June 14, 1960 H. S. BARNES 2,940,169

METHOD OF BRAZING TWO METAL HEADS TO A METAL BARREL TO PRODUCE A BOBBIN FOR YARN

Filed April 5, 1955 2 Sheets-Sheet 1

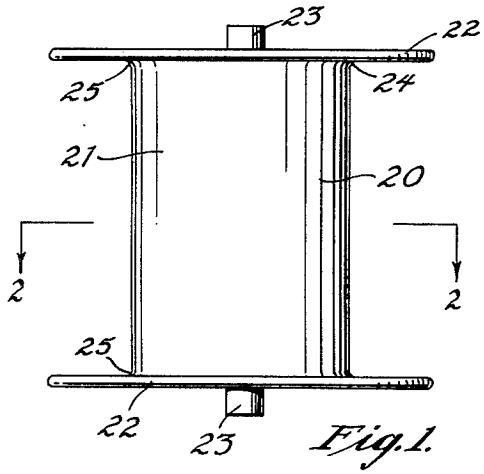


Fig. 1.

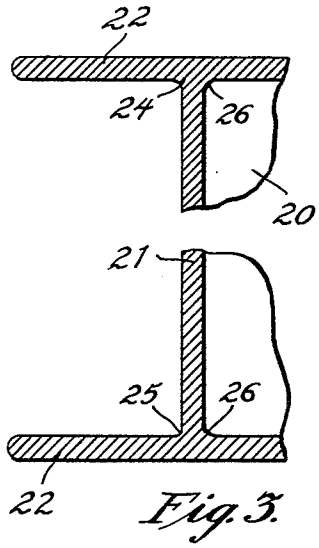


Fig. 3.

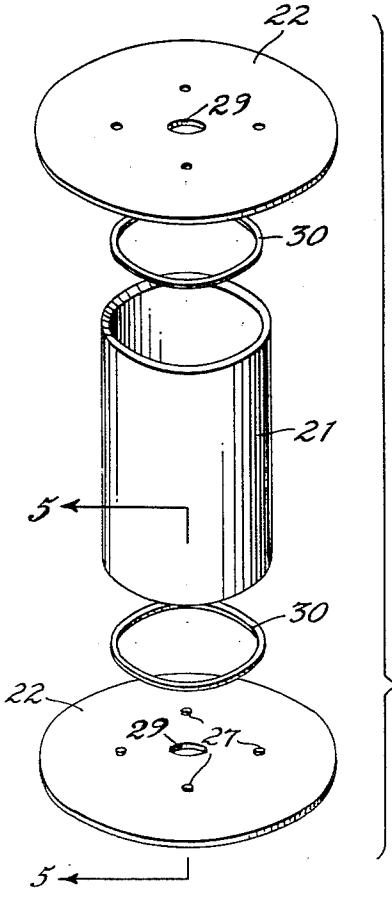


Fig. 4.

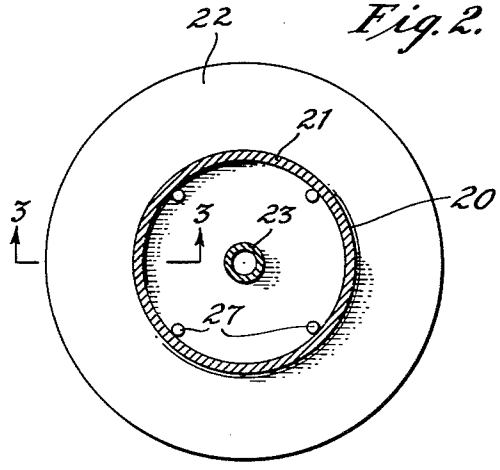


Fig. 2.

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METHOD OF BRAZING TWO METAL HEADS TO A METAL BARREL TO PRODUCE A BOBBIN FOR YARN

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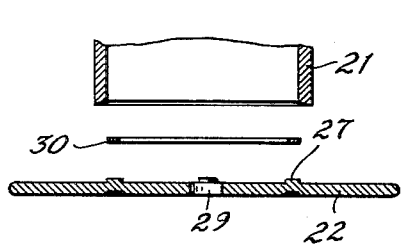


Fig. 5.

Fig. 6.

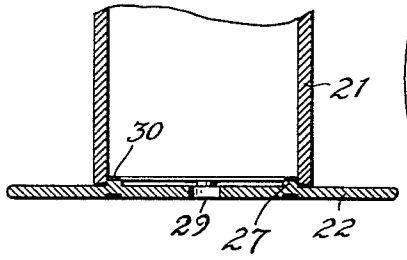
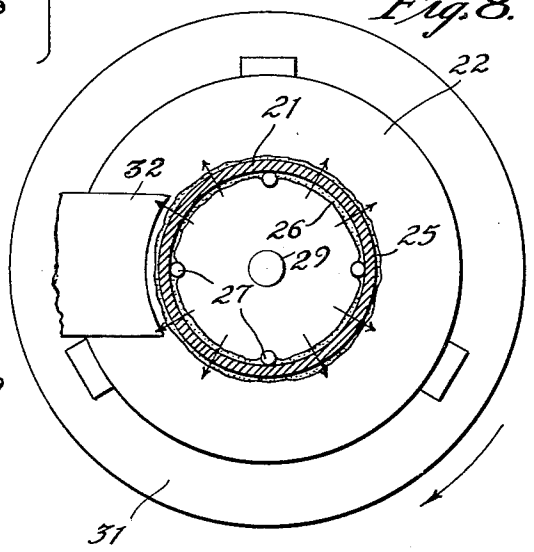


Fig. 8.



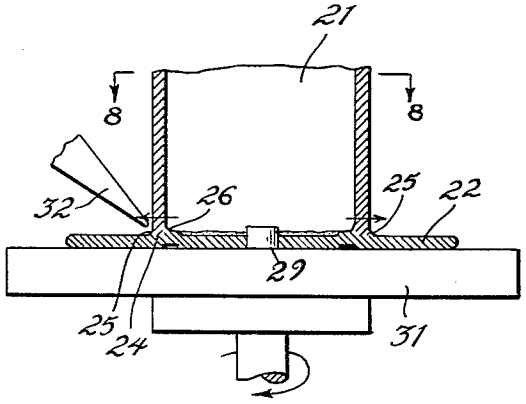


Fig. 7.

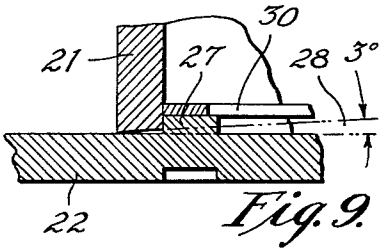


Fig. 9.

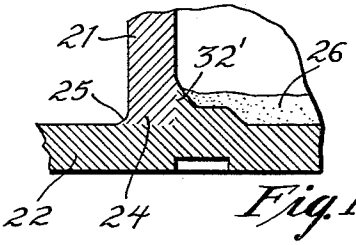


Fig. 10.

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METHOD OF BRAZING TWO METAL HEADS TO A METAL BARREL TO PRODUCE A BOBBIN FOR YARN

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Filed Apr. 5, 1955, Ser. No. 499,267

4 Claims. (Cl. 29—471.1)

The present invention relates to a method of making a bobbin.

A purpose of the invention is to produce a bobbin which is stronger and more resistant against deformation incident to forces developed in service, particularly forces incident to the treatment of textile fibers wound on the bobbin.

A further purpose is to produce a unitary metallic bobbin which will not have a tendency to permit yarn or thread to enter the space between the barrel and the head, and become caught or suffer damage thereby.

A further purpose is to produce a unitary metallic bobbin comprising a metallic barrel, metallic heads on opposite ends of the barrel and a continuous ring of brazing alloy extending around the barrel at each end and uniting the barrel to the heads, the brazing alloy forming an outward fillet connected to the barrel at one end and to the head at the other end, and preventing intrusion of yarn or thread between the head and the barrel.

A further purpose is to hold the barrel centrally with respect to the head by projections on the head.

A further purpose is to unite the barrel to the head by deforming the head along the line of the inside diameter of the barrel to produce projections, placing the barrel in vertical position on one head with the projections engaging the inside of the barrel, placing brazing metal around the inside of the barrel adjacent the engagement between the barrel and the head, rotating the combination on a vertical axis while heating the combination adjacent the engagement until brazing metal flows outward to form an outside fillet between the barrel and the head, and to join together the barrel and the head, and allowing the brazing metal to solidify.

A further purpose is to taper the end of the barrel outwardly at an angle not exceeding 6° prior to brazing.

Further purposes appear in the specification and in the claims.

In the drawings I have chosen to illustrate one only of the numerous embodiments in which my invention may appear, selecting the form shown from the standpoints of convenience in illustration, satisfactory operation and clear demonstration of the principles involved.

Figure 1 is a side elevation of a completed bobbin according to the invention.

Figure 2 is a transverse section on the line 2—2 of Figure 1.

Figure 3 is a fragmentary enlarged section on the line 3—3 of Figure 2.

Figure 4 is an exploded perspective showing the components prior to assembly.

Figure 5 is a fragmentary exploded section on the line 5—5 of Figure 4.

Figure 6 is a section corresponding to Figure 5, showing the components assembled prior to brazing.

Figure 7 is a section corresponding to Figure 5 showing the brazing operation.

Figure 8 is a plan section on the line 8—8 of Figure 7.

Figure 9 is a fragmentary enlarged axial section showing the components assembled prior to brazing.

Figure 10 is a view corresponding to Figure 9 showing the components after brazing.

Describing in illustration but not in limitation and referring to the drawings:

In the prior art bobbins have been extensively produced using head and barrel portions which are joined together by rivets with felt inserts placed between the ends of the heads and the ends of the barrel portion. Difficulties have been encountered with this construction. Nylon and similar synthetic yarns or threads are in many cases heat treated after winding on the bobbin, using temperatures which may in individual instances be as high as 300° F. By virtue of the heat treatment, the yarn in many cases exerts powerful forces on the bobbin which in some instances have been great enough to deform or dish the heads.

A further difficulty is that under the high forces which develop, the yarn or thread often has been forced against the felt so as to compress, mat and deform the felt. Under these conditions there has been a tendency for the yarn or thread to catch in the space between the head and the barrel, thus either preventing the thread or yarn from unwinding or causing the thread or yarn to break.

Efforts have also been made to produce a bobbin by cutting holes in the heads, extending the barrel beyond the heads, and spinning the ends of the barrel over to secure the heads. This construction has not in many cases been satisfactory because of its tendency to deform by dishing of the heads under pressure.

There is a serious need for a unitary metallic bobbin which will be of substantially increased strength, thus more effectively resisting the stresses produced by the thread or yarn, and at the same time preventing the tendency which has previously existed in some cases, for the thread or yarn to catch between the head and the barrel.

I have discovered that an improved unitary metallic bobbin can be produced by uniting the barrel to the heads by brazing so as to develop an external fillet which will prevent the thread or yarn from entering the space between the head and the barrel, and retaining the head in proper position with respect to the barrel by projections on the head.

I have further discovered that this construction can be effectively brazed, while holding the barrel centered by means of the projections, by applying the heat at the outside adjacent the joint, rotating the combination and supplying the brazing metal from the inside, continuing the rotation until the fillet is formed on the outside and then immediately cooling the combination.

This assures a construction that is quite strong and resistant against loads encountered in service.

In the drawings I illustrate a bobbin **20**, having a barrel **21** and heads **22**. While other metals such as stainless steel may be used for the barrel and the heads, it is decidedly preferable to manufacture the same of aluminum base alloy which may be united by brazing. While aluminum base alloys such as 2S and 3S may be used, because of the requirement of high strength it is preferable to use 61S and to heat treat the same, desirably to 61ST6.

The heads are provided at the axis with gudgeons **23** which may be of stainless steel, and which suitably make forced fits in axial openings in the heads. The gudgeons have openings axially in line which provide the pivotal mounting for the bobbin as well known.

The heads and the barrel are united by brazing metal at **24** which in the case of aluminum base alloy heads and barrel will be aluminum brazing alloy of the character produced for example by Aluminum Company of America

and well known in the art. The aluminum brazing alloy at **24** provides an outward fillet **25** which connects to the head at one end and to the barrel at the other end and prevents the possibility that yarn or thread could become caught between the head and the barrel.

The aluminum brazing alloy may also form an interior fillet **26** which increases the section of the joint.

The heads have symmetrical projections **27** forming supporting and guiding knobs which conform on their external circle diameter to the interior diameter of the tubular barrel thus locating the barrel centrally of the head.

In manufacturing the bobbin of the invention, the barrel is first produced suitably of tubing, and the ends are cut off desirably on an outward taper at an angle **28** shown in Figure 9 which is less than the 6°, more than 1° and preferably about 3°. This angle permits flow of brazing metal more readily toward the outside. In forming the bobbin, one of the heads **22** is placed in horizontal position with the projections **27** upwardly directed and a ring of brazing metal **30** is centrally located around the axis on the head. The barrel **21** is then placed symmetrically in position around the outside of the projections as shown in Figure 6, the axis of the body being vertical. The structure is desirably mounted on a rotating turntable **31** as shown in Figures 7 and 8, for example using the gudgeon hole **29** to center on a pin, and heat from a suitable flame **32** is directed inwardly against the outside of the joint between the head and the barrel. Due to the surface tension characteristics of the structure, the brazing alloy melts and notwithstanding that the rotation may be rather slow (suitably of the order of 20 r.p.m.) the brazing alloy flows outward in the spacing between the barrel and the head to form the fillet **25**. The rotation makes the fillet symmetrical and assures uniform heating. The effect therefore is to form a unitary structure with the brazing metal uniting the barrel to the head and with the projections bonded additionally to the head at **32'** as shown in Figure 10 as to form a very strong joint and impart considerable depth of section at the joint.

It is decidedly desirable to stop the brazing operation as soon as the fillet **25** forms at the outside as this is an indication of complete fusion and further heating is likely to undesirably further spread the brazing metal and weaken the joint. The preferred practice is to remove the source of heat, allow the metal to solidify and quench immediately in any suitable quenching medium such as water.

After the head has been united at one end, the structure is turned upside down and the head at the other end is put on by the same procedure.

The above technique makes it possible to operate with brazing alloys which have an operating temperature only about 50° below the melting point of the aluminum base alloy and to assure reliable results.

The projections not only serve to assure proper positioning of the barrel with respect to the head, but they also assure a stronger structure after the completion of brazing.

After the completion of the brazing operation the structure will desirably be heat treated as for example by exposing it to a suitable elevated temperature for a period of the order of 8 hours.

The resulting bobbin has unusually great strength. Using a two and one-half inch outside diameter barrel with a wall thickness of 0.080 inch, bobbins according to the present invention under test have withstood tension loads as great as 9000 pounds applied axially to the heads.

After completion of the brazing and heat treating as above described, the gudgeons are forced into position.

It will be evident that in the construction of the invention there is little if any tendency for the thread or yarn to enter between the head and the barrel. The head is very strong indeed, and winding loads and loads developed by heat treatment of the yarn are resisted to a high degree.

In view of my invention and disclosure variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art to obtain all or part of the benefits of my invention without copying the structure and method shown, and I, therefore, claim all such insofar as they fall within the reasonable spirit and scope of my claims.

Having thus disclosed my invention what I claim as new and desire to secure by Letters Patent is:

1. In a method for producing a unitary metallic bobbin for yarn comprising a metallic barrel, metallic heads on opposite ends of the barrel each secured in place by a brazing alloy forming an outward continuous symmetrical fillet connecting to the barrel at one end of the fillet and to the head at the other end of the fillet so as to prevent the intrusion of yarn or thread between the head and the barrel, the steps comprising providing a tubular metallic barrel and a pair of metallic heads, and each of the heads having a plurality of projections for engaging the inside surface of the barrel at spaced locations and for aligning the head with respect to the barrel, placing the barrel endwise in vertical position on a face of one of said heads with the projections on the one head engaging the inside of the barrel and disposing a supply of brazing metal inside the barrel adjacent to where said barrel is engaged by the projections on the one head, rotating the combination substantially on the vertical axes of the barrel while heating the combination locally at one side adjacent to the supply of brazing metal until the brazing metal flows outward from the space inside said barrel and fills in radially of the joint being formed between said face of the one head and the corresponding end of the barrel through to the outside of the barrel giving an outward continuous fillet connecting to the barrel and to the one head, allowing the brazing metal to solidify, disposing a supply of brazing metal on said other head adjacent to the position where the barrel is adapted to be engaged by the projections on said other head, placing the other end of the barrel in a vertical position on the upper face of the other head with the plurality of spaced projections on the latter head engaging the inside of the barrel, rotating the combination substantially on the vertical axis of the barrel while heating the combination locally at one side adjacent to where said barrel and said other head are engaged until the brazing metal then being heated flows outward from the space inside the barrel and fills in radially of the joint being formed between said face of said other head and the corresponding end of the barrel through to the outside of the barrel giving an outward continuous symmetrical fillet connecting to the barrel and to said other head, and allowing the related supply of brazing metal to solidify while said one head remains brazed to the barrel, accordingly producing a bobbin unit in which both of said heads are brazed to the barrel and in which the outside fillets impose barriers against the intrusion of yarn or thread between the heads and the barrel.

2. The method according to claim 1 in which the ends of the barrel as provided form acute angles opening toward the inside of the barrel with respect to the corresponding faces of the heads on which the barrel is disposed vertically for brazing, thus affording pockets accommodating the outward flow of the brazing metal from inside the barrel when the brazing metal is heated to fusion.

3. The method according to claim 1 in which the ends of the barrel are provided in a tapered condition and accordingly made to form angles of 1° to 6° opening toward the inside of the barrel with respect to the corresponding faces of the heads on which the barrel is disposed vertically for brazing, thus affording pockets accommodating the outward flow of the brazing metal from inside the barrel when the brazing metal is heated to fusion.

4. The method according to claim 1 in which the brazing metal is provided substantially in the form of rings of

the metal extending adjacent to the inside surface of the barrel prior to brazing.

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