Mar. 3, 1925. 1,528,445

N. MARSHALL

SPOOL

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Fig. 1.

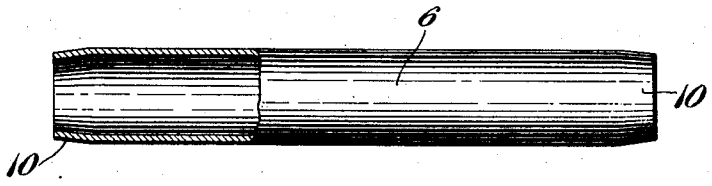


Fig. 2.

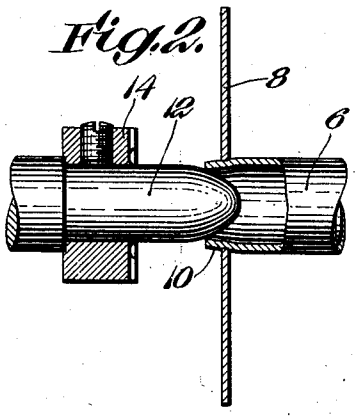


Fig. 3.

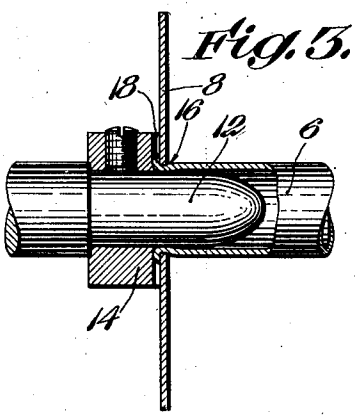
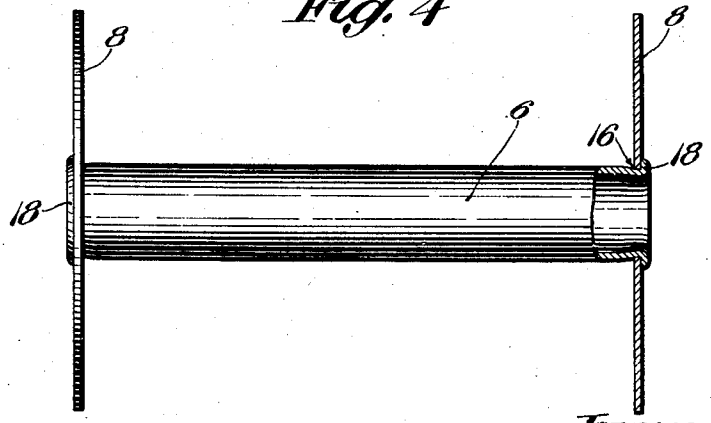


Fig. 4



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UNITED STATES PATENT OFFICE.

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SPOOL.

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To all whom it may concern:

Be it known that I, NORMAN MARSHALL, a citizen of the United States, residing at Nashua, in the county of Hillsborough and State of New Hampshire, have invented certain new and useful Improvements in Spools; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to spools and more particularly to a type of paper or pasteboard spool formed from a central core tube and a pair of end disks secured thereon.

The object of the present invention is to provide a spool of this general nature which can be easily and economically manufactured and which is of sufficient strength to withstand the usual conditions to which the spool is put in actual use. To this end the invention consists of the spool hereinafter described and particularly defined in the claims.

In the accompanying drawings Fig. 1 is an elevation, partly in section, of the preferred form of core tube; Figs. 2 and 3 are detail views showing the manner of heading over ends of the tube to secure the end disks therein; and Fig. 4 is an elevation, partly in section, of the completed spool.

The illustrated embodiment of the invention comprises a central core tube 6 together with a pair of end disks 8 which are secured on the ends of the tube. The tube 6 is formed from rolled paper and, as illustrated in Fig. 1, is provided with a taper 10 at each end, the taper being preferably formed by subjecting the ends of the tube to the action of a tapering die. This tapering operation does not weaken the tube by the removal of material therefrom but on the contrary strengthens the ends by crowding the fibres into a smaller space so that the thickness of the tapered ends is equal to, or slightly greater than, the thickness of the paper at the center of the tube. The end disks 8, which are placed on the ends of the tube, are provided with central openings of sufficient size to be accommodated snugly upon the tapered portion of the tube and to leave a sufficient amount of tube protruding outside of the disk to provide for heading over the end of the tube to secure the disk thereon. This heading operation is preferably performed by the heading tool illustrated in Figs. 2 and 3, which comprises a rotating arbor 12, upon which is secured a heading die 14. The entrance of the arbor into the end of the tube, as shown in Fig. 2, serves initially to distend the walls of the tube, thereby causing the inner wall of the disk to be firmly impressed in the material of the core thus forming a slight shoulder at the point 16. Upon further inward movement of the tool when the heading die comes into engagement with the protruding end of the tube, the latter is rolled down or headed over against the side of the disk, as shown in Fig. 3. The pressure of the die against the disk also serves to push the latter inwardly, accentuating the shoulder 16. The disk is thus secured against inward movement by the shoulder 16 and against outward movement by the headed over portion 18 of the tube.

The completely formed spool, as illustrated in Fig. 4, may, if desired, be coated or impregnated at its ends with a hardening compound which will give a more secure engagement between the tube and the end disks. Although a wide variety of substances may be used for this purpose, it has been found that sodium silicate is the most suitable. The ends of the tube may be dipped into or sprayed with a solution of sodium silicate, and upon drying the silicate will form a hard glass-like coating, thus forming a secure bond to retain the disks on the tube.

It will be seen that the present invention forms a spool of exceedingly substantial construction. The formation of the taper on the core without the removal of any material from the core is an important feature, because the material which is originally compressed into the taper during the tapering operation is afterwards available when the tube is headed over to spread out to substantially its original thickness. The tube is, therefore, of substantial and uniform strength throughout its length, even at the ends.

The invention having been described, what is claimed is:

1. A spool comprising a paper core tube having its ends compressed to form tapers of substantially the same thickness as the center of the core, a disk with a central

opening mounted on each end of the core, the core being headed over at the ends to secure the disks upon the core.

2. A spool comprising a paper core tube having the material at its ends compressed to form tapers of a thickness at least as great as the center of the core, and a pair of end disks mounted on the ends of the core, the protruding ends of the core being headed over to secure the disks thereto.

3. A spool comprising a paper core tube formed with tapered ends of substantially the same thickness as the center of the tube, and a pair of end disks with circular openings mounted at the ends of the tube, the ends of the tube being headed over and impregnated with a hardening compound to retain the disks securely on the tube.

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