March 25, 1958 R. J. SCHLIEKELMANN 2,827,967

HELICOPTER ROTOR BLADE

Filed May 13, 1955 2 Sheets-Sheet 1

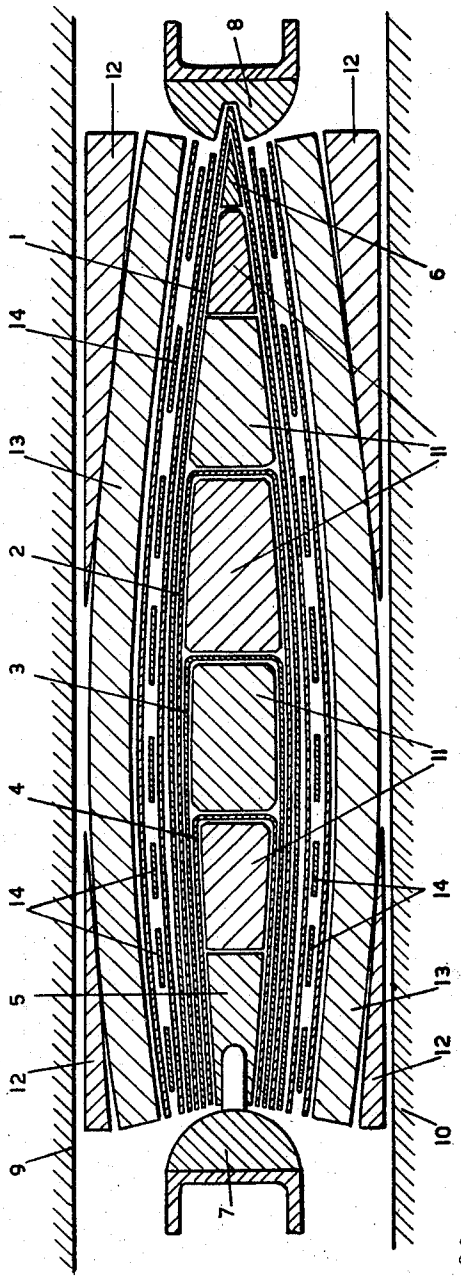


FIG. 1

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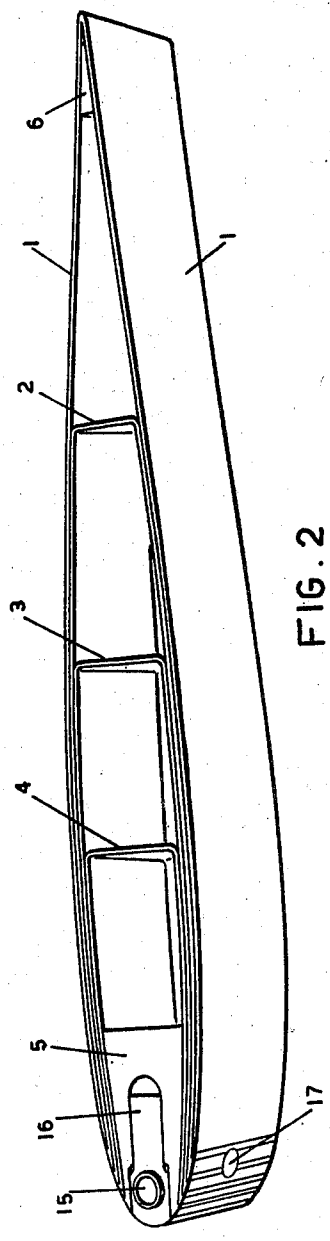


FIG. 2

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HELICOPTER ROTOR BLADE

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Application May 13, 1955, Serial No. 508,272

3 Claims. (Cl. 170—159)

The present invention relates to an aerofoil construction, especially a rotor blade for helicopters, in which the profile of the aerofoil is built up from a number of interconnected U-shaped sheets, disposed, in section, perpendicular to the longitudinal axis of the blade of U-shaped sheets, said sheets fitting into each other with the open ends of the U directed to the front of the aerofoil, in such a way that the closed end of each U forms a cross bracing, these bracings being arranged at increasing distances from the front of the aerofoil. A construction of this kind is known from the U. S. patent specification 2,410,609, Fig. 6. In this known construction a mixed structure of tubular components and U-shaped sheets is applied. The innermost tubular component contains elements for taking up centrifugal forces.

It is one object of the present invention to provide an improvement of this known construction by causing the entire aerofoil to join in taking up the centrifugal force and to contribute to increase the stiffness against torsion forces.

It is another object of the present invention to provide exclusively U-shaped sheets used for the construction, while all the legs of the U-shaped sheets extend to the vicinity of a filler for the front part and the U-shaped sheets, in the absence of longitudinal beams or tubes in the aerofoil, take up themselves the forces acting on the aerofoil construction.

It is yet another object of the present invention to provide a light, simple and strong construction, precisely because all the elements of the structure take up the forces acting thereon, especially the centrifugal and torsion forces.

It is also an object of the present invention to provide an aerofoil construction in which the open end of the leading U-shaped sheet is closed by a spacing block forming the front of the aerofoil, said spacing block being preferably connected to the legs of the U-shaped sheets by means of connecting means especially cross rivets.

With these and other objects in view which will become apparent in the following detailed description, the present invention will be clearly understood in connection with the accompanying drawings, in which:

Figure 1 shows a cross-section of a rotor blade according to the invention during glueing; and

Fig. 2 is a perspective view of a section of a completed rotor blade.

As clearly disclosed in Fig. 1, the rotor blade is composed of four U-shaped sheets **1, 2, 3, 4,** fitting into each

other with the open ends of the U's directed to the front of the aerofoil. At the front a U-shaped bar **5** is fitted between the legs of the sheet **4**. At the rear of the aerofoil a filler **6** is inserted into the pointed end of sheet **1**. After covering the parts **1—6** at the adjoining faces with glue, these parts are placed between two calibers **7** and **8** in a press, the working faces of which are indicated by **9** and **10**. To this end fillers **11** are inserted in the spaces between the U-shaped sheets. Wooden fillers **12** and thick rubber sheets **13** are inserted between the working faces **9** and **10** respectively and the rotor blade to be glued. Between said rubber sheets and the rotor blade electric heating elements **14** are provided which are insulated by means of a glass fiber cloth.

After the glueing has been completed a spacing block **16** is inserted into the bar **5**, said spacing block being provided with a channel **15** for taking up fuel conduits and ignition pipings. As may appear from Fig. 2 the front of the aerofoil construction is machined in a suitable way after the glueing is completed, said machining being carried out by milling. The spacing block **16** is connected to the rotor blade by means of cross rivets **17**.

Although the rotor blade described above is meant especially for helicopters, it is also possible to apply the invention to blades for other purposes, e. g. normal propellers or wings for rockets.

While I have disclosed one embodiment of the present invention, it is to be understood that this embodiment is given by example only and not in a limiting manner, the scope of the present invention being determined by the objects and the claims.

What I claim is:

1. An aerofoil construction, especially a rotor blade for helicopters, said rotor blade comprising solely a plurality of interconnected U-shaped sheets disposed in section perpendicular to the longitudinal axis of said blade and each of said U-shaped sheets having one open end, said sheets fitting into each other with said open end of each of said U-sheets directed to the leading edge of said blade and the closed end of each of said U-shaped sheets forming a cross-bracing, said cross-bracing of said successive U-shaped sheets being arranged at increasing distances from the leading edge of said blade in rearward direction, and all leg portions of said U-shaped sheets extending to the leading edge of said blade, so that all forces acting upon said aerofoil construction are carried at least partly by said U-shaped sheets.

2. The aerofoil construction, as set forth in claim 1, in which said open end of the foremost of said U-shaped sheets receives a spacing block forming jointly with the ends of said leg portions of said U-shaped sheets the leading edge of said blade, and means for connecting the leg portions of said U-shaped sheets with said spacing block.

3. The aerofoil construction, as set forth in claim 2, in which said connecting means comprises cross rivets extending through said leg portions of said U-shaped sheets and through said spacing block.

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