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E. L. MÜLLER

MANUFACTURE OF AIR PROPELLERS

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Fig:1. Fig:2.

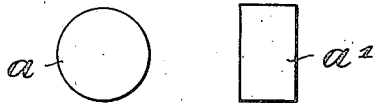


Fig:3. Fig:4.



Fig:5. Fig:6.

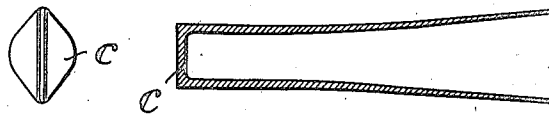
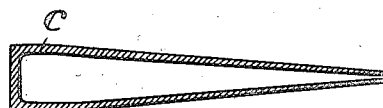


Fig:7.



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# UNITED STATES PATENT OFFICE.

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## MANUFACTURE OF AIR PROPELLERS.

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*To all whom it may concern:*

Be it known that I, EUGEN LUDWIG MÜLLER, a citizen of the German Empire, residing at Berlin, Germany, have invented certain new and useful Improvements in Manufacture of Air Propellers, of which the following is a specification.

My invention refers to propellers, especially for use in aircraft, and more particularly to a method whereby hollow metallic propellers can be made, its object being to manufacture propellers of great strength at less cost than was hitherto possible.

According to my invention a hollow body made after the manner of manufacturing cartridges is used for each wing, i. e., a tube-shaped hollow body produced by a drawing process with walls changing as to thickness according to requirements, whose thick-walled end is closed by a bottom.

In carrying my invention into practice, I proceed after the manner known from the manufacture of cartridges, viz, I convert a metal disc by drawing into an outwardly cylindrical hollow body closed at one end, the distribution of the metal being such that the cylindrical wall increases in thickness towards the closed end or bottom, and I then compress the hollow body so as to transform it into a propeller blade with the open end forming the free end or tip of the blade and the closed or bottom end forming the base or socket.

This process offers the following advantages:

The cartridge is provided with a bottom from the beginning and thus does not require a separate cap. By the case-making process the hollow body may obtain any thickness of the wall required towards the bottom and thus the propeller wing made from it can obtain a hub as strong as necessitated by the requirements of strength and safety. With a tube this increase of thickness could only be obtained by turning it down, which would require far higher expenses and far more labour. Finally the use of a case as raw material permits to make the propeller wings exactly equal in weight, not only as a whole but in all sections as well.

In the drawings affixed to this specification and forming part thereof the preferred mode of carrying my invention into effect is illustrated by way of example. In the drawings:

Fig. 1 is a plan view and

Fig. 2 a side elevation of the disc or blank  $a$  or  $a'$  to be transformed into a propeller blade.

Fig. 3 is a plan view, and

Fig. 4 a longitudinal section of the cylindrical body  $b$  formed from such blank in accordance with the method adopted in manufacturing shell cases.

Figs. 5 and 6 are like views and

Fig. 7 is another longitudinal section at right angles to the one shown in Fig. 6, of the raw propeller blade  $c$  formed by compressing the cylindrical body shown in Fig. 4, such blade being thereafter shaped by further compression or other treatment to suit the requirements of each individual case.

Two, three or four such compressed hollow blades can be secured to a suitable hub to form the complete propeller, the pitch of the blades being chosen in accordance with the requirements of each individual case.

I wish it to be understood that I do not desire to be limited to the exact details of procedure and construction above described and illustrated in the drawings for obvious modifications will occur to a person skilled in the art.

I claim:

The method which consists in converting a metal disc into an outwardly cylindrical hollow body closed at one end and increasing in thickness towards the closed end and compressing said hollow body so as to transform it into a propeller blade with the open end forming the tip and the closed end forming the base of the blade, said blade containing a strong portion which makes it adaptable to be joined to other blades in the building up of an entire propeller wherein angular displacement of individual blades is essential.

In testimony whereof I affix my signature.

EUGEN L. MÜLLER.