May 9, 1933. J. SQUIRES 1,908,074

METHOD OF WORKING METAL TUBES

Filed April 9, 1930

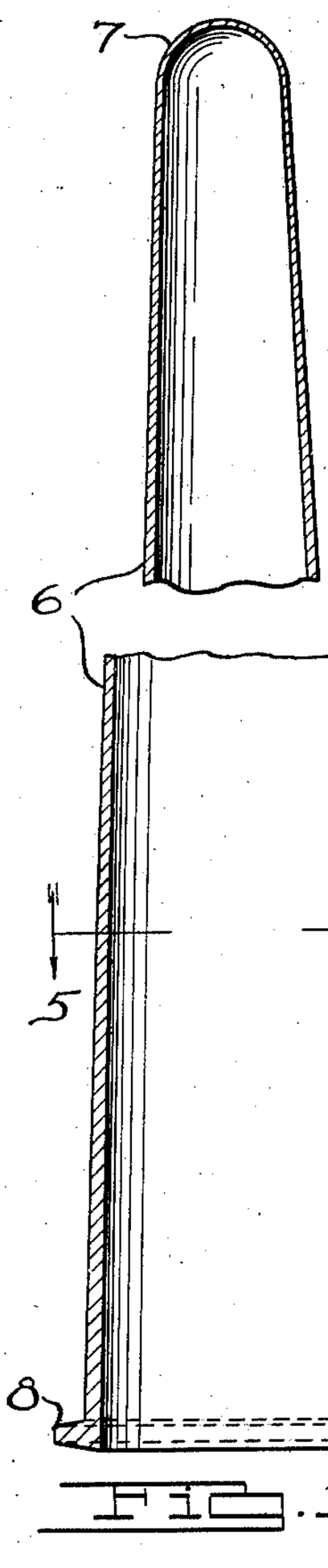

Fig. 1.

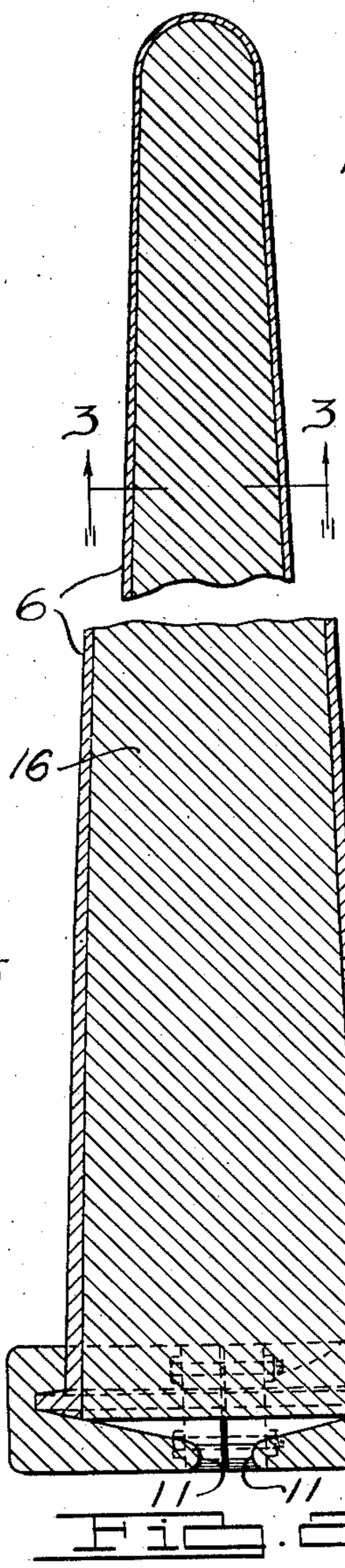

Fig. 2.

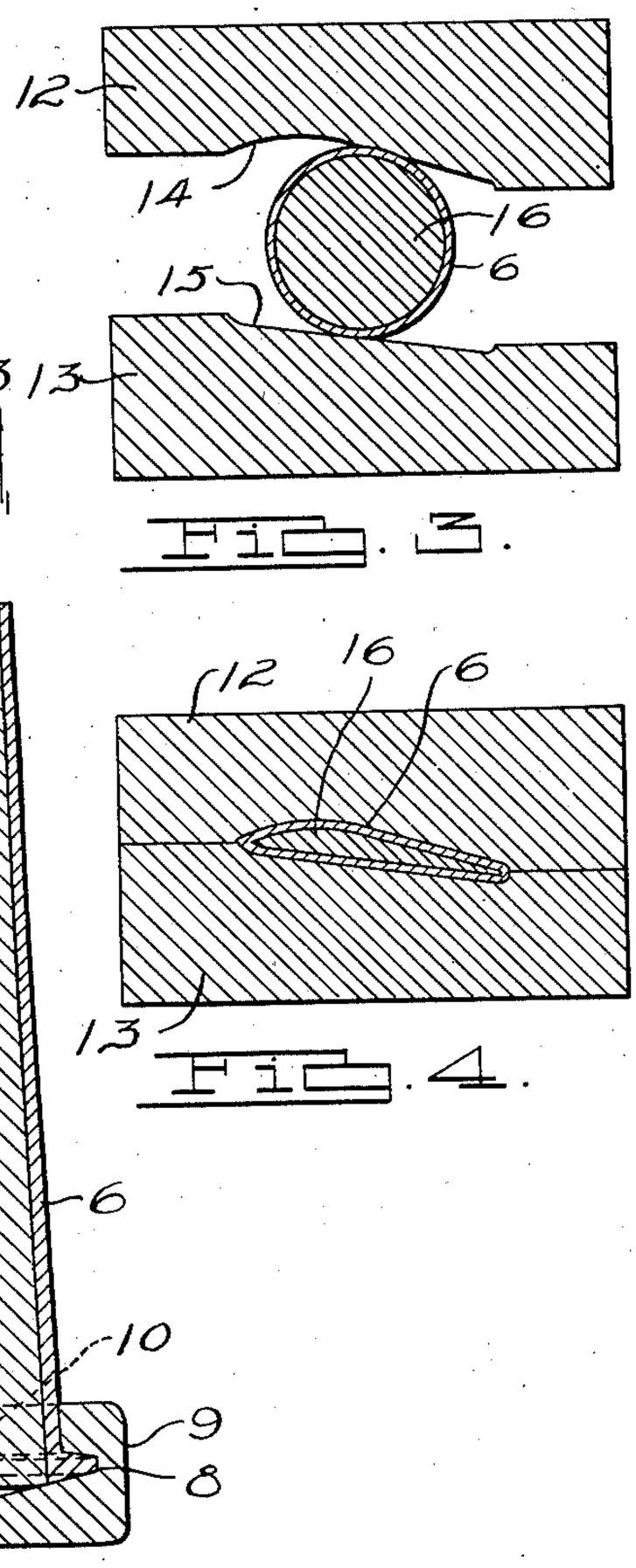

Fig. 3.

Fig. 4.

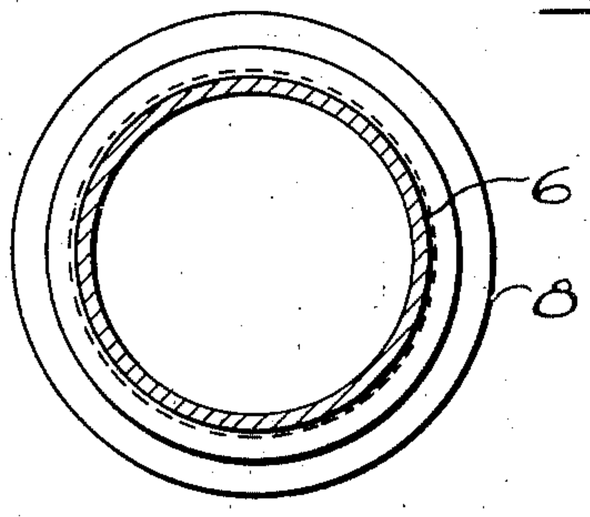

Fig. 5.

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UNITED STATES PATENT OFFICE

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METHOD OF WORKING METAL TUBES

Application filed April 9, 1930. Serial No. 442,950.

This invention relates to a method of working metal tubes.

The main objects of this invention are to provide an improved method for supporting the inner walls of a metal tube to keep them from collapsing when subjected to the action of forming dies; and to provide an improved method by the use of which propeller blades of air foil section may be formed from steel or other metal tubing.

An illustrative embodiment of this invention is shown in the accompanying drawing, in which,

Fig. 1 is a longitudinal medial sectional view of a steel tube from which my improved propeller blade is made.

Fig. 2 is a similar view of the same after the filler material has been put therein and the restricting clamp secured on the open end thereof.

Fig. 3 is a view showing the tube in place between a pair of forming dies prior to the closing of the dies, the tube being shown in section, as taken on the line 3—3 of Fig. 2.

Fig. 4 is a similar view of the same after the forming dies have been brought together.

Fig. 5 is a sectional view taken on the line 5—5 of Fig. 1, looking in the direction indicated by the arrows.

The method disclosed herein is related to the method disclosed in my co-pending application executed December 16, 1929, Serial No. 415,028, filed December 18, 1929, and the type of blank from which the propeller blade is made is of the character which has been formed in accordance with the method disclosed in my co-pending application executed of even date herewith, Serial No. 442,949, filed April 9, 1930. It will be understood, however, that this method is equally applicable for use in the working of other types of blanks regardless of the manner in which they were formed, and by the term "metal tube" as used in the specification and claims herein is meant any hollow metal body without regard to its cross sectional shape or general conformation.

In the embodiment shown in the drawing, an elongated seamless tapered steel tube 6 having a closed end 7 and an outwardly extending annular bead or flange 8 is provided with a split clamping ring 9 secured thereon by bolts 10. The ring 9 embraces the bead 8 and is provided with an inwardly extending annular flange 11 which provides a restricted opening therethrough for the open end of the tube 6.

The tube 6 with the clamp 9 thereon is placed in an inverted position from that shown in Fig. 2 of the drawing, and filled with molten resin or other non-ductile solidifiable liquid integral mass which will harden or solidify at normal atmospheric temperatures.

The filled tube is then placed between a pair of forming dies 12 and 13 which have die depressions 14 and 15 respectively therein. The perimetric distance of the die depressions 14 and 15 is equal to the circumference of the tube 6 so that when the dies are brought together the walls of the tube will not be stretched.

The dies 12 and 13 are then brought together as shown in Fig. 4 of the drawing, thus squeezing or pressing the opposite sides of the tube 6 toward each other to secure an air-foil cross section of the tube. As the walls of the tube are forced toward each other a part of the filler mass 16 is squeezed out through the restricted opening formed by the flange 11, the resistance being such, however, that the walls of the tube are effectually supported during the forming movement of the dies, and caused to be pressed out to the exact conformation of the die depressions.

After the forming operation has been completed the clamp 9 is removed from the bead 8 and the resin melted out of the formed propeller blade.

Although but one specific method has been herein disclosed, it will be understood that numerous details thereof may be altered or omitted, without departing from the spirit of this invention as defined by the following claims.

What I claim is:

1. The method of working a metal tube which comprises filling the tube with resin, and then subjecting the tube to the action of forming dies for changing the cross-sectional shape of the tube.

2. The method of working a metal tube

which comprises filling the tube with molten resin, solidifying the resin, and then subjecting the tube to the action of forming dies for changing the cross-sectional shape of the tube.

3. The method of working a metal tube which comprises filling the tube with resin, subjecting the tube to the action of forming dies for changing the cross-sectional shape of the tube, and then removing the resin.

4. The method of working a metal tube which comprises filling the tube with molten resin, solidifying the resin, subjecting the tube to the action of forming dies for changing the cross-sectional shape of the tube, and then melting out the resin.

5. The method of shaping an open-ended metal tube which comprises restricting the opening in the end of the tube, filling the tube with resin, and then subjecting the tube to the action of forming dies for changing the cross-sectional shape of the tube.

6. The method of shaping an open-ended metal tube which comprises restricting the opening in the end of the tube, filling the tube with molten resin, and then subjecting the tube to the action of forming dies for changing the cross-sectional shape of the tube.

7. The method of shaping an open-ended metal tube which comprises restricting the opening in the end of the tube, filling the tube with resin, subjecting the tube to the action of forming dies for changing the cross-sectional shape of the tube, and then removing the filler mass.

8. The method of shaping an open-ended metal tube which comprises restricting the opening in the end of the tube, filling the tube with molten resin, solidifying the resin, subjecting the tube to the action of forming dies for changing the cross-sectional shape of the tube, and then melting out the filler mass.

JOHN SQUIRES.