Jan. 18, 1927. 1,614,648

E. C. BUFFINGTON

BOBBIN FERRULE AND PROCESS OF MAKING THE SAME

Filed Nov. 19, 1925

Fig. 1.

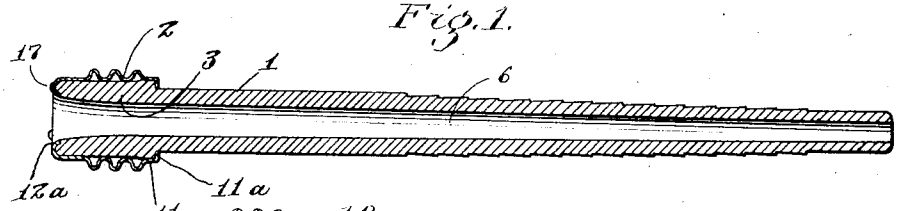




Fig. 8

Fig. 2

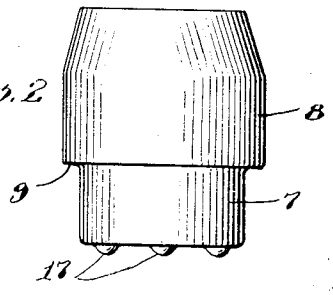


Fig. 3

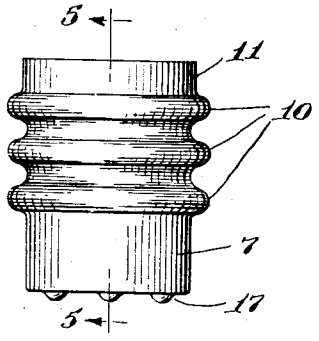


Fig. 7.



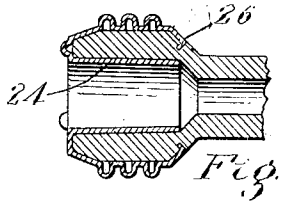


Fig. 9

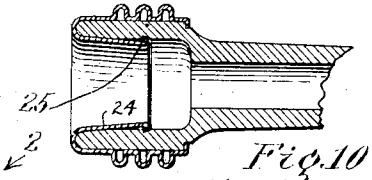


Fig. 10

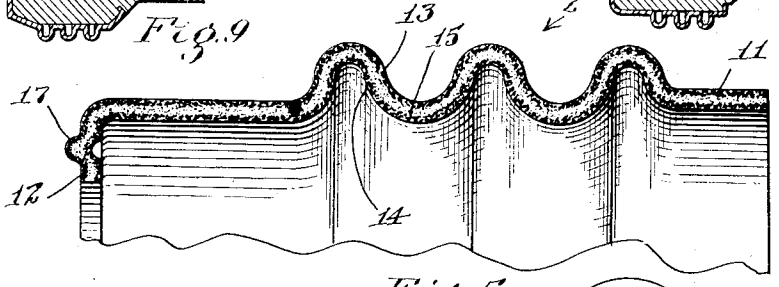


Fig. 5.

Fig. 6.

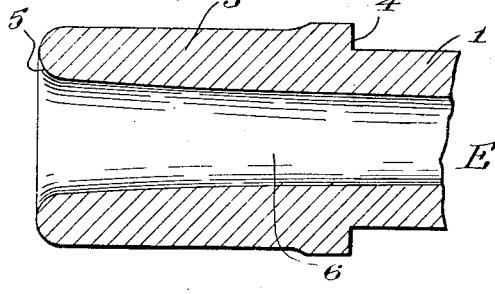
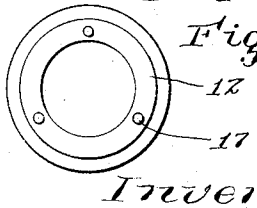


Fig. 4.



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UNITED STATES PATENT OFFICE.

EDWIN C. BUFFINGTON, OF MANCHESTER, NEW HAMPSHIRE, ASSIGNOR TO U. S. BOBBIN & SHUTTLE COMPANY, OF MANCHESTER, NEW HAMPSHIRE, A CORPORATION OF RHODE ISLAND.

BOBBIN FERRULE AND PROCESS OF MAKING THE SAME.

Application filed November 19, 1925. Serial No. 70,027.

This invention pertains to yarn mass holders, for example bobbins or cop-skewers for supporting yarn masses in loom shuttles, and relates more particularly to an improved sheath or ferrule adapted to protect the base of the holder proper and having elements designed to cooperate with complemental retaining elements of the shuttle jaws, and further to the process of making such sheath or ferrule.

Usually the body of the holder is made of wood, although other materials are sometimes employed, and its base is furnished with a series of spaced hardened steel rings which are adapted to engage grooves in the opposed faces of the shuttle jaws thereby to retain the yarn mass holder in operative position within the shuttle. Since the wood body of the holder, hereinafter specifically referred to for convenience as a bobbin, is subject to shrinkage and its base portion is exposed to heavy blows, particularly when used in an automatic bobbin changing loom, it is difficult to keep these independent rings in proper position. If the rings become displaced even to a slight extent, it is almost impossible to introduce the bobbin into the shuttle while even if properly positioned they sometimes cause breakage of the yarn in doffing. Moreover, it is quite difficult to make and properly to apply these independent hard steel rings, especially when the bobbins are of small size.

These difficulties have led to endeavors to substitute sheet metal ferrules for the independent rings, such ferrules being provided with spaced circumferential ribs adapted to engage the shuttle jaws, but even with this arrangement difficulty is experienced in securing the ferrule to the body of the bobbin in such a manner that it cannot be displaced, and the only practical mode at present known to me of attaching such ferrules is by turning in the metal at the ends of the ferrules to form flanges adapted to engage substantially radial surfaces of the bobbin, for example the end face or internal bore of the bobbin and an annular shoulder or groove provided upon or in the base of the bobbin at a suitable distance from its lower end against or into which the metal of the ferrule may be spun, pressed or bent.

While this mode of attaching the ferrule is practical and quite satisfactory in that it does provide a secure and permanent union of the ferrule and bobbin body, it has necessitated making these ferrules of relatively soft material, for example, mild steel, in order to permit their ends to be spun or flanged over as described without cracking or splitting the thin metal of which the ferrules are made.

It is necessary to use thin metal for this purpose to avoid undue increase in weight of the bobbin, and since for the reasons just stated this metal is soft, the ribs which cooperate with the shuttle jaws wear through very rapidly and the bobbin must then be discarded. Not only do these soft metal ribs wear rapidly but the shuttle jaws bite so deeply into them that insertion into or removal of the bobbin from the shuttle is slow and difficult and accordingly such bobbins are not acceptable for use in bobbin replenishing looms.

In accordance with my present invention I avoid the above difficulties and provide a ferrule or sheath which may be applied and secured to the body of the yarn mass holder in the approved manner and which at the same time has wear resisting qualities comparable to those of the independent rings of the prior art.

In the accompanying drawings I have illustrated my improved bobbin sheath or ferrule together with certain steps comprised in a method or process which I prefer to employ in producing it.

In the drawings,

Fig. 1 is a longitudinal section through a bobbin equipped with a sheath or ferrule made in accordance with my present invention;

Fig. 2 is a side elevation to large scale of a sleeve or thimble representing an intermediate stage in the production of my improved ferrule;

Fig. 3 is a side elevation of the ferrule substantially complete and ready to apply to the bobbin;

Fig. 4 is a bottom view of the ferrule shown in Fig. 3;

Fig. 5 is a fragmentary section to much larger scale on the line 5—5 of Fig. 3;

Fig. 6 is a fragmentary longitudinal section to large scale through the lower end or base of the bobbin body;

Fig. 7 is a view similar to Fig. 5 but to

much smaller scale and showing a modification;

Fig. 8 is a view similar to Fig. 1 showing the improved sheath applied to a cop-skewer; and

Figs. 9 and 10 are fragmentary views similar to Fig. 1 but showing alternative ways of attaching the sheath or ferrule to the bobbin body.

Referring to the drawings the numeral 1 indicates the body of a bobbin of usual type. This body may be of wood, hard fibre, or any other suitable material, and is as usual furnished with a central bore 6. The sheath or ferrule 2 is secured to the base or lower end 3 of the bobbin body, such lower end preferably being of a diameter larger than that of the main body of the bobbin and terminating in an abrupt shoulder 4, (Fig. 6). The extreme lower end of the bobbin body is preferably rounded as shown at 5 to provide a flaring entrance to the bore 6.

In accordance with my present process I first provide a tubular thimble or sleeve, preferably pressed or punched from sheet material, although it may be cut from a length of seamless tubing of proper thickness and diameter or produced in any other desired manner, and I shape this sleeve or thimble by pressure, spinning, or other appropriate process to give it a form preferably such as shown in Fig. 2. At this stage the thimble comprises a lower part 7 whose internal diameter is preferably substantially equal to the external diameter of the base 3 of the bobbin and whose upper part 8 is of substantially greater diameter, the lower part 7 as shown though not necessarily merging abruptly into the upper part 8 at the shoulder 9.

After this thimble has been shaped initially as described, it is subjected to the action of suitable forming means, for example rolls disposed both within and without the part 8, which press and draw the metal to form a series of circumferential, axially spaced ribs 10. These ribs are so spaced and shaped that they are adapted to cooperate with the usual retaining grooves in the opposite faces of the spring jaws of a loom shuttle, and thus to perform the function of the independent rings which are commonly provided upon a bobbin for retaining it in the shuttle. The uppermost of the ribs 10 is spaced somewhat from the upper end of the thimble to leave a cylindrical portion 11. At any desired stage of the operation, for example just prior to forming the ribs 10, the lower end of the part 7 may be turned in as shown in Figs. 4 and 5 to provide a flange 12.

After the thimble or sleeve has been shaped as above described, it is then subjected to suitable treatment for hardening its outer surface or at least for hardening the outer surfaces of the ribs. One treatment which may be employed is to subject the entire thimble to a case-hardening process which increases the carbon content of the outer and inner layers of the thimble so that these layers may be made extremely hard. However, it is essential to my process that this card-hardening be terminated before the middle layer of the material has been hardened to any substantial extent in order that this central portion or median layer may constitute a soft backing for the hardened surface layers to permit subsequent working of the metal, as by bending or spinning, without cracking or breaking.

The case-hardening process, if such be employed, may be carried out by heating the entire thimble in a suitable treating bath and subsequently quenching it, which as above described hardens both the inner and outer surfaces of the thimble.

As a specific example of a treatment which has been found to give the desired results I may make the ferrule of steel of preferably from 0.05% to 0.15% carbon and approximately 0.016 inch thick, and immerse the entire ferrule in a cyanid or other appropriate hardening bath at approximately 1500° F., allowing it to remain in the bath substantially one minute and then quenching in oil, or water. Of course for different thicknesses or grades of steel the temperature and time of immersion in the bath is correspondingly varied.

Since there is no particular utility in hardening the inner surface, the case-hardening may be carried out if preferred by some method in which the inner surface of the thimble will be protected or will otherwise remain unaffected by the case-hardening process. In this event both the median and inner layers of the thimble will remain soft while only its outer surface will be hardened.

Preferably I case harden the outer layer of the ferrule as near to glass-hardness as practicable, not only for the extra wearing qualities obtained but also to facilitate insertion into and removal of the bobbin from the shuttle.

After the hardening process has been completed the thimble is slipped over the base 3 of the bobbin body and the flange 12 is further turned in, for example by spinning, until it closes against and conforms to the rounded surface 5 of the bobbin body as indicated at 12^a in Fig. 1. Likewise, the upper end 11 of the thimble is flanged or spun in as shown at 11^a in Fig. 1 to bear snugly against the shoulder 4 of the bobbin body.

This spinning or bending of the ends of the thimble is permitted by reason of the fact that the case-hardening operation has been performed as above described and the metal at the ends of the thimble is still duc-

tile and capable of bending without cracking. At the same time the outer surfaces of the ribs are extremely hard and wear resistant so that the bobbin thus equipped with my improved ferrule may be used for a very extended period without appreciable wear. Since the several ribs 10 are formed integrally with the ferrule there is no danger that they may become displaced relatively to one another while the entire ferrule is held firmly in position in the manner above described.

The ferrule thus provided may be produced very cheaply and rapidly and may be applied much more easily to the bobbin body than the independent rings which are commonly employed.

While I have described case-hardening as a desirable method of providing the hard outer surface, I contemplate that other processes of producing a hard and wear resistant surface may be employed, such processes being well known to the metallurgist. I further contemplate that whereas I have herein shown the sheath as made of a single thickness of material of initially homogeneous character, I may if desired build up the sheath from concentric layers or nested thimbles of different materials, for example, hard steel to form the outer surface and soft steel or other suitable metal to form the inner surface. If so constructed, these layers of material may or may not be united, one mode of forming such a union if desired being electric welding. Such a process would undoubtedly be more expensive than that which I prefer, but nevertheless I regard it as falling within the purview of my invention.

While I have suggested and prefer to harden the entire outer surface of the ferrule, this may not be necessary, and I may harden the ferrule as indicated in Fig. 7. In this figure only the central part of the ferrule body having the ribs 10^a is hardened and such hardening may if desired extend through the entire thickness of the ribbed portion of the ferrule. In accordance with this modified arrangement the end portions 16 and 17 of the ferrule are untreated so that they retain their original ductile character and may be spun over into contact with the bobbin body without any danger whatever of cracking or breaking.

At any desired stage in the operation, preferably prior to hardening, the lower end of the ferrule may, if desired, be provided with spaced projections 17 of the type disclosed for example in the patent to Hambleton No. 1,061,239, May 6, 1913, such projections being useful in supporting the bobbin in a slightly elevated position above the bottom of the winding spindle. While these projections 17 may be omitted if desired, the hardening of the ferrule in accordance with the present process hardens the bearing faces of these projections, if used, so that they wear much longer than as usually constructed.

In Fig. 8 I show the improved ferrule applied to a yarn mass holder of another kind, to wit, a cop-skewer. This cop-skewer has a wood base 18 provided with a fixed spindle 19, usually of steel, having its projecting portion split to provide the resilient fingers 20 and 21 upon which a cop may be slipped. The wood base is provided with my improved sheath or ferrule 2^a having end flanges 22 and 23 spun in against the ends of the base.

In Figs. 9 and 10 are illustrated alternative methods of attaching the ferrule to the base of the bobbin or cop-skewer. Thus in these figures the ferrule has a tubular sleeve 24 at its lower end which enters the bore in the base. In Fig. 9 the upper edge 26 of the ferrule is flanged over into an external groove on the base. In Fig. 10 the upper edge of the ferrule is flanged over on to a shoulder as in Fig. 1, while its edge 25 is spun over into an internal groove in the bore of the base. Obviously many other ways of attaching the ferrule to the base may be employed but I make no specific claims to such methods herein.

I claim:

1. A bobbin ferrule comprising an outer layer of hard wear resistant material and an underlying layer of relatively soft and ductile material.

2. A sheet steel bobbin ferrule having spaced circumferential ribs for engagement with the jaws of a shuttle, said ribs having hard wear resistant outer surfaces, the end portions of the ferrule having sufficient ductility to permit them without cracking to be flanged over into engagement with cooperating elements of a bobbin body.

3. A bobbin ferrule having spaced circumferential ribs for engagement with the jaws of a shuttle, said ferrule consisting of mild steel case-hardened to provide an outer wear resistant layer, the case-hardening extending inwardly from the outer surface to a limited extent so as to leave beneath it a layer of relatively soft and ductile material capable of bending without cracking.

4. A bobbin ferrule of sheet steel, said ferrule having circumferential ribs for engagement with the jaws of a shuttle, said ferrule being case-hardened upon its inner and outer surfaces but comprising an intermediate layer of relatively soft and ductile material.

5. A bobbin ferrule having spaced circumferential ribs for engagement with the jaws of a shuttle, said ferrule consisting of mild steel case-hardened to provide an outer wear resistant layer, the case-hardening extending inwardly from the outer surface to

a limited extent so as to leave beneath it a layer of relatively soft and ductile material capable of bending without cracking, the lower end of the ferrule having spaced projections for engagement with the top of a bobbin holder, said projections being substantially glass-hard.

6. That process of making bobbin ferrules which comprises as steps preparing a tubular thimble of suitable length and of a ductile material, shaping the body of the thimble to provide elements engageable with the jaws of a shuttle whereby to retain the thimble in place between said jaws, and hardening the jaw engaging surfaces of said elements while leaving other portions of the thimble soft and ductile.

7. That process of making bobbin ferrules which comprises as steps preparing a tubular thimble of suitable length and of thin mild steel, providing the outer surface of the thimble with circumferentially extending ribs for cooperation with the jaws of a shuttle, and case-hardening the thimble, terminating the case-hardening operation before the entire thickness of the material of the thimble has been hardened so as to leave an underlying layer of mild and relatively soft steel capable of bending without cracking as a backing for the case-hardened layer.

8. That process of making bobbin ferrules which comprises as steps providing a tubular thimble of thin mild steel, forming spaced circumferential ribs on the body of the thimble, and case-hardening the thimble substantially to glass hardness so as to give the ribs a hard and wear resistant outer surface, the duration of the case-hardening operation being so determined as to leave the median layer of the thimble soft and ductile thereby to permit the ends of the thimble to be spun over into contact with a bobbin body without cracking.

Signed by me at Boston, Massachusetts, this 16th day of November 1925.

EDWIN C. BUFFINGTON.