

Jan. 8, 1924.

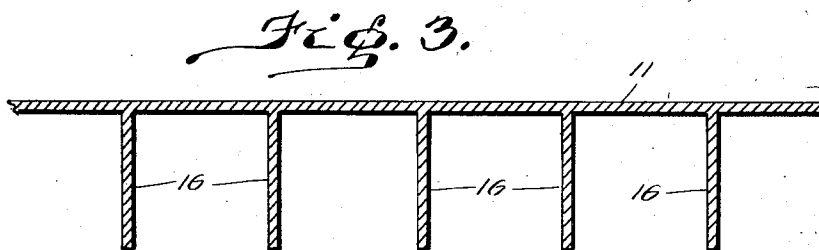
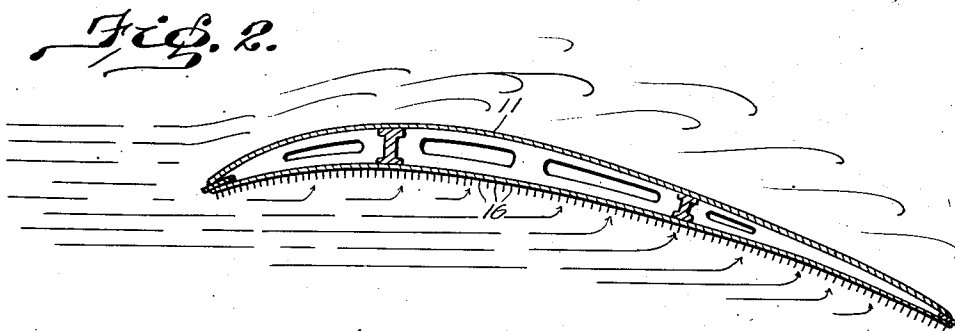
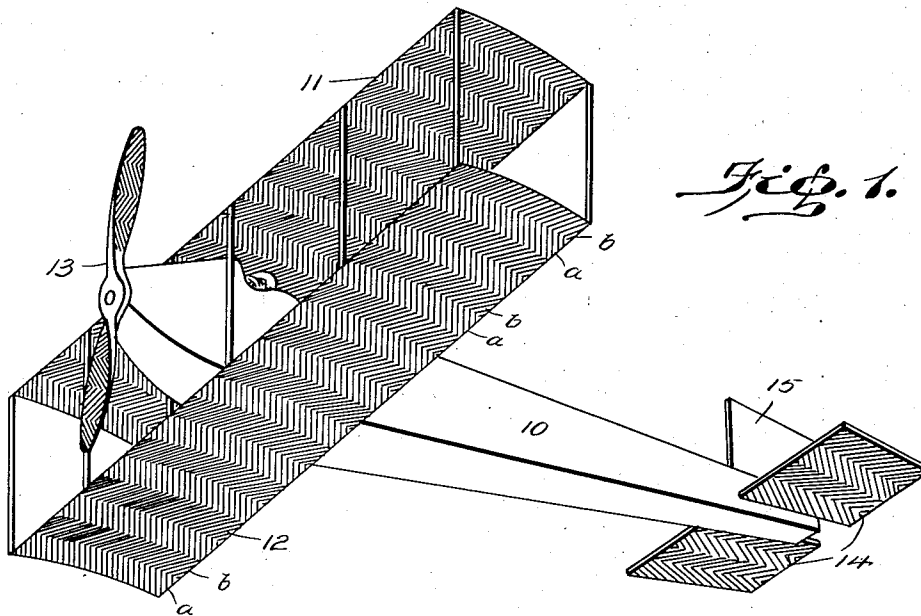
P. K. MILLER

1,480,408

AIR PRESSURE SURFACE CONSTRUCTION

Filed Nov. 14, 1921

2 Sheets-Sheet 1



Inventor
P. K. Miller,

By *Geot. Kimmel*
Attorney

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Fig. 4.

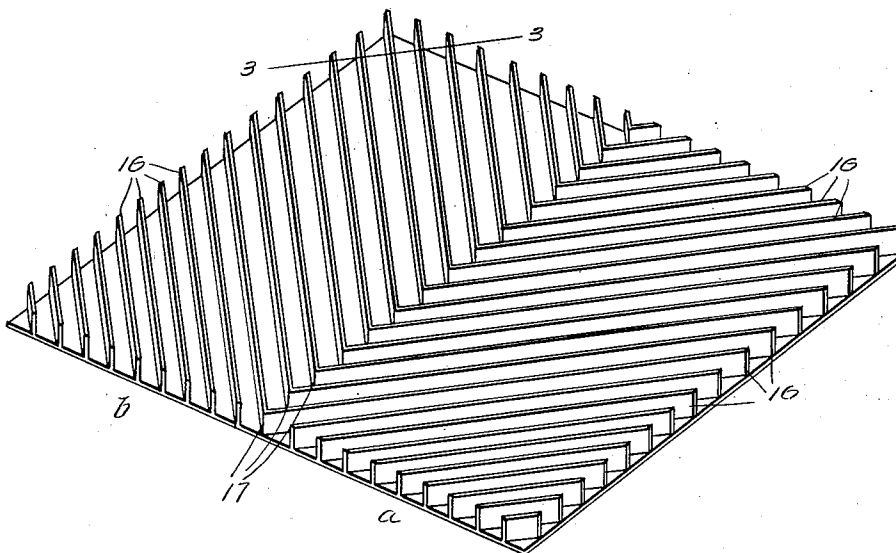


Fig. 5.

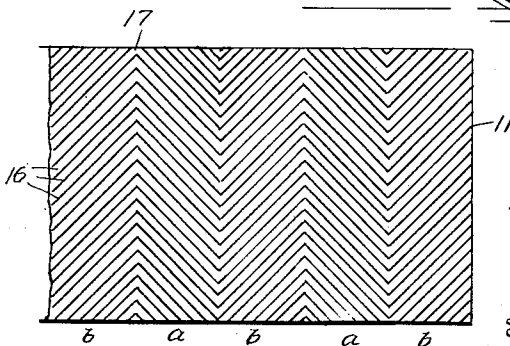
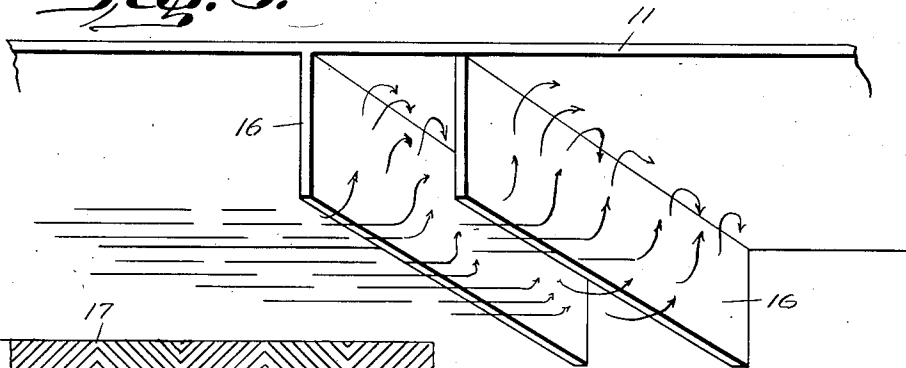


Fig. 6.

Inventor

P. K. Miller.

By

Geot. Kimmel.
Attorney

UNITED STATES PATENT OFFICE.

PAUL K. MILLER, OF COVINGTON, OHIO.

AIR-PRESSURE SURFACE CONSTRUCTION.

Application filed November 14, 1921. Serial No. 515,016.

To all whom it may concern:

Be it known that I, PAUL K. MILLER, a citizen of the United States, residing at Covington, in the county of Miami and State of Ohio, have invented certain new and useful Improvements in Air-Pressure Surface Constructions, of which the following is a specification.

This invention appertains to surface constructions which are movable in atmosphere for effecting the lifting, supporting and propelling of the same by the action of the air currents or streams thereof, or which are acted on by such air currents or streams for the production of mechanical energy or power for independent and extraneous purposes, such as is involved in air craft operation on the one hand, and the producing of power by windmill wheels or the like on the other.

The principal object of the invention is to provide for a means to be applied to any and all surfaces to be acted upon by air currents or streams, such surfaces being of themselves movable in the path of such air currents or streams, and either in the same direction of flow or movement thereof or in the direction opposed thereto, or movable in fixed position under the pressure exerted by the flow of movement of such currents and streams, whereby the ordinary pressures of the latter are concentrated, intensified or otherwise increased in a manner to effect a greater lifting, supporting and propelling of the said surfaces.

A further object of the invention is to provide for a means as characterized, and one to be incorporated in the construction of all wing, control and propelling surfaces of air crafts, and to the sides thereof against which air currents or streams exert their pressures for effecting the lifting, supporting, controlling and propelling of the air craft, whereby the capacity of such surfaces is increased to a marked degree, and to an extent that the normally high speeds now necessary for the successful, efficient and safe operation of air craft, can and will be greatly, or at least, correspondingly reduced.

Another object of the invention is to provide for a means of the character mentioned, and one which is capable of application to all devices operating in air, or acted upon by air, whereby the pressure effects of the

latter is increased to a degree, wherein it is possible to correspondingly reduce the driving speed of a device to obtain the same, or practically the same results as in the operation of now-known types of such devices on the one hand, or to correspondingly increase the power developed in a device acted upon by such increased pressure effects of air on the other hand.

With the foregoing and other objects in view, the invention resides in the certain novel and useful construction and arrangement of parts as will be hereinafter more fully described, set forth in the appended claims, and illustrated in the accompanying drawings, in which:—

Figure 1 is a perspective view of a conventional form of aeroplane, showing diagrammatically a preferred embodiment of the invention as applied thereto,

Fig. 2 is an enlarged transverse section taken through the upper part of the aeroplane wings or aerofoil, and showing diagrammatically the action of the air currents or streams on the surfaces thereof,

Fig. 3 is a section through the wing construction as taken on the line 3—3 of Fig. 4,

Fig. 4 is an enlarged fragmentary section, in perspective, of the pressure surface of an aeroplane wing and showing the preferred embodiment of the invention as applied thereto,

Fig. 5 is an enlarged fragmentary section of an aeroplane wing showing diagrammatically the action of the air currents or streams thereon, and,

Fig. 6 is a bottom plan view of a portion of the pressure surface, and showing the construction and arrangement of the same with the invention as preferably incorporated thereon.

Referring to the drawings, wherein similar characters of reference designate corresponding parts throughout the several views thereof, the numeral 10 indicates the fuselage of a conventional form of aeroplane; 11 the main supporting upper wings or aerofoil; 12 the main supporting lower wings or aerofoil; 13 the aerial screw or propeller; 14 the fixed horizontal stabilizers; and 15 the rudder thereof.

In the application of the invention to the foregoing briefly described and conventional aeroplane construction, all pressure or lower surfaces of the main supporting upper and

lower wings or aerofoils 11 and 12; of the fixed horizontal stabilizers 14; and the pressure surfaces of the aerial screw or propeller 13 are to be provided with a series of ribs 16, preferably of substantial slat-like form secured on edge and spaced equidistantly apart one with respect to the other. These ribs or slats 16, in their application to relatively long or wide surfaces, such as the main supporting upper and lower wings or aerofoils 11 and 12, and the stabilizers 14, are preferably arranged in a series of groups of two sets each, designated *a*, *b*, the ribs or slats 16 of each set being diagonally disposed one in a direction opposite to that of the other, and rearwardly from the leading edges of the said surfaces, whereby the apexes 17 of the angles formed by the connected ends of the inner pairs of the ribs or slats 16 are directed toward such leading edges and against the air current or stream caused by the forward movement of the surfaces when in flight.

As shown in Figs. 2 and 5, in the forward movement or flight of the lifting and supporting surfaces, such as the aerofoils 11 and 12 and the stabilizers 14, a partial vacuum is created upon the said surfaces in the usual manner, as at *x*, but the air or wind current or stream passing beneath the surfaces, instead of passing thereunder on a straight line from the leading edge to the trailing edge thereof, strikes the angularly and rearwardly directed ribs or slats 16, and passes under the surfaces on curving or diagonally extending lines, and are broken up into a number of streams or eddy currents corresponding to that of the number of channelways formed between the ribs or slats 16, and these independent streams or eddy currents have imparted to the same a whirling action, whereby the pressures of the same are directed upwardly against the under or lower surfaces of the aerofoils and stabilizers, and in a forward direction against the rearwardly disposed faces of the several ribs or slats 16. These ribs or slats 16 are preferably positioned on the pressure surfaces as aforesaid, and at an angle of approximately 45 degrees with respect to the line of flight thereof, while the depth of the channelways formed between the same will, under ordinary circumstances, be equal, or substantially so, to the width of the spaces between adjacent parallel sides of the ribs or slats 16. Also, these ribs or slats 16 are to be constructed of materials similar to that employed in the aerofoil or stabilizer structures, or from cloth, fibre, or the like, when used on the lifting, supporting, and control surfaces of air crafts, or from metal, when used on aerial screws, propellers or windmill wheel structures of wood or metal.

In the application of the ribs, slats or fins 16 on the pressure surfaces of aerial screws,

propellers or windmill wheels, the same may be separately formed and secured in position thereon, or, in the case of such screws, propellers or windmill wheels being made from metal, they may be integrally formed therewith and, in any case, the angular or diagonal disposition thereof in groups of two sets each will obtain, whereby the air pressure is equally split up into independent currents or eddies and directed in oppositely disposed parallel curved or diagonal lines rearwardly from the leading edge of the screw, propeller, or wheel to the trailing edges thereof.

From the foregoing, it will be readily apparent that the invention provides for a means whereby air currents or streams, normally passing directly across the pressure surfaces of air craft lifting, supporting and controlling surfaces, or the similar surfaces of screws, propellers, or wind wheels, are diverted from the leading edges thereof to the trailing edges of the same in a number of oppositely and angularly disposed currents or streams, with the consequent lengthening of the path of such currents and streams, and the imparting thereto of a whirling action, whereby the pressures exerted by the same are greatly increased, and are directed with fullest effect upwardly between the ribs or slats 16, whereby to correspondingly increase the lifting action of the pressure surface area of the lifting, supporting and controlling surfaces, and also an appreciable degree of such pressure, due to the whirling action aforesaid, is directed against the inner or rear side faces of the ribs or slats, and in a manner tending to aid in the forward flight of the said surfaces being acted upon, such as has been found in practice to allow for a marked reduction in the speed, in the case of air craft, necessary for the "take off" of the latter from the ground, and also for the supporting of the air craft during flight, as compared to that speed now required for the purpose.

It is well understood, that, while a preferred embodiment of the invention has been described and illustrated herein in specific terms and details of construction, arrangement and operation, various changes in and modifications thereof may be resorted to without departing from the spirit of the same, or from the scope of the claims appended hereto.

Having thus fully described the invention, what is claimed as new, is:

1. In air pressure surface construction in aerial navigation, means to provide the surface to be acted upon, and means for effecting the direction of the travel of the air current or stream on said surface, said means arranged in series, each series comprising two sets of spaced oppositely extending relatively thin rectangular ribs of slab-like form projecting from and disposed

diagonally with respect to said surface, certain of the ribs of each pair of sets abutting, and certain of the ribs of one set of ribs of one series abutting against certain of the ribs of one set of an adjacent series.

2. In air pressure surface construction in aerial navigation, means to provide the surface to be acted upon, and means for effecting the direction of the travel of the air current or stream on said surface, said means arranged in series, each series comprising two sets of spaced oppositely extending relatively thin rectangular ribs of slab-like form projecting from and disposed diagonally with respect to said surface, certain of the ribs of each pair of sets abutting, and certain of the ribs of one set of ribs of one series abutting against certain of the ribs of one set of an adjacent series, each of said ribs of the same width throughout.

3. In air pressure surface construction in aerial navigation, means to provide the surface to be acted upon, and means for effecting the direction of the travel of the air current or stream on said surface, said means arranged in series, each series comprising two sets of spaced oppositely extending relatively thin rectangular ribs of slab-like form projecting from and disposed diagonally

nally with respect to said surface, certain of the ribs of each pair of sets abutting, and certain of the ribs of one set of ribs of one series abutting against certain of the ribs of one set of an adjacent series, the ribs of each set of each pair of sets increasing in length from each end of the set toward the center of the set.

4. In air pressure surface construction in aerial navigation, means to provide the surface to be acted upon, and means for effecting the direction of the travel of the air current or stream on said surface, said means arranged in series, each series comprising two sets of spaced oppositely extending relatively thin rectangular ribs of slab-like form projecting from and disposed diagonally with respect to said surface, certain of the ribs of each pair of sets abutting, and certain of the ribs of one set of ribs of one series abutting against certain of the ribs of one set of an adjacent series, each of said ribs of the same width throughout, the ribs of each set of each pair of sets increasing in length from each end of the set toward the center of the set.

In testimony whereof, I affix my signature hereto.

PAUL K. MILLER.