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AIR TRANSFER ARRANGEMENTS
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Fig.1

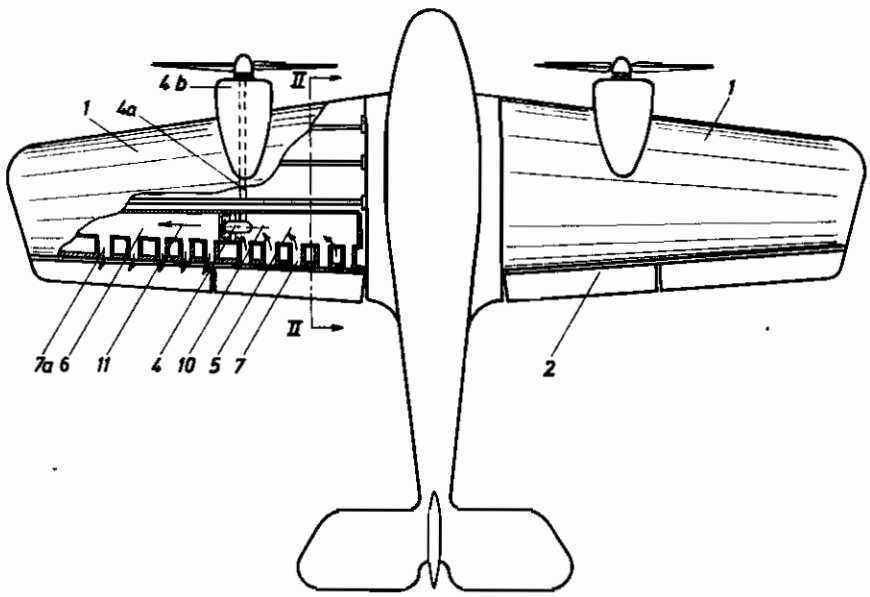


Fig.2

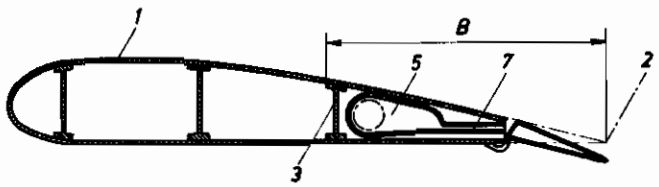
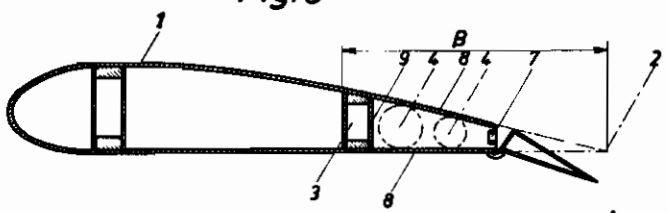


Fig.3



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ALIEN PROPERTY CUSTODIAN

AIR TRANSFER ARRANGEMENTS

Franz Villinger, Dessau, Germany; vested in the Alien Property Custodian

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This invention relates to improvements in air transfer arrangements for exhausting air from one portion of the skin layer adjacent a wing or fusclage and discharging it into another portion of the skin layer in order to effectively increase the lifting capacity of the airplane. I am aware that it is, broadly speaking, old to provide an arrangement including an air pumping mechanism and the necessary piping and ducts to accomplish this purpose, but the various parts in such arrangements have usually been spread throughout various portions of an airplane—either the wings, or the fuselage, or both. This has resulted not only in reducing the pay-load capacity, rendering loading more difficult, and necessitating the use of relatively long air piping and ducts having a number of bends therein so that extra large and heavy pumping mechanisms have been needed to obtain the desired increase in lifting capacity, but it has also necessitated very great care in distributing the pay-load so as not to disturb the balance of the airplane, because the transverse gravity axis of an airplane must extend across it along an imaginary line located one-third of the axial length of the wings from the front thereof and disposed at right angles to the longitudinal axis of the airplane.

It is an object of this invention to provide such an air transfer arrangement in an airplane wherein the entire arrangement is located in the back of each wing behind the rear main spar and is distributed across the major portion of the wing. In this manner provision is made for easy loading, and the pay-load space is provided substantially equally on both sides of the transverse gravity axis of the plane, so that however the load is distributed the gravity axis cannot be to any great extent disturbed. Moreover the pay load is then also carried in the strongest portion of the wing.

Another object of the invention is to provide such an air transfer arrangement which is located adjacent the portion of the skin layer it is most desirable to influence, thereby reducing the length of the piping and ducts to a minimum. Moreover the ducts to and from the air pumping mechanism may either be formed by an enclosed rear portion of the wing itself, or consist of suitable ducts carried therein.

Yet another object of the invention is to provide such an air transfer arrangement wherein the ducts extending transversely of the rear portion of a wing are provided with inlets and outlets respectively and are connected through suitable air pumping mechanism of the direct propeller or fan type so that a direct and efficient airflow results substantially in a straight line from the inlets to the outlets.

Having thus briefly stated some of the salient features of my invention and some of the advantages gained thereby, I will now proceed to describe two preferred embodiments thereof more fully with the aid of the accompanying drawings, in which:

Figure 1 illustrates a plan view of an airplane with a portion of the top of one of the wings broken away.

Figure 2 is an enlarged section on the line II—II of Figure 1.

Figure 3 is a similar sectional view showing a modification of both the wing and the air transfer arrangement.

Referring to Figures 1 and 2, 1 designates a main wing having a rear main spar 3 extending transversely thereof from the wing tip to the fuselage, and B denotes a wing zone extending between the rear spar 3 and the rear wing flap 2, within which zone it is most desirable to influence the skin layer of air by exhausting air from portions thereof and discharging this air into other portions thereof. Within the rear portion of the wing 1, and within the zone B, an air pumping mechanism 4 is provided, which is preferably of the propeller or fan type so that air is drawn therethrough and discharged therefrom substantially in a straight line. This air pumping mechanism 4 is suitably driven as by a shaft 4a extending rearwardly from a propeller motor 4b. The air pumping mechanism 4 has its axis 10 arranged parallel to, and substantially in alignment with the axes of, two aligned ducts, an intake duct 5 and a discharge duct 6, between which it is located. Opening into the duct 5 through the rear of the wing 1 are inlet passages 7, and opening into the duct 6 also through the rear of the said wing are outlet passages 7a. The passages 7 and 7a are so located that they are closed by the flap 2 when the latter is raised, and open when the flap is downwardly and rearwardly inclined. In this instance the ducts 5 and 6 are separate from, and mounted within, the rear portion of the wing 1.

Thus air drawn from the skin layer through the inlet passages 7 flows through the duct 5 to the pumping mechanism 4 by which it is discharged through the duct 6 and out through the outlet passages 7a, so that the air flows substantially directly in the direction of the arrow 11 from the inlets 7 to the outlets 7a without any abrupt change of direction.

In the modification shown in Figure 3 the ducts are formed by, and between the upper and lower walls 8 of the wing and rearwardly of a partition wall 9 supported by the rear main spar 3. In this instance two air pumping mechanisms 4 are indicated having their axes parallel with the axes of the ducts.

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