempts have been made to adapt illuminated characters to the under sides of aeroplane wings as a means of night display and attraction, but such attempts have always heretofore been unsuccessful owing to the fact that the characters blur and run into each other and can not be distinguished at the lowest possible safe altitude and even the ground observer must be directly under the plane to distinguish the display at lower altitudes.

My invention provides an illuminated display that may be easily read and distinguished from the ground when the plane is at altitudes of 3000 to 3500 feet and furthermore may be equally well observed and distinguished from wide angles, such as during the approach and retreat of the aeroplane over a considerable range.

Further objects of my invention lie in the adaptation of my sign attachment to any wing without removing the wing cover, altering the wing in any manner, or disturbing the struts; in the securing and shaping of my attachment to the aeroplane wing such that the flying ability and qualities are not interfered with; and in the interchangeability of the sign cover carrying the display. While my attachment practically doubles the thickness of the average sized aeroplane wing, I find that the attachment does not in anyway affect the handling of the aeroplane other than the obtaining of a slightly better response to the controls.

My invention is primarily for use in night flying, although the display, when illuminated may be observed in daylight. In using the illuminated display, at night, a very effective means of presenting advertising and conveying of messages to the ground observer is to be had, especially when a number of areoplanes are used with their underside illuminated displays flashing on and off in sequence far up in the sky.

I accomplish these and other objects as may hereinafter appear by the means as illustrated in the accompanying drawings, in which:—

Fig. 1, is a plan view of my illuminated sign attachment, attached to the under side of the wing of an aeroplane, with a fragment of the cover broken away to show the interior construction; Fig. 2, an end elevation of an aeroplane wing with my sign attachment suspended under it; Fig. 3, a section taken on the line 3—3 of Fig. 1; Fig. 4, a section taken on the line 4—4 of Fig. 1, to show an auxiliary rib installation and Fig. 5 a front elevation of a leading edge brace.

Like characters indicate like parts in the several views of the drawings.

Referring to the drawings, the wing 5 represents the usual and well known type of an aeroplane wing and for the purposes of my invention is the lower wing in other than mono-planes, in which "*a*" is the leading edge, "*b*," the trailing edge, "*c*" the outer end, "*d*," the fuselage end, and "*e*" the under side. The wing 5 is built up in the usual and well known manner with a covering over the spars 6 and 7 and the transverse ribs 8 as shown in Figs. 3 and 4.

To the top of the leading edge "*a*" of the wing 5, I attach a metal shell 9 by means of screws 10 passing through the shell 9 into the spar 7. The shell 9 extends forwardly and downwardly to follow practically the same curvatures as the top side of the wing, and then is bent rearwardly parallel to the under side of the wing to form a drop approximately equal to the greatest thickness of the wings. A similar trailing edge metal shell 11 is secured to the top side of the trailing edge *b* of the wing 5 by means of screws 12 extending through the shell 11 into the ribs 8 as in Fig. 4. The shell 11 extends rearwardly and downwardly following approximately a slightly greater curvature than that of the upper side of the trailing edge *b* and then forwardly parallel to the under side of the trailing edge *b* to give a drop as in the shell 9.

Within the shell 9 and the shell 11 are the angle strips 13 and 14 secured to the shells by rivets *r*. The angle strips 13 and 14 have a series of slots 15 as shown in Fig. 1 throughout their entire lengths. Secured to the angle strips 13 and 14 are a plurality of lamp receptacle bars 16 by means of bolts 17 passing through each end of the bars 16 and the slots 15 in the angle strips 13 and 14. The receptacle bars 16 are adjustable longitudinally of the wing 5 within the slots 15. The bars 16 are preferably made of channel section to insure sufficient rigidity with the desired lightness of weight and are upwardly arched to give lamp clearance as shown in Fig. 3. On each bar 16 are dependingly mounted a plurality of lamp receptacles 18 that are placed in an electrical circuit by means of the two-conductor cable 19 extending along the back of each bar 16, and connecting with each receptacle of that bar, which conductor in turn is tapped into the main feeder cable that is carried along the trailing edge angle strip 13 as shown in Figs. 3 and 4. The cable 19 leads to a storage battery carried within the fuselage of the aeroplane. The lamp receptacles 18 are of the miniature base type and are adapted to receive the lamps 21 of the 6—8 volt, 4 c. p. size which I find give ample illumination without too quickly exhausting the storge battery. A suitable generator operated by the aeroplane engine may supply current as well as the storage battery, or a combination of both as is commonly used in an automobile.

A flange 22 formed in the lower rear end of the leading edge metal shell 9 and a corresponding flange 23 in the lower front edge of the trailing edge metal shell 11 receive a light wood frame 24 to which is secured the sign cover 25. The sign composed of the frame 24 and cover 25 is attached to the shells 9 and 11 by means of machine screws 26 passing through the frame 24 and screwing into the screw-threaded holes in the shell flanges 22 and 23. The cover 25 is made of the usual aeroplane linen wing covering and has the desired display wording blocked out on it as the word "Join" in Fig. 1, while the remainder of the cover is rendered opaque such as by painting it black so as to leave that portion of the covering comprising the lettering translucent.

The bars 16 are previously arranged according to the particular sign by suitable adjustments in the slots 15 and by removal where not required, by placing them immediately back of the lettering and removing those lamps 21 not coming back of the particular letter, as in the letter N in Fig. 1.

In order to bring the sign cover 25 back up to conform to the same curvature as the underside *e* of the wing 5, I place a number of auxiliary ribs 27 having the proper curvature back of the sign cover 25 by resting their ends within the shells 9 and 11 and draw the cover 25 back and secure it to the ribs 27 by the battens 28, with the use of the wood screws 29 passing through the battens 28 and into the ribs 27. The ribs 27 are prevented from being longitudinally displaced such as by vibration by means of a transverse wire 39 extending the length of my sign attachment and anchored at each end in headers 30 and 31 used to fill in the space at the ends of the attachment and to hold the ends of the frame 24. To prevent distortion and the breaking down of the metal shells 9 and 11, I use a plurality of leading edge braces 32, a front elevation of which is shown in Fig. 5, each having a screw 33 passing through its flange into the rib 8 and its forward end fitting snugly into the shell 9, and a plurality of similar trailing edge braces 34, attached to the wing 5 by means of through rivets as 35.

Any number of sign displays may be made up in advance of their use by having a corresponding number of frames 24 and covers 25, inasmuch as by using interchangeable frames 24, the remainder of my invention is adjustable to correspond, such as the placing of the auxiliary ribs 27 and the illuminating lamps 21 with their bars 16.

Having fully described my invention in the form now best known to me, I desire to point out that it is capable of many variations in structure without departing from the spirit of the invention, and I therefore do not desire to be limited to the precise form as shown, nor any more than may be required by the following claims.

I claim:—

1. In an aeroplane, the combination with a wing, and a source of electrical energy, of means for displaying signs, said means being an homologous enlargement of said wing and suspended below said wing and having an under opaque cover with translucent characters.

2. In an aeroplane, the combination with a wing and a source of electrical energy, of an opaque sign cover having translucent characters, said sign cover being suspended below and having the same curvature as the under side of said wing, means of detachably securing said sign cover to said wing, and adjustable means for illuminating the characters of said sign cover.

3. In an aeroplane, the combination with a wing and a source of electrical energy, of an opaque sign cover having translucent characters, said sign cover being suspended below and having the same curvature as the under side of said wing, means of illuminating said characters a leading edge shell forming an homologous enlargement of the leading edge of said wing, a trailing edge shell forming an homologous enlargement

of the trailing edge of the wing, said leading-edge shell and said trailing-edge shell spacing said sign cover apart from said wing under-surface.

4. In an aeroplane, the combination with a wing and a source of electrical energy, of an opaque cover having translucent characters, means for illuminating said characters, said sign cover having the same curvature as the under side of said wing, a leading edge shell forming an homologous enlargement of the leading edge of said wing, a trailing edge shell forming an homologous enlargement of the trailing edge of the wing, said leading and trailing edge shells spacing said sign cover apart from the under side of said wing and means for removably securing the sign cover to the shells of said leading and trailing edges.

5. In an aeroplane, the combination with a wing and a source of electrical energy, of an opaque cover having translucent characters, means for illuminating said characters said sign cover having the same curvature as the under side of said wing, a leading edge shell forming an homologous enlargement of the leading edge of the wing, a trailing edge shell forming an homologous enlargement of the trailing edge of the wing, said leading and trailing edge shells spacing said sign cover below and apart from the under side of said wing and a plurality of braces from the wing to both shells.

6. In an aeroplane, the combination with a wing, of an opaque sign cover having translucent characters and suspended below the wing, means for detachably securing the sign cover to the wing, a plurality of laterally adjustable electric lamp supporting bars between the cover and the wing, and a plurality of electric lamps for each bar each lamp being removably secured to its bar.

7. In an aeroplane, the combination with a wing, of an opaque sign cover having characters suspended below the wing, means for detachably securing the sign cover to the wing, a lamp bar support adjacent each longitudinal edge of the wing, each bar having a plurality of longitudinal slots, a plurality of lamp-supporting bars extending from one of said bar supports to the other, bolts passing through the bars and through the slots in the bar supports, and a plurality of lamps removably secured to each bar.

8. In an aeroplane, the combination with a wing, of a hollow extension below the wing comprising an underside sign sheet, a plurality of ribs conforming to the curvature of the lower side of the wing located between the sheet and the wing, and means for securing the sheet to the ribs.

9. In an aeroplane, the combination with a wing, of a hollow extension below the wing comprising an underside sign sheet, a plurality of ribs conforming with the curvature of the lower side of the wing located between the sheet and the wing, means for securing the sheet to the ribs and means to prevent the longitudinal displacement of the ribs.

10. In an aeroplane, the combination with a wing, of a leading edge shell forming an homologous enlargement of the leading edge of said wing, a trailing edge shell forming an homologous enlargement of the trailing edge of the wing, a sign cover frame secured to both edge shells and supported in part thereby, a sign cover attached to the frame and a source of light between the sign cover and wing.

11. In an aeroplane, the combination with a wing, of a hollow extension below the wing comprising shells attached to the upper sides of the leading and the trailing edges of the wing and extending thence outwardly and downwardly in approximately the same curvature as that of the adjacent wing edge and then inwardly parallel with the adjacent under side of the wing, detachable sign closure means connecting the leading edge shell with the trailing edge shell, and means for bracing the shells.

12. In an aeroplane, the combination with a wing, of a hollow extension below the wing comprising shells attached to the upper sides of the leading and of the trailing edges of the wing and extending thence outwardly and downwardly in approximately the same curvature as the adjacent wing edge of the respective shells and thence inwardly parallel with the adjacent under side of the wing, headers to which the ends of the shells are attached, detachable sign closure means connecting the leading edge shell with the trailing edge shell, and means between the headers for bracing the shells.

13. In an aeroplane, the combination with a wing, of a shell attached to the upper side of the leading edge of the wing and extending thence outwardly and downwardly in approximately the same curvature as that edge of the wing and thence inwardly parallel with the adjacent under side of the wing, a second shell attached to the trailing edge of the wing and extending thence outwardly and downwardly in approximately the same curvature as its edge of the wing and thence inwardly parallel with the adjacent under side of the wing, headers to which the ends of the shells are attached, means between the headers for bracing the shells, ribs extending from one shell to the other curved to conform with the under side curvature of the wing, and a sign closure for the space bounded by the shells and headers, adjustable means of illuminating said sign closure and means for securing

the closure to the shells and headers and means for securing the closure to the ribs.

14. In an aeroplane, the combination with a wing, of an opaque sign cover having translucent characters suspended below the wing, means for detachably securing the sign cover to the wing, a lamp bar support adjacent each longitudinal edge of the wing, each bar having a plurality of longitudinal slots, a plurality of lamp-supporting bars extending from one of said bar supports to the other, bolts passing through the bars and through the slots in the bar supports, and a plurality of lamps removably secured to each bar, said lamps, lamp bars and lamp-supporting bars being within the inclosure between the under side of said wing and said sign cover, and said lamp-supporting bars being adjustably positioned to place said lamps immediately behind said translucent characters.

Signed at Indianapolis, Indiana, this 24th day of January, 1924.

STANLEY F. MARTIN.