April 5, 1960 J. W. H. BISHOP 2,931,482

RIBBON SPOOL AND RIBBON AND METHOD OF ASSEMBLING SAME

Filed June 24, 1958

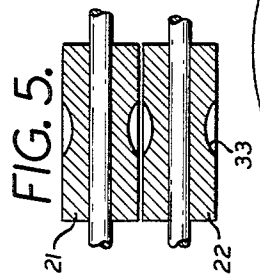


FIG. 5.

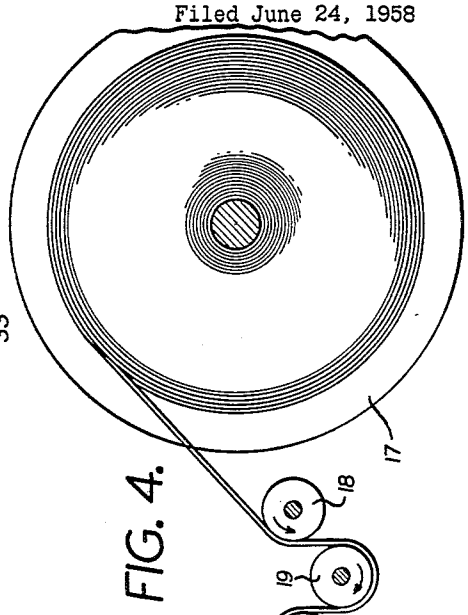


FIG. 4.

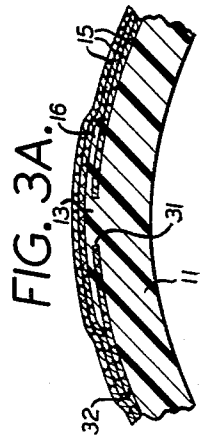


FIG. 3A.

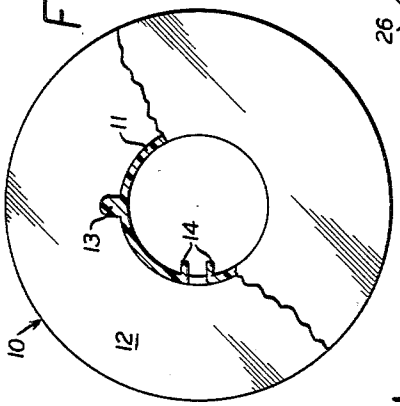
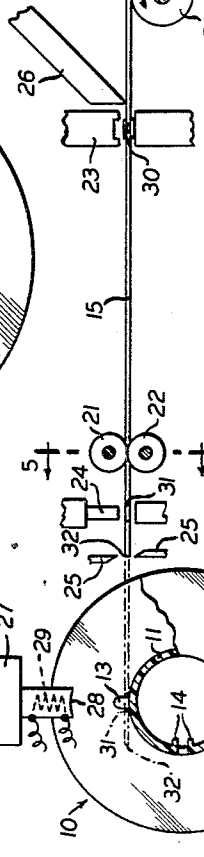


FIG. 1.



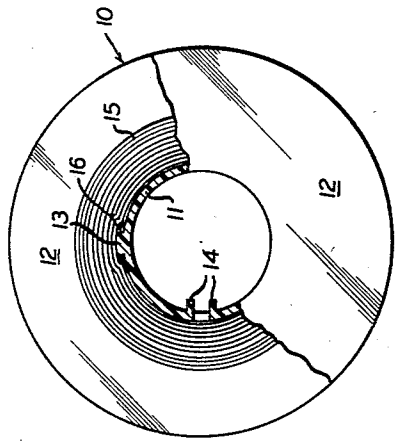


FIG. 3.

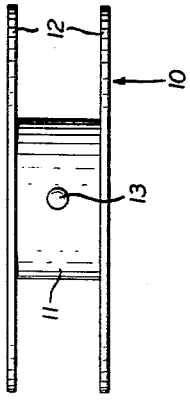


FIG. 2.

INVENTOR
JOHN W. H. BISHOP
BY
Byerly, Townsend, Watson & Churchill
ATTORNEYS.

United States Patent Office 2,931,482 Patented Apr. 5, 1960

2,931,482

RIBBON SPOOL AND RIBBON AND METHOD OF ASSEMBLING SAME

John W. H. Bishop, Essex, Conn.

Application June 24, 1958, Serial No. 744,199

8 Claims. (Cl. 197—175)

The present invention relates to a ribbon spool and inked ribbon for use on business machines and to the method of assembling the ribbon on the spool.

Ribbon spools for business machines have been for the years past primarily made of sheet metal which necessitated stamping, bending, and assembling operations. Such spools were usually formed with means on the hub in the nature of a struck-up hook, bridge or spear prong for anchoring one end of the ribbon on the spool, which anchoring had to be done manually and involved a time consuming operation. It has been also proposed to make the spool from synthetic resin, and where this has been tried, a metallic anchoring hook for the ribbon was secured to the spool hub during the molding operation.

An object of the present invention is to provide a combined ribbon spool and inked ribbon for use on business machines more cheaply and efficiently than heretofore.

A further object of the invention is to form a ribbon spool of molded synthetic thermoplastic resin having integral thermoplastic means for anchoring the ribbon on the spool.

A still further object of the invention is to provide a method for preparing, presenting and anchoring an inked ribbon onto a thermoplastic ribbon spool.

The foregoing and other objects of the invention, not specifically enumerated, I accomplish by molding from thermoplastic resin, a ribbon spool with integral anchoring means thereon and while supporting a spool on a suitable support preparatory to securing and winding a ribbon thereon, preparing the end of an inked ribbon which is to be anchored to the spool, with an opening for cooperation with the anchoring means and with an eyelet intended for operating a reversing mechanism on certain makes of business machines in a known manner. The invention will be readily understood from the detailed description which follows when considered in connection with the accompanying drawing showing a preferred embodiment and wherein:

Figure 1 is a side elevation, partly broken away, of the ribbon spool embodying the invention.

Figure 2 is a top plan view of a ribbon spool shown in Fig. 1.

Figure 3 is a side elevation of the ribbon spool of Figure 2 showing an inked ribbon anchored to the spool and wound thereon.

Figure 3A is a greatly enlarged detailed showing of the anchoring of the inked ribbon in Figure 3.

Figure 4 is a schematic showing of the method of assembling an inked ribbon on a spool as shown in Figure 1.

Figure 5 is a section taken on the line 5—5 of Figure 4.

Referring first to Figs. 1 to 3A of the drawing, the ribbon spool 10 of the present invention may be said to consist of a generally cylidrical hub 11, having at each end thereof a substantially flat annular flange 12 extending perpendicularly to the axis of the hub. The spool may be formed of any suitable thermoplastic material such as polystyrene, polyethylene, polymerized vinylidene chloride, polymerized methyl-methacrylate and the like. Integrally formed on the hub and extending substantially radially outwardly therefrom in substantially the medial plane thereof is a protuberance, nub or teat 13 of a size to engage through a hole in the end of an inked ribbon and capable of being spread and deformed under heat and pressure into substantial surface engagement with the hub 11. Also formed integrally with the hub is a pair of substantially parallel radial ribs 14 adapted to constitute a spline for cooperation with a groove in the driving hub of the machine upon which the spool is used. As herein shown, the spool 10 is of the noiseless core type but it will be appreciated that the spool may be of any type having means on the hub by which the spool may be rotated.

The protuberance 13, after the holed end of an inked ribbon 15 has been applied thereover is deformed under heat and pressure to form a mushroom-like head 16, to lie in substantial surface engagement with the ribbon and preferably flow through the weave of the ribbon, as best shown in Fig. 3A to securely anchor the ribbon to the hub of the spool to enable the ribbon to be wound on the hub. The application of the holed end of the ribbon to the protuberance and the means for deforming the protuberance under heat and pressure may be accomplished in numerous ways.

Preferably, I prefer to accomplish the aforementioned operations as schematically shown in Fig. 4 wherein the thermoplastic spool 10 is supported for rotation on its axis with the protuberance 13 extending upwardly. The inked ribbon 15 is then drawn from a ribbon reel 17 over guide rollers 18, 19 and 20 by a pair of feed rollers 21 and 22. In the course of this feeding operation the ribbon is drawn beneath an eyeleting punch 23, a perforating punch 24 and a pair of shear blades 25. Adjacent the eyeleting punch 23 is a feed mechanism 26 adapted to periodically feed an eyelet beneath the punch 23. Above the protuberance 13 when mounted on its support is a punch 27 having a concave operating end 28 having a curvature complemental to the curvature of the hub and heated by an electrical heating element 29, or its equivalent.

In assembling an inked ribbon on a spool with the apparatus illustrated in Fig. 4 the procedure is as follows: The ribbon is drawn from the reel 17 by the feed rollers 21, 22 and when the free end of the ribbon is at a position slightly to the left of the shear blades 25 the feed rollers are temporarily stopped and the eyeleting punch 23, the perforating punch 24 and the shear blades 25 are simultaneously operated to apply an eyelet 30 to the ribbon, punch a hole 31 in the ribbon and sever the ribbon at 32. This having been accomplished, the feed rollers are again rotated to present the end of the ribbon into substantially tangential relation to the spool hub with the hole in the ribbon in position over the protuberance 13. The feed is again stopped and the punch 27 is operated to mushroom the protuberance over the end of the ribbon as best shown in Fig. 3A. The spool is then rotated to wind the ribbon thereon. In order that the eyelet 30 during this winding operation may pass through the feed rollers 21, 22 they are each formed with a medial circumferential groove 33 as shown in Fig. 5. When a desired length of ribbon has been wound on the spool rotation thereof is stopped and the operation of eyeleting, perforating, and severing the ribbon as aforementioned is repeated. The wound spool is removed from its support and replaced by another spool to be wound by a repetition of the operations of feeding the end of the ribbon into position over the protuberance, anchoring of the ribbon to the hub and winding the ribbon thereon. The free end of the wound

ribbon may then have a hooked eyelet applied thereto for attaching said end to a second spool on a machine.

The operation of the various movements of the ribbon through the apparatus and the operation of the eyeleting and perforating punches and shears may be suitably timed by controlled cams or other means well known to workers skilled in the art.

Although I have shown and described a specific form of spool and a method of feeding, anchoring and winding an inked ribbon thereon it is to be understood that changes in the spool contruction and in the specific apparatus and arrangement of parts may be mod.fied within the range of engineering skill without departing from the spirit of the invention as claimed.

What I claim is:

1. A ribbon spool formed of thermoplastic resin comprising a cylindrical hub having an integral outwardly extending protuberance located in the medial plane of the hub of a size capable of being spread under heat and pressure into surface engagement with the hub.

2. A ribbon spool according to claim 1 wherein the protuberance has the form of a teat.

3. In combination, a ribbon spool formed of thermoplastic resin and an inked ribbon wound thereon, one end of the ribbon being bonded to the hub of the spool by causing the thermoplastic of the hub to pass through the weave of the ribbon.

4. In combination, a ribbon spool formed of thermoplastic resin and an inked ribbon wound thereon, the hub of the spool having an integral outwardly extending protuberance, one end of the ribbon having a hole therein of slightly larger diameter than the protuberance and through which hole the protuberance extends and the protuberance being deformed under heat and pressure to form an enlarged head to anchor the holed end of the ribbon onto the hub.

5. In combination, a ribbon spool formed of thermoplastic resin and an inked ribbon wound thereon, the hub of the spool having an integral outwardly extending protuberance, one end of the ribbon having a hole therein of slightly larger diameter than the protuberance and through which hole the protuberance extends and the protuberance being deformed under heat and pressure so that portions of the deformed protuberance extend

through the weave of the ribbon to bond the ribbon to the hub.

6. The combination according to claim 5 wherein the heat and pressure deformation of the protuberance has spread the protuberance over the surface of the ribbon around the hole therein.

7. The method of assembling an inked ribbon on a thermoplastic ribbon spool which comprises, supporting a spool for rotation on its axis, feeding the free end of a ribbon toward the hub of the spool, stopping said feeding at an operating station in advance of the hub and at said station applying an eyelet to the ribbon in spaced relation to the end thereof, advancing the free end of the ribbon into substantially tangential relation to the hub and while in said position applying sufficient heat and pressure to the engaging surfaces of the hub and ribbon to cause the thermoplastic to flow through the weave of the ribbon, withdrawing the heat and pressure and then rotating the supported spool to wind the ribbon thereon.

8. The method of assembling an inked ribbon on a thermoplastic resin spool which comprises, supporting on its axis a spool having on its hub an integral outwardly projecting protuberance with the protuberance extending upwardly, feeding the free end of a ribbon toward the hub, stopping said feeding at an operating station in advance of the hub and at said station simultaneously punching in the ribbon adjacent its end a hole, of a size to pass over the projection and applying an eyelet to the ribbon in longitudinal spaced relation to the hole, advancing the free end of the ribbon so that the punched hole in the ribbon overlies the protuberance on the hub, applying sufficient heat and pressure to the protuberance to substantially flatten it to overlie the ribbon and flow through the weave thereof to anchor the ribbon onto the hub, withdrawing the heat and pressure and then rotating the spool to wind the ribbon thereon.

References Cited in the file of this patent

UNITED STATES PATENTS

1,386,617	Gunderman	Aug. 9, 1921
2,477,010	Schmidt	July 26, 1949