Oct. 19, 1943. G. D. ATWOOD 2,331,954

SPOOL

Filed July 17, 1940

Fig. 1.

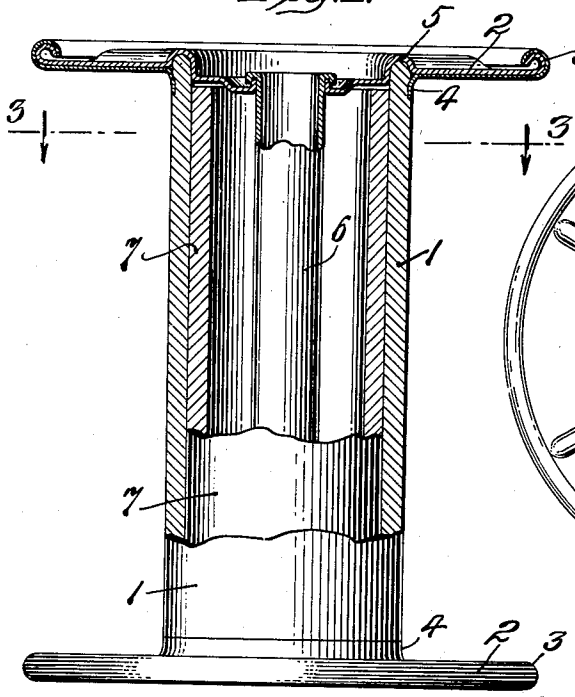


Fig. 2.

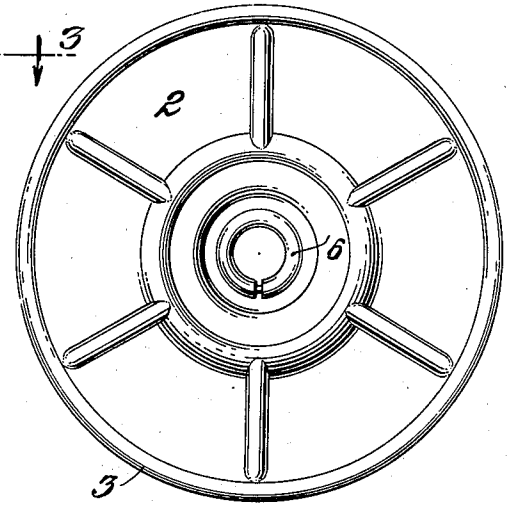


Fig. 3.

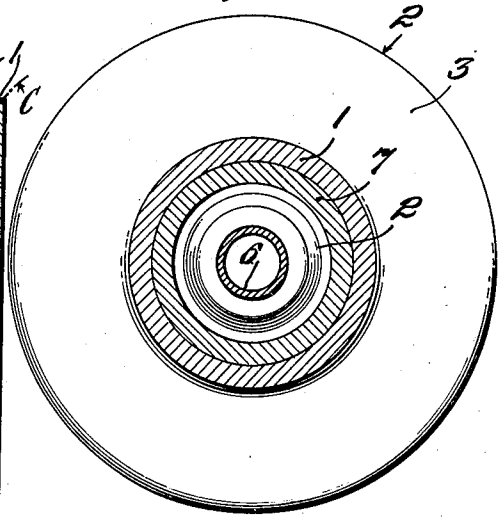


Fig. 4.

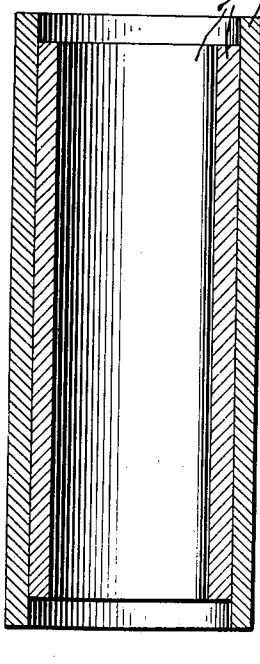
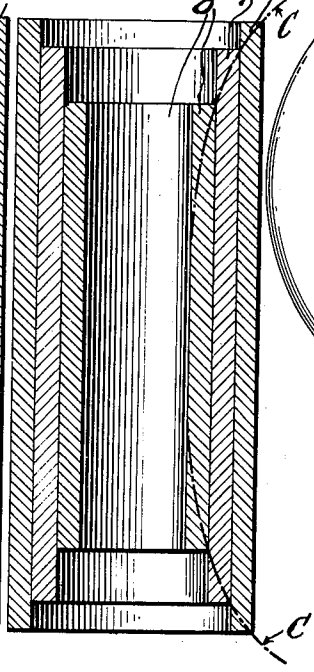


Fig. 5.



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SPOOL

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Application July 17, 1940, Serial No. 345,887

1 Claim. (Cl. 242—119)

This invention relates to spools, and more particularly to textile spools.

It is an object of the invention to provide improved reinforcing means in a spool of the character indicated.

Further objects of the invention are to provide reinforcing means not requiring reconstruction of other elements of the spool and permitting the use of relatively light and inexpensive materials, such as stamped metal and pasteboard.

The field of use of light-weight, inexpensive spools has hitherto been limited by considerations of strength of the barrel to certain types of fibers. As a general thing, the finer the thread and the smoother its surface the greater the pressure produced on the spool barrel will be. This pressure manifests itself by a flowing of the mass of thread nearest the barrel and the building up of pressure at points along the barrel not predictable in advance, so that a barrel may fail near its ends as well as near its center. With fibers such as glass or artificial silk, the pressure conditions are often so severe as to prohibit the use of conventional pasteboard or metal barrel spools and to require the use of fiber or wooden barrels with attendant expense in spool costs and shipping costs. It is an object of the present invention to extend the field of use of the pasteboard and stamped metal spools into these fields in which the requirements have hitherto been found too severe to permit their use.

With these and other objects which will appear in the following full description in mind, the invention consists in the combinations and arrangements of parts and details of construction which will now be described in connection with the accompanying drawing and then pointed out more particularly in the appended claim.

In the drawing:

Fig. 1 is a side elevation of a spool embodying the invention in a preferred form and with the parts progressively broken away to exhibit their construction in central vertical section;

Fig. 2 is a plan view of the end of the spool of Fig. 1;

Fig. 3 is a cross section taken on the line 3—3 of Fig. 1;

Fig. 4 is a longitudinal central section of the barrel of the spool of Fig. 1 prior to assembly; and

Fig. 5 is a view similar to Fig. 4 but illustrating the invention in a modified form.

Referring to Figs. 1 and 2, it will be observed that the invention is illustrated as applied to an anti-thread trapping spool constructed in accordance with Patent No. 2,250,563, granted July 29, 1941, to Rawson Atwood, and is shown as applied to a spool with stamped metal ends and a pasteboard barrel. The spool, generally, includes a barrel 1 preferably made of pasteboard or similar material formed of laminated or comminuted substances, bonded together with adhesive, or of suitable plastic. Ends 2 made of stamped sheet steel or the like are provided and may be surfaced with an anti-thread trapping lining 3 which is rolled into the barrel 1 as at 4. The barrel 1 is fitted into an annular groove 5 formed on each end 2 and is compressed to a certain extent within this groove. The practical limitations on the stamping of metal shapes of this character and the compression of pasteboard or similar materials place a limit upon the thickness of the barrel such that it is not practical to make the barrel of any desired thickness or of any required strength and it is found in practice that in certain uses reinforcement of the barrel is essential. This characteristic is not peculiar to the pasteboard barrel spool but is shared by light-weight inexpensive spools with barrels made of other materials, it being generally true that the practical requirements of the metal stamping and turning art place very definite limits upon the thickness and strength of the barrel. The ends are held together against the barrel by means of a central eyelet or rivet 6 in the customary way.

The spool as thus far described is disclosed fully in the above-mentioned patent and may be taken as an illustration of one type of spool to which the invention is applicable. Such spools have been made in the past either without reinforcement for the barrel or, as illustrated in the said application, with metal reinforcing elements in the form of flanged annular discs or rings inside the barrel. I have discovered that such reinforcements may be dispensed with and a barrel of greater strength and reliability produced by employing as a reinforcing member a tube 7 of pasteboard, or the like, positioned within the barrel 1 and preferably having a driving fit therein, no transversely extending reinforcement being necessary. As will be readily appreciated, pasteboard tubing has certain irregularities not readily illustrable on the scale of the attached drawing, so that there will not ordinarily be contact between the reinforcing tube 7 and the barrel 1 over the entire outer surface of the tube. In particular, pasteboard tubing usually has a slightly nonuniform diameter, due to the ending of the outer lap of spirally-wound paper of which it is

composed; and the inner surface of the barrel 1, when made of pasteboard, will present a similar irregularity.

The reinforcing tube 7 may be made short enough to provide clearance between its ends and the spool ends as shown, so as not to introduce any complication into the assembly of the spool and requiring in manufacture, as compared with a nonreinforced spool, merely the substitution of a barrel and reinforcement assembly, as shown in Fig. 4, for an unreinforced barrel as one element to be assembled.

As a theoretical matter, it might be supposed that the pressure of the thread against the spool barrel would have the greatest tendency to deform or collapse the latter near its center, and accordingly reinforcements spaced symmetrically about the center, or approximately so, have been employed. In fact, however, the point of collapse may be located at any point along the barrel length and the reinforcement of the present invention provides support at whatever point it is needed and in addition makes available the strength of the pasteboard tube at adjacent points along its length for supporting the outer barrel at the point where support is required.

One desirable feature of the present invention is that it is possible to reinforce spools of given design as required for a particular use, omitting the reinforcement to save shipping weight, when none is needed, and adding reinforcement as required. If greater strength than that provided by a single reinforcing tube is needed, it may readily be provided by positioning within the reinforcing tube 7 one or more additional reinforcing tubes 8, as shown in Fig. 5, the spool construction used with the doubly reinforced barrel of Fig. 5 being the same as that shown in Figs. 1 to 3. In this case the barrel 1 and reinforcing tubes 7 and 8 may be of successively-decreasing length so that the total thickness of the barrel, together wtih its reinforcements, corresponds approximately at any given point along the spool length to the bending or collapsing moment, on the assumption of uniform thread pressure against the barrel. This feature is illustrated in Fig. 5 in which the broken arc C represents the moment along the barrel, its distance radially from the barrel surface being proportional thereto at each point along the barrel. As will be observed, it is possible with the construction of the invention employing a plurality of reinforcing tubes to approximate the thickness of the composite structure step fashion quite closely to the curve.

What is claimed is:

In a textile spool, and in combination, a tubular barrel of pasteboard, ends fastened to the said barrel and a plurality of separate tubular reinforcing tubes within the said barrel, the said reinforcing tubes being successively shorter and proportioned so that the total thickness of the barrel and reinforcing tubes at any point along the barrel is substantially proportional to the collapsing moment at the said point.

GEORGE D. ATWOOD.