G. H. BENJAMIN.

BOBBIN.

APPLICATION FILED SEPT. 6, 1917.

1,291,372.

Patented Jan. 14, 1919.

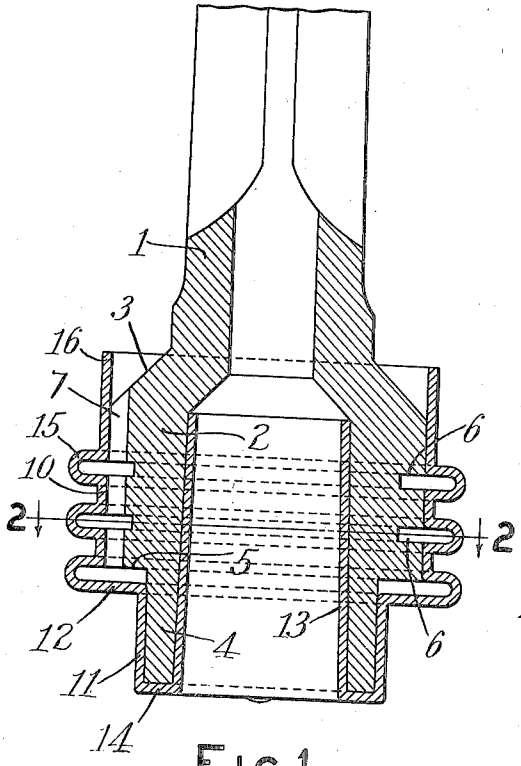

FIG. 1.

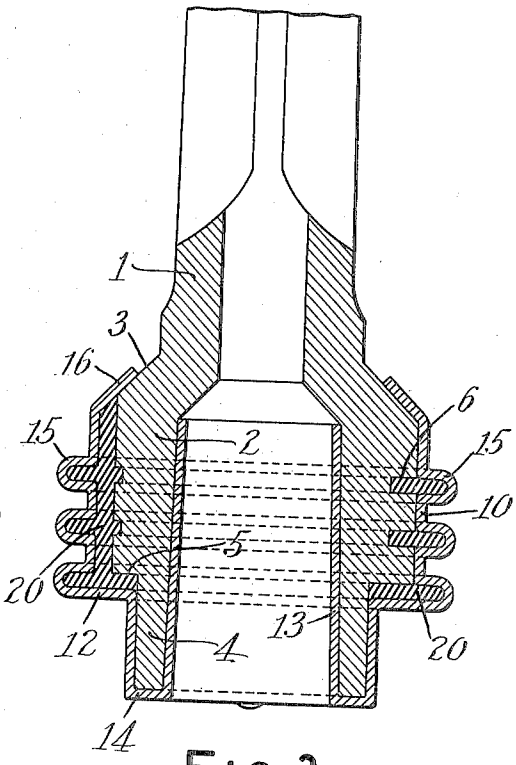

FIG. 3.

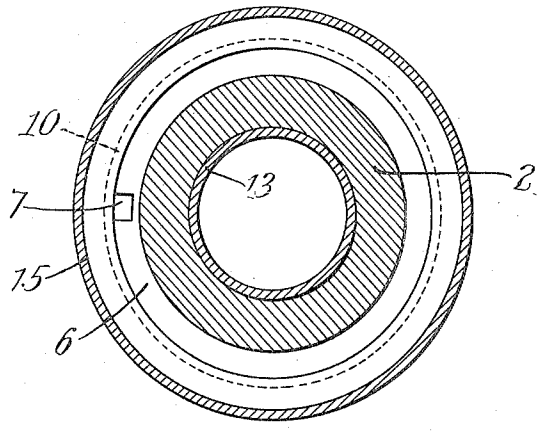

FIG. 2.

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UNITED STATES PATENT OFFICE.

GEORGE HILLARD BENJAMIN, OF NEW YORK, N. Y., ASSIGNOR TO DRAPER CORPORATION, OF HOPEDALE, MASSACHUSETTS, A CORPORATION OF MAINE.

BOBBIN.

1,291,372. Specification of Letters Patent. Patented Jan. 14, 1919.

Application filed September 6, 1917. Serial No. 190,044.

To all whom it may concern:

Be it known that I, GEORGE HILLARD BENJAMIN, of the city, county, and State of New York, have invented certain new and useful Improvements in Bobbins, of which the following is a specification.

This invention relates to bobbins of the type consisting of a shank made of wood or other material which has a tendency to expand and contract when subjected to heat and moisture and subsequently dried, and a ferrule formed of metal, and adapted to surround the lower portion or head of the bobbin, and which in practice, coacts with the spindle which imparts rotation to the bobbin and which is subjected to heavy blows when the bobbin is inserted into and removed from a shuttle, as is the practice in automatic looms of the Northrop type.

In bobbins of the type described, it is found difficult to permanently secure the ferrule to the bobbin. The expansion and contraction of the bobbin serves to change the diameter of the head of the bobbin relative to that of the ferrule, and the blows to which the ferrule is subjected acts to loosen the ferrule. When the bobbin and ferrule are not firmly united, it is difficult to place the bobbin upon a spindle, and further, almost impossible to introduce the bobbin into a shuttle. The object of the invention, therefore, is to effect a permanent union between the head and the ferrule, and to insure effective coöperation between the bobbin and the spindle, and the bobbin and the shuttle.

The improvement is illustrated in the accompanying drawings in which Figure 1 is a longitudinal section of the head of a bobbin with a ferrule in place but not united to the head. Fig. 2 is a cross section in the plane indicated by the line 2—2 in Fig. 1. Fig. 3 is a vertical section of the lower end of the completed bobbin.

As shown in Fig. 1 the bobbin has a shank 1 with an enlarged head 2 with a tapering shoulder 3 between them. The lower end of the head is reduced at 4 with a shoulder 5 between the said lower end or foot and the portion of the head of largest diameter. The head is provided with circumferential exterior grooves 6, and with an intersecting channel 7 open at both ends.

The ferrule comprises an external sleeve 10 adapted to surround the largest portion of the head 2; a contracted foot 11 with a shoulder 12 between it and the sleeve; and a tubular bushing 13 fitting within the interior bore of the bobbin and united to the foot 11 by the bottom wall 14. The sleeve 10 is formed with internal grooves 15, which, by their formation, constitute outwardly projecting annular ribs adapted to engage the spring jaws of the shuttle such as is commonly employed in the Northrop loom, as exemplified by United States Letters Patent of Northrop No. 529,940, November 27, 1894.

When the ferrule and the bobbin are assembled as in Fig. 1, the bobbin grooves 6 and the ferrule grooves 15 are preferably in register with each other and a space is left between the shoulders 5 and 12. The ferrule is substantially co-extensive with the head of the bobbin and is shaped to inclose the outer and inner surfaces and bottom thereof. The top 16 of the sleeve 10 extends above the top of the channel 7 thereby forming a funnel between the sleeve and the inclined wall 3 of the bobbin.

The bobbin is thoroughly dried before the next step in the manufacture.

After the bobbin and ferrule have been assembled, as in Fig. 1, a hot fluid "addition product" of phenol and formaldehyde is poured into the top of the sleeve 10 and it flows downwardly through the channel 7 into the grooves 5 and 15, into the space between the shoulders 5 and 12 and into all the crevices between the ferrule and the head. The same result can be obtained by dipping the lower end of the bobbin with its applied ferrule into hot fluid addition product. The hot fluid addition product also permeates the material of the bobbin head. This hot fluid material is preferably the initial reaction product of phenol and formaldehyde described in the Wiechmann Patent, No. 1,080,188, December 2, 1913, which is free from water. This hot liquid addition product is viscous and sufficiently adhesive to firmly unite the ferrule and head. The hot fluid addition product may be forced under pressure into the crevices between the ferrule and the bobbin head.

After the addition product has been introduced, the end 16 of the ferrule is bent down against the inclined shoulder 3, as shown in Fig. 3. The addition product is then polymerized. This is done by subjecting the bobbin to a temperature of about

100 degrees centrigrade for several hours and under pressure if an addition product like that of the Baekeland Patent, No. 942,699, December 7, 1909, is employed. The temperature acts to convert the addition product from a liquid into a hard, elastic, compressible, water-proof, infusible body, insoluble in acids and most alkalies.

The addition product is indicated at 20 in Fig. 3. It fills the grooves 5 and 16 and the space between the shoulders 5 and 12 so that it interlocks the ferrule and bobbin together.

Bobbins are used under different conditions. They may be used dry, where the expansion and contraction of the head is relatively small; they may be used wet in high temperature fluids, as in dyeing, steaming, etc., where the expansion and contraction of the head are relatively large. One object of the invention is to produce a bobbin which will not expand and contract when subjected to steaming; or in other words, to produce a bobbin in which there shall be no change in the characteristics of the bobbin as a whole, or difference in size between the ferrule and the head, which would result in loosening of the ferrule from the head.

The addition product acts as an adhesive material in that it is absorbed into the interstices of the head and enters the corrugations of the head and the ferrule, thereby securing the head to the ferrule. The rolling down of the ferrule on the head serves as additional means for securing them together. The head is subjected to very heavy blows upon being forced in and out of the shuttle. These blows tend to separate the head from the ferrule. By the interposition of the condensation product, the blows are in effect cushioned, and the head remains in firm contact with the ferrule. Everyone familiar with the use of bobbins in automatic looms, knows that a difficulty which has been experienced with these articles, is found in the fact that the blows loosen the metallic rings surrounding the head or loosen the metallic ferrule. The purpose sought to be secured by the device disclosed, is to prevent such loosening by interposing a compressible, water-proof material between the head and the shank to cushion the blows to which the head is subjected. Further, the adhesive quality of the material helps the union of the parts and prevents ingress of water and steam, etc. The addition product constitutes a cement for cementing the ferrule and head together.

I claim—

A bobbin comprising a shank having an enlarged head, a series of concentric grooves in said head, a ferrule for the bobbin annular in form and provided with a series of concentric grooves in the outer wall of the annulus which register with those of the head, and an infusible, insoluble product introduced between the head and the ferrule and filling the grooves in them.

In witness whereof, I have hereunto signed my name.

GEORGE HILLARD BENJAMIN.