Oct. 25, 1960 H. F. BENOIT 2,957,642

SPOOL

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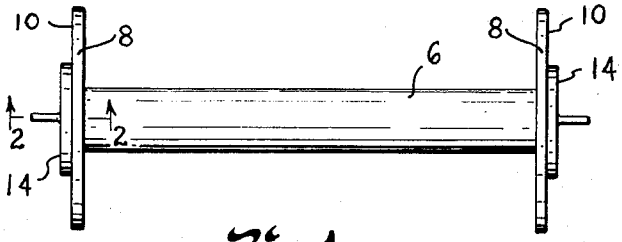


Fig. 1

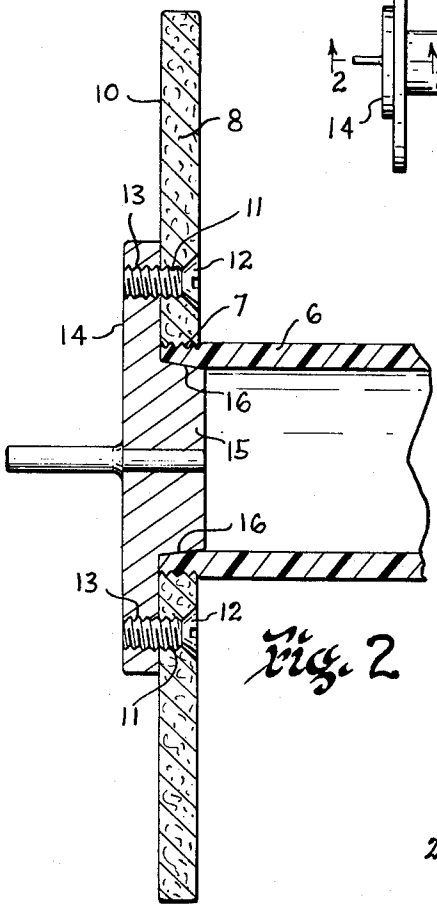


Fig. 2

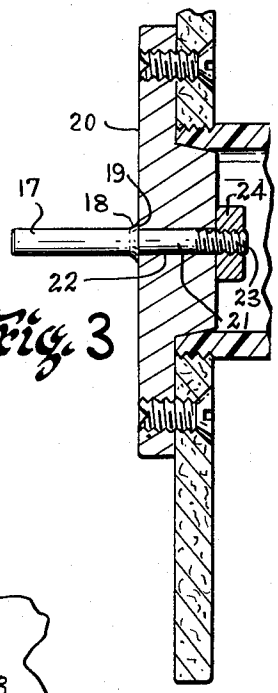


Fig. 3

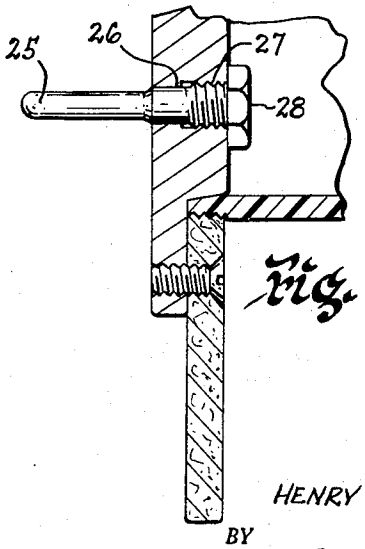


Fig. 4

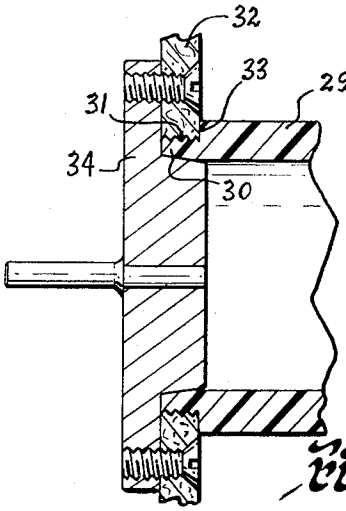


Fig. 5

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SPOOL

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This invention relates to improvements in spools for use with mule spinning, carding and like machines.

Spools of the character embodying the invention are adapted for use in carrying a plurality of wool strands which are initially wound on the spool and which are thereafter withdrawn therefrom during spinning, carding or like operations. In performing such operations the spools are manually placed on and removed from the machines and must be manually placed in and trucked from one machine to another. Such spools are relatively large and, when filled with wool strands, are quite heavy and bulky to handle and thereby receive considerable abuse during the handling thereof either from accidental dropping, from bumping the heads of the spools against the frames of the machines during their removal or replacement or from throwing the spools into the trucks by means of which they are conveyed from one machine to another. One of the primary difficulties has been that the ends of the barrels soon became displaced or bent with the result that the heads could not be supported in proper angular relation with the barrel or were rendered too loose for continued use.

There are various types of spools on the market, all of which have attempted to overcome the above difficulties. Some of these spools are provided with a wooden barrel having the heads attached to the opposed ends thereof by centrally disposed clamp bolts which enabled periodic tightening of the heads. It has been found that during use and due to the abuse which such devices encountered, the ends of the wooden barrels would either split or the material thereof became displaced to such an extent that the heads could no longer be properly angularly disposed relative to the barrel or be sufficiently tightened.

Another difficulty has been that such barrels become splintered to such an extent that individuals handling the spools often received severe injuries from slivers and further difficulty was encountered in being unable to freely draw the woolen strands from the barrels.

To overcome this difficulty other spools appeared on the market having the barrel portion thereof formed of aluminum tubing to which the heads were attached by centrally disposed spring tensioning means which was designed to relieve the head and barrel connections from shock and strain as the result of the abuse they receive during the use of the spool. This type of spool did not solve the problem for the ends of the barrel soon became bent and displaced to such an extent that the heads not only loosened but tilted to an undesirable angle and rendered the spools impractical for use.

As stated above, most of the prior art spools embodied either wooden or aluminum barrels and several different means for attaching the heads on the ends of the barrel were tried with little if any success.

It, therefore, is one of the principal objects of the present invention to provide a spool which will overcome all of the above difficulties and which will be durable, resistant to displacement, cracking, chemical

attack, impact, chipping, bending or splintering and having its head portions attached to the spool in such manner as to prevent the heads from becoming loose or angularly displaced during the use thereof and which may be fabricated in a simple and inexpensive manner.

Another object is to provide spools of the above character wherein the various parts thereof may be removed and replaced if worn or otherwise rendered impractical for use.

Other objects and advantages of the invention will become apparent from the following description taken in connection with the accompanying drawings wherein:

Fig. 1 is a side elevational view of a spool embodying the invention;

Fig. 2 is an enlarged fragmentary sectional view taken as on line 2—2 of Fig. 1 and looking in the direction indicated by the arrows;

Fig. 3 is a view generally similar to Fig. 2 of a modification of the invention;

Fig. 4 is a view similar to Fig. 2 of a further modification; and

Fig. 5 is a view generally similar to Fig. 2 of a still further modification.

Referring to the drawings wherein like characters of reference designate like parts throughout the various views, the device embodying the invention comprises a barrel **6** formed of hollow hard plastic tubular material having its opposed ends provided with a thread **7** formed preferably of the pipe-thread type which is adapted to be threaded internally of a threaded opening formed centrally of disklike heads **8**. The heads **8** are formed of pressed fiber material which is resistant to bending and to wear. The length of the threads **7** on the ends of the barrel are controlled dimensionally so that the fiber heads **8** may be tightly threaded thereon with the respective ends **9** of the barrel assuming a flush relation with the outer surface **10** of the heads. The heads are provided with a plurality of openings **11** spaced circumferentially considerably outwardly of the barrel **6** through which screws **12** may be extended and threaded internally of threaded openings **13** formed in a steel flange **14** of a diameter greater than the diameter of the barrel to provide added resistance to sidewise deflection of the heads relative to the barrel.

The steel flange **14** is provided with an inner boss **15** having a tapered side wall **16** adapted to extend inwardly of a respective end of the hard plastic tubular barrel and is controlled in diameter so as to cause the end of the barrel to flare outwardly when said boss is forced and held inwardly of the tube to thereby cause the threads **7** to frictionally and intimately engage the threads of the openings in the heads **8**. The screws **12** are adapted to hold the boss in said fitted relation inwardly of the hard plastic tubular barrel. When the screws are tightened, the enlarged heads thereof are adapted to be drawn into frictional contact with the fiber material of the head **8** wherein said fiber will tend to prevent the screws from backing out and becoming loose during the use of the spool. The flange is provided with a central opening which extends through said flange **14** and boss **15** and into which a steel pivot pin is mounted and secured therein by welding, brazing or the like.

The barrel **6** is preferably formed of a rigid polyvinyl chloride material containing a suitable antacid such as lead carbonate and containing an anti-oxidant such as carbon black to render the barrel resistant to chemical attack and aging. The barrel may also be formed of linear polyethylene or cellulose acetate butyrate which may also have such an antacid and antioxidant therein to render the barrel resistant to chemical attack and to prevent aging thereof. If desired, at the time of fabricat-

ing the hard plastic barrels suitable fillers may be mixed with the plastic to further reinforce the same such as are commonly known in the art.

The advantage of a hard plastic barrel of the above character is that it is not only resistant to chemical attack and aging but is extremely durable and resistant to impact, chipping, bending or splintering. Further, the plastic material when threaded inwardly of a fiber head, in accordance with the invention, provides a more permanent connection between the barrel and head and which is more resistant to impact than has been possible to be attained with prior art constructions such as set forth above.

Further, when the flange **14** is secured to the head by the screws **12** with the tapered boss forced inwardly of the end of the hard plastic tubular barrel, the thread connections **7** become more firmly interlocked and the boss and flange, by reason of its increased diameter over the diameter of the barrel and the outward location of the screws further function to resist impact which might cause the heads to be displaced sidewise to undesirable angular relation with the barrel.

The barrel is preferably about 2⅜" in diameter having a wall thickness of approximately ¼" but may be made to other diameters and wall thicknesses as required.

It is pointed out that spools of this construction have been proven to withstand considerable more punishment than any of the prior art spools mentioned above.

In Fig. 3 there is shown a preferred construction wherein the steel pivot pins **17** are each provided with a flange portion **18** producing a shoulder **19** for engaging the outer surface **20** of a respective flange and further provided with a stem **21** which extends through a central opening **22** in the flange and boss and which is provided with a threaded end **23** onto which a suitable nut **24** or the like is threaded to detachably secure the pin **17** to the flange. Otherwise, the flange and boss are constructed similar to the construction illustrated in Fig. 2.

A further modification of the invention is shown in Fig. 4 wherein the steel pivot pin **25** is provided with a shank **26** which extends into the opening in the flange and boss in a manner similar to the stem **21** with the exception that the bore of the opening is threaded throughout the thickness of the boss to receive a threaded portion **27** formed on the shank of the pin **25**. The inner end of the pin is provided with a flared hex-head or the like **28** whereby the pin may be inserted through the opening from the inner side of the flange and boss and thence be threadedly and detachably held in connected relation with the flange by tightening the threads of the boss inwardly of the threaded portion of the opening.

In the constructions of Figs. 3 and 4, the pins **17** and **25** may be removed and replaced should they become worn after prolonged use of the spools.

It is pointed out that the spools resulting from the above-described arrangements and methods are particularly durable and resistant to impact and abuse and have overcome all of the difficulties encountered with prior art spools, that is, they are resistant to chipping, splintering, cracking, bending and particularly resistant to chemical attack and aging.

In Fig. 5 there is illustrated a further modification of the invention wherein the barrel **29** has a wall thickness much greater than that of the previously described barrels and is provided with a reduced end **30** having its outer surface threaded at **31** to which the head **32** is threadedly connected. In this instance, the end of the barrel is provided with a shoulder **33** which engages the inner surface of the head **32** and which functions cooperatively with the flange **34** and tapered boss in retaining the head against sidewise displacement and loosening during the use of the spool.

It is pointed out that with all of the constructions described herein the barrels, intermediate the dislike heads **8**, have smooth unobstructed surfaces extending from the inner surface of the head on one end of the spool to the inner surface on the opposite end of the spool thereby permitting the yarn to be wound on the barrel throughout the entire length thereof with no danger of the strands becoming caught between the ends of the barrel and the heads, as was encountered with many of the prior art structures.

With applicant's arrangement the exposed surfaces of the ends of the barrel are always in intimate relation with the adjacent inner side surfaces of the spools wherein no portions of the strands can be forced inwardly between the heads and barrel during the winding of the wool strands on the spools.

It has been found that the use of heads formed of a hard fiber material, when combined with a hard plastic barrel of the type defined herein, results in a more positive and permanent attachment of the heads, as the materials of the barrel and the heads provide a positive friction interlock throughout their interthreaded portions, particularly when combined with the outward wedging action of the bosses, for example, such as shown and described in connection with Fig. 2. The hard plastic tubing also results in barrels which are resistant to cracking, chipping or in any way becoming damaged.

While certain hard plastics have been described herein as being suitable for use with the present invention, it is to be understood that other similar hard plastics may be employed and which have the same characteristics as those described above.

It is further pointed out that if desired, instead of utilizing screws such as shown at **12** for securing the head **10** to the flange **14**, headed pins or the like might be employed and further, in instances when screws are used, the ends thereof may be flared outwardly subsequent to the tightening of the screws to further prevent their loosening and backing out. However, it has been found that the friction binding of the metallic head of the screw with the fiber material of the head functions very satisfactorily in retaining the screws against backing out.

From the foregoing it will be seen that simple, efficient and economical means and method have been provided for accomplishing all the objects and advantages of the invention. Nevertheless, it should be apparent that many changes in the details of construction, arrangement of parts or steps of the method may be made without departing from the spirit of the invention as expressed in the accompanying claims.

Having described my invention, I claim:

1. A spool comprising the combination of a tubular barrel formed of hard plastic material resistant to cracking, chemical attack, impact, chipping, bending and splintering having outwardly threaded end portions, disk-like head portions of hard fiber material each having a threaded opening centrally thereof threadedly attached to the threaded ends of the barrel, a flange of a diameter considerably larger than the diameter of the barrel secured to each of said heads and each having a tapered boss extending inwardly of the respective ends of the hard plastic barrel and of a size to cause the material of the ends of said barrel to flare outwardly and force the threaded ends thereof into frictional binding relation with the threaded openings of the heads, said flanges and bosses being formed of metal and pivot pin means carried by said flanges for pivotally supporting the spool in the machine with which the spool is to be used.

2. A spool comprising the combination of a tubular barrel formed of hard plastic material resistant to cracking, chemical attack, impact, chipping, bending and splintering having outwardly threaded end portions, disk-like head portions of hard fiber material each having a threaded opening centrally thereof threadedly attached to

the threaded ends of the barrel, a flange of a diameter considerably larger than the diameter of the barrel and less than the diameter of the heads secured to each of said heads in overlying relation with the outer side surfaces thereof and each having a tapered boss extending inwardly of the respective ends of the hard plastic barrel and of a size to cause the material of the ends of said barrel to flare outwardly and force the threaded ends thereof into frictional binding relation with the threaded openings of the heads and pivot pin means carried by said flanges for pivotally supporting the spool in the machine with which the spool is to be used.

3. A spool comprising the combination of a tubular barrel formed of hard plastic material resistant to cracking, chemical attack, impact, chipping, bending and splintering having outwardly threaded end portions, disklike head portions of hard fiber material each having a threaded opening centrally thereof threadedly attached to the threaded ends of the barrel, a flange of a diameter considerably larger than the diameter of the barrel secured to each of said heads in overlying relation with the outer side surfaces thereof and each having a tapered boss extending inwardly of the respective ends of the hard plastic barrel and of a size to cause the material of the ends of said barrel to flare outwardly and force the threaded ends thereof into frictional binding relation with the threaded openings of the heads, said flanges and tapered bosses being integrally formed of metal and a metallic pivot pin means detachably carried by said flanges for pivotally supporting the spool in the machine with which the spool is to be used.

4. A spool comprising the combination of a tubular barrel formed of hard plastic material resistant to cracking, chemical attack, impact, chipping, bending and splintering having threaded end portions, disklike head portions of hard fiber material each having a threaded opening centrally thereof threadedly attached to the threaded ends of the barrel, a metallic flange of a diameter considerably larger than the diameter of the barrel and less than the diameter of the heads secured to each of said heads by screws having portions in frictionally locked contact with said heads and each having a tapered metallic boss extending inwardly of the respective ends of the hard plastic barrel and of a size to cause the material of the ends of said barrel to flare outwardly and force the threaded ends thereof into frictional binding relation with the threaded openings of the heads and interchangeable metallic pivot pin means carried by said flanges for pivotally supporting the spool in the machine with which the spool is to be used.

5. In a device of the character described the combination of a tubular barrel of hard plastic material resistant to cracking, chemical attack, impact, chipping, bending and splintering having threaded end portions, disklike head portions of hard fiber material threadedly attached to the ends of said barrel, a flange of a diameter considerably larger than the diameter of the barrel secured to each of said heads and having an integral tapered boss extending inwardly of the respective ends of the hard plastic barrel and secured therein in such a manner as to cause the material of said barrel to flare outwardly and to force the threaded ends thereof into frictional binding relation with the threaded connection with the heads, said flanges and integral bosses being formed of steel, said flanges and tapered bosses having a central opening therein and detachable metallic pivot pin means having a portion extending outwardly of said central openings and having an inner threaded portion threadedly attaching said pin means to said flanges.

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