Aug. 14, 1934. F. M. WOMELDORFF 1,970,506

SPOOL COVERING MACHINE

Filed March 10, 1932 3 Sheets-Sheet 1

FIG. 1.

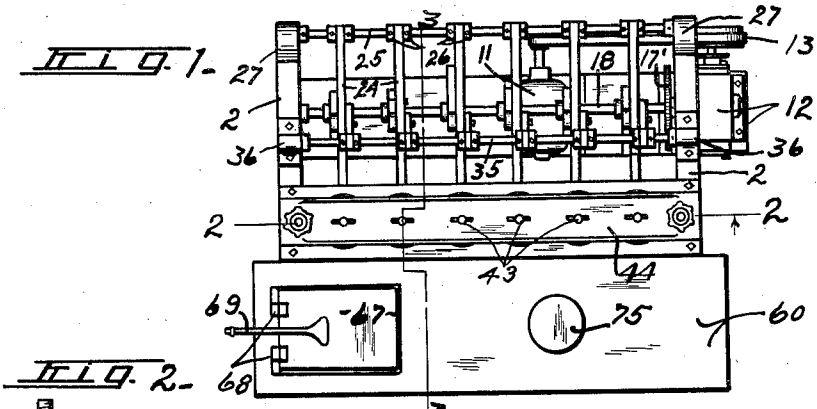
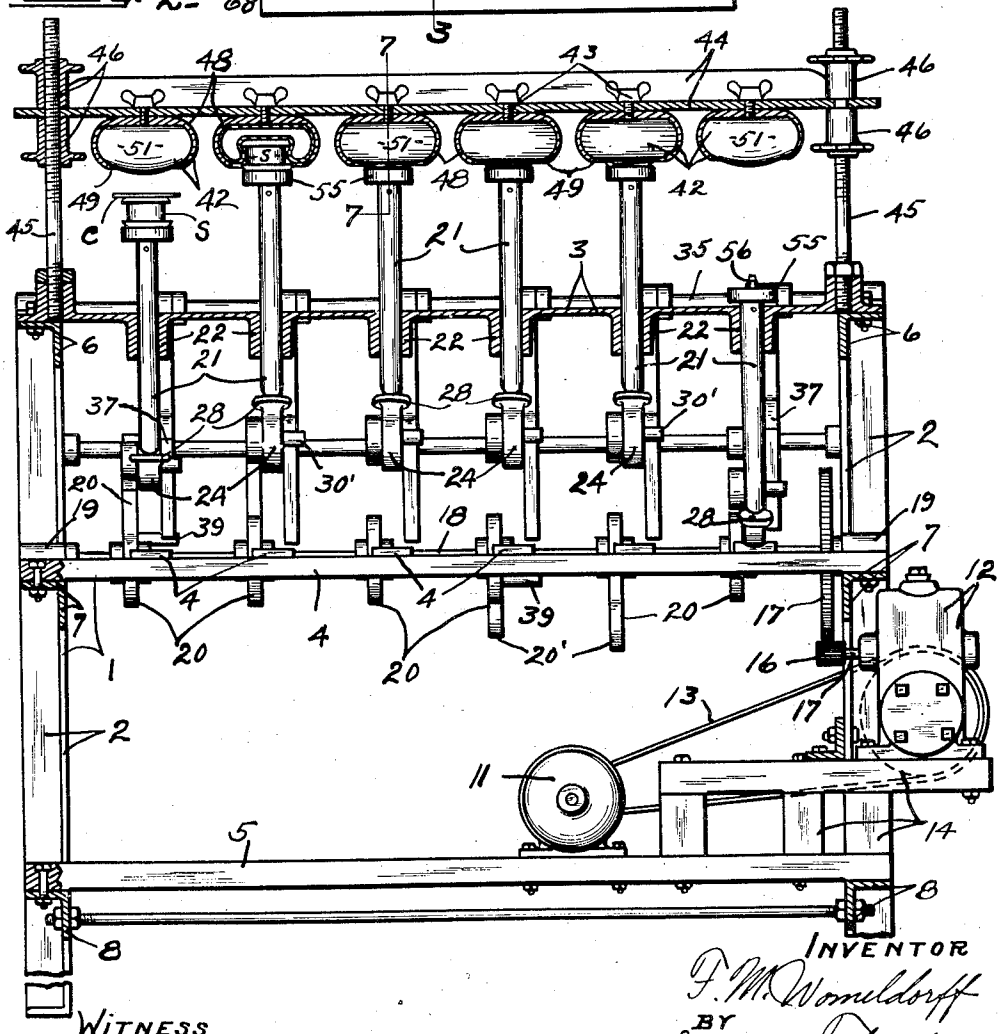


FIG. 2.



WITNESS
J. J. Mains

INVENTOR
F. M. Womeldorff
BY
Denison & Thompson
ATTORNEYS

Aug. 14, 1934. F. M. WOMELDORFF 1,970,506

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FIG. 3.

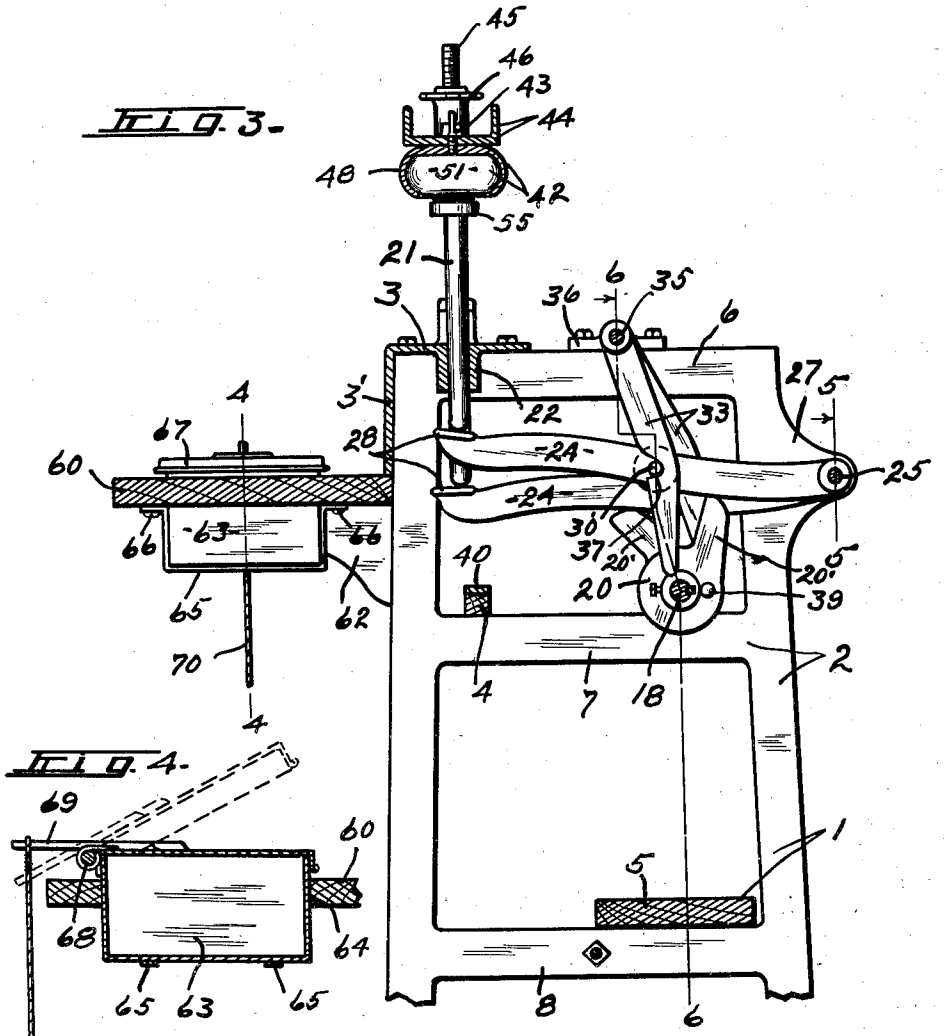
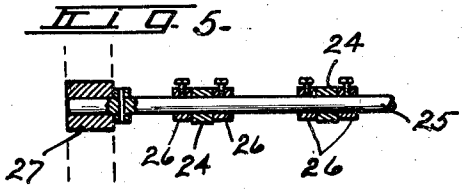
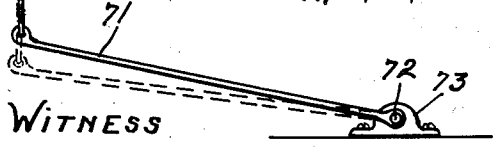


FIG. 4.

FIG. 5.





WITNESS
J. J. Mains

INVENTOR
F. M. Womeldorff
BY
Denison & Thompson
ATTORNEYS

Aug. 14, 1934. F. M. WOMELDORFF 1,970,506

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FIG. 6.

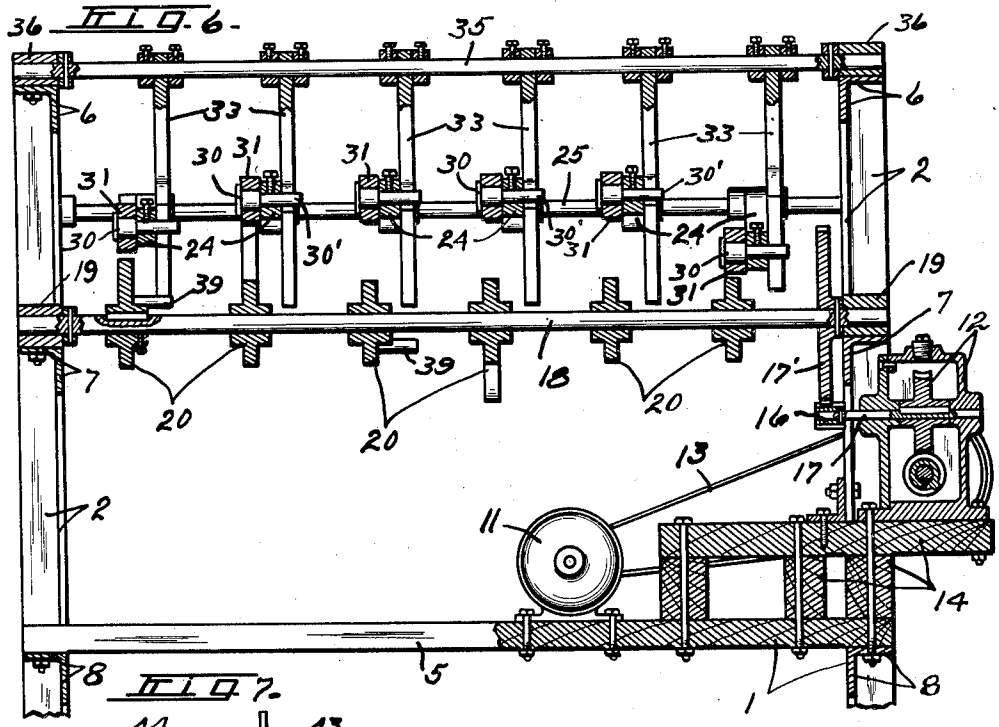


FIG. 7.

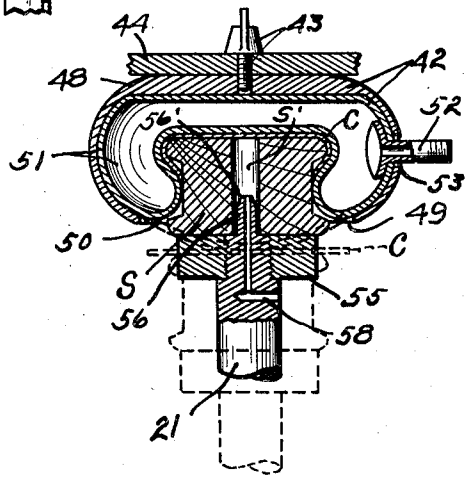
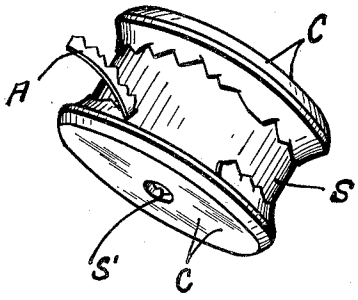


FIG. 8.



INVENTOR
F. M. Womeldorff
BY
Denison & Thompson
ATTORNEYS

WITNESS
J. J. Mains

Patented Aug. 14, 1934

1,970,506

UNITED STATES PATENT OFFICE

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SPOOL COVERING MACHINE

Francis Marion Womeldorff, Norwich, N. Y., assignor to Samuel A. Jones, Sr., Samuel A. Jones, Jr., and Herbert D. Kenyon, all of Norwich, N. Y.

Application March 10, 1932, Serial No. 598,051

8 Claims. (Cl. 18—19)

This invention relates to an apparatus for applying covers to articles of manufacture having uneven surfaces, and pertains more particularly to a device for permanently fixing covers to the heads of spools, bobbins or the like.

In the manufacture of flanged spools or bobbins adapted to receive high grade twine such, for instance, as fish line, it is desirous from a sales standpoint to produce a spool which is exceptionally attractive in appearance and at a minimum of expense. This has heretofore been accomplished by first rendering a flat disk of celluloid or other suitable material soft and pliable and then cementing and manually applying the disks to the heads of the spools. This has been a very slow and laborious process due to the necessity of stretching or forming the disk over the ends and about the curved flanges of the spools in order to produce a neat, smooth and attractive article.

The main object of this invention is to produce a machine which will readily apply flat disk covers composed of celluloid or its substitute to articles of manufacture having uneven surfaces such as the heads of spools, reels, bobbins or the like so as to produce a covering which is smooth in appearance and which is permanently fixed thereto.

Another object is to produce a machine of the above-mentioned class which is readily adjustable to spools of different widths and diameters and having surfaces of varying degrees of curvatures or unevenness.

Still another object is to produce a machine by which covers of varying degrees of thicknesses and flexibility may be permanently and rapidly applied to the spool heads.

Other objects and advantages relating to the structure and form and relation of the parts thereof will more fully appear from the following description taken in connection with the accompanying drawings in which:—

Figure 1 is a top plan of an apparatus embodying the various features of this invention.

Figure 2 is an enlarged longitudinal vertical section through the work-supporting plungers and mold members taken on line 2—2, Figure 1.

Figure 3 is an enlarged vertical transverse sectional view taken on line 3—3, Figure 1.

Figures 4 and 5 are detail sectional views taken respectively on lines 4—4 and 5—5, Figure 3.

Figure 6 is a detail vertical sectional view taken on line 6—6, Figure 3.

Figure 7 is an enlarged vertical detail sectional view taken on line 7—7, Figure 2.

Figure 8 is a perspective view of a flanged spool or bobbin with the ends having the covers applied thereto.

My novel cover-applying mechanism, as illustrated in the drawings, consists of a supporting frame 1 composed of a pair of vertically disposed end frames 2 joined at their upper ends by a longitudinally extending bearing plate 3 and a pair of similarly disposed tie bars 4 and 5 arranged in vertical spaced relation below the bearing plate 3 and which are secured by bolts or their equivalent to respective cross members 6, 7 and 8 comprising a portion of the end frames 2. The bearing plate 3 extends across the forward side of the frame 1 and is provided with a downwardly extending apron 3' which extends across the forward side of the end frames 2.

The lower positioned tie bar as 5 is conveniently positioned at the rear of the supporting frame 1 and is utilized for supporting a drive motor 11 and a gear speed-reducing member 12 which is driven by the motor 11 by means of a belt 13. The speed-reducing member 12, in this instance, is mounted on a suitable supplemental supporting frame 14 which is secured to the tie bar 5 and extends a short distance above and to the outside of one of the end frames 2 for maintaining a drive pinion 16 secured to the drive shaft 17 of the speed-reducing unit 12 in meshing engagement with a gear 17' secured to a horizontally disposed cam shaft 18.

The cam shaft 18 extends longitudinally of the supporting frame 1 near the rear side thereof and has its ends journaled in suitable bearings 19 secured to the intermediate cross member 7 at the rear of the tie bar 4 which, in this instance, is positioned in a plane below the bearing plate 3.

The cam shaft 18 has secured thereto a plurality of, in this instance six, similarly constructed cams 20 which are arranged in longitudinal spaced relation along the shaft 18 for successively raising a corresponding number of work-supporting plungers 21 which are journaled for vertical reciprocative movement in respective bearing members 22 provided in the bearing plate 3.

The plungers 21 are lifted by the action of the cams 20 through the medium of respective cam follower levers 24 disposed in a horizontal plane above the cam shaft 18, with the rear ends thereof pivotally mounted on a supporting shaft 25. Each lever is mounted on said shaft between a pair of collars 26 which maintain the levers in alignment with the plungers 21 and permit the free rocking movement thereof.

The supporting shaft 25 extends longitudinally

of the frame 1 at the rear side thereof with the ends of the shaft mounted in respective rearwardly extending members 27 secured to or made integral with the end frames 2. The forward ends of the cam follower levers 24 terminate beneath a respective plunger 21, and each of the levers is provided with an enlarged contact surface or plate 28 adapted to engage the lower ends of respective plungers 21.

The plungers 21 and levers 24 are arranged in a plane at one side of the respective actuating cam 20, while each lever is provided with a shouldered stud 30 which has the enlarged end thereof extended over the respective actuating cam 20 and has rotatably mounted thereon a roller 31 adapted to engage the face of said cam.

The opposite ends of the studs 30 extend outwardly at the opposite side of the respective levers 24 in the path of movement of latch members 33 to form stop pins 30' adapted to be engaged by a corresponding latch 33 for maintaining the levers in their uppermost position. The latch members 33 extend upwardly and downwardly in a substantially vertical plane from the pins 30' with the upper ends thereof pivotally mounted on a supporting shaft 35 which extends in a horizontal plane across the upper end of the supporting frame 1 in a vertical plane slightly to the front of the plane of the stop pins 30' so that the forward vertical edges of the latch members will normally contact with said pins.

The shaft 35 is secured to the supporting frame 1 by means of journal members 36 positioned at the ends of the shaft 35 and secured to the upper cross bars 6 of the end frames 2.

The lower ends of the latch members 33 terminate a short distance above the cam shaft 18, and each latch is provided with a recess or pin-engaging notch 37 in the forward vertical face thereof and at such a distance from the supporting shaft 35 that when the respective stop pin 30' registers therein, the follower levers 24 and the plungers 21 associated therewith will be maintained in their extreme uppermost positions.

The cams 20 are so constructed that the respective levers 24 will be moved from the lowermost to the uppermost position during substantially one-sixth of a revolution of the cam shaft 18, and as these levers approach their uppermost position, the stop pins 30' will ride into the respective recess 37 in the corresponding latch member and be maintained in the upper position thereby until such time as the cam shaft 18 has completed substantially $\frac{11}{12}$ths of a revolution, whereupon the lower ends of the latch members 33 will be engaged by a release pin 39 secured to each cam 20 to cause said latch members to rock rearwardly and release the respective cam follower levers 24, permitting said levers and the plungers 21 actuated thereby to return to their lowermost position which, in this instance, is determined by the forward end of the levers 24 engaging the upper face of the tie bar 4 which, for the purpose of reducing the shock of the return movement of the plungers and levers to a minimum, is provided with yielding pads 40 composed of rubber or other resilient material secured to the upper face of said bar.

The cams 20, in this instance, are arranged in staggered relation upon the shaft 18 or, in other words, the throw portions as 20' of these cams are arranged in equal circumferential spaced relation about the axis of the shaft 18 so that the plungers 21 will be moved upwardly one at a time for bringing the work carried thereby into successive engagement with a corresponding number of cover-applying molds 42 which are arranged in longitudinal spaced relation above the plungers 21 and are secured by thumb screws 43 or their equivalent to the lower face of a supporting bar 44. This bar extends in a horizontal plane longitudinally of the supporting frame 1 with the ends thereof slidably mounted upon respective vertically disposed posts 45 which have their lower ends secured in respective ends of the bearing plate 3.

The mold-supporting bar 44 is adjustably maintained in position upon each post 45 by means of nuts 46 positioned one adjacent either side of the bar 44.

The mold 42 for applying the cap or cover C to the work as the spool S, consists in this instance, of a hollow substantially spherical case 48 having the upper and lower faces thereof flattened and the lower face provided with an opening 49 therethrough communicating with the interior of the case.

The opening 49 is somewhat larger in diameter than the diameter of the work S for permitting the free entrance of the work to the interior of the case. Within the inner chamber as 50 of the case 48 is positioned the mold proper consisting of an inflated bag 51 preferably composed of rubber or other suitable elastic or pliable material adapted to be inflated with gas or air to a greater or less degree, and for this purpose, the bag is provided with a suitable inlet valve as 52 which is connected with said bag and extends outwardly through a suitable opening 53 provided in the side of the case 48.

The upper end of each work-supporting plunger 21 is provided with an enlarged annular flange or ring 55 secured to or made integral with the plunger and adapted to have the work as the spool S supportably positioned thereon, and in order to maintain the work in operative relation with the plunger and with the mold 42, the upper end of each plunger is provided with an extension 56 which, in this instance, is reduced in diameter to conform to the diameter of the central passage or bore S' which extends centrally through the spool S between the heads thereof so that the spool may be mounted on the shoulder 55 and be maintained in operative position thereon by the extension 56 which extends into the bore S'. The upper end of the extension 56 is beveled to form a relatively sharp end 56' adapted to readily perforate the cap or cover C when such cover has been applied to the lower end of the spool as the spool is positioned on the plunger or spindle 21.

The cover or cap C, in this instance, is a flat disk of somewhat greater diameter than the head of the work or spool S to be covered and is composed of celluloid or other similar material, and in order that the air may readily escape from between the central portion of the cap or cover and spool through the bore S', I have provided the upper end of the plunger 21 with an aperture or passage 58 which extends downwardly from the upper end of the extension 56 to below the shoulder 55 where it terminates in a radial portion having the outer end in communication with the atmosphere.

I have also provided the apparatus with a shelf or table 60 which extends longitudinally across the front of the frame 1 beneath the apron 3' of the bearing plate 3 and is supported by a pair of brackets 62 secured to or made integral with the end frames 2. The table 60 is provided at one end with a container 63 adapted to contain a weakened solution for the purpose of maintaining the disks placed therein in a soft, pliable condition.

The container 63, in this instance, extends

through a suitable aperture 64 provided near one end preferably at the left-hand side of the table, and is maintained in position therein by a pair of U-shaped brackets 65 which are secured to the undersurface of the table by means of screws 66.

The upper end of the container 63 is closed by a suitable door or cover 67 which is hingedly mounted as at 68 to one side of the container 63, and that the door or cover may be readily opened while the hands of the operator are otherwise engaged, I have provided the cover with an extension 69 which extends outwardly over the end of the table and is connected by a suitable cable 70 to one end of a foot pedal 71 which is pivotally connected at the other end as at 72 to a bracket 73 secured to the floor or other suitable support.

The table 60 is also provided with a container or pot 75, adapted to contain glue, and which is positioned in a suitable aperture provided in the table intermediate the container 65 and the opposite end of the table and may be maintained in said opening in any suitable manner, not herein necessary to illustrate.

Operation

In applying disk caps or covers composed of celluloid or any of its substitute materials to the ends of spools, the disks are first made soft and pliable by first immersing them into a suitable solution for a relatively short period of time, say ten or fifteen minutes, depending upon the material used and the thickness of the material, after which the disks are placed in the container 65 provided in the table 60 which contains a weakened solution adapted to maintain the disks in the desired state of flexibility.

As the plungers or spindles 21 are moved successively and intermittently from the lowermost position to the uppermost position in proximity to the respective molds 42 by the action of the motor 11, the disks are taken from the container 63 in the soft pliable state, and after applying a coating of glue to the inner face of the disks, these disks are then applied to the upper end of the work as the spool S, after which the spool with the disk thereon is placed upon the lowermost spindle 21 and as said spindle is raised by the action of the respective cam 20, the disk first comes in contact with the lower convex surface of the bag 51 which extends downwardly through the opening 49 a relatively short distance below the lower face of the case 48, as illustrated by dotted lines in Figure 7, in which position the central portion only of the disk is in contact with the bag and as the plunger and spool continue their upward course, it is evident that the bag will progressively engage the cover from the center outwardly and under a gradually increasing pressure as the spool and cap enter the chamber 50 of the case 48.

As the spool and cover continue the inward movement, it is obvious that the flexible bag 51 will be drawn tightly around and beneath the flange *f* of the spool due to the gas or air contained in the bag being forced from the central portion of the bag to the outer peripheral edge thereof as the lower central portion of the bag is moved by the spool and cover towards the upper corresponding portion thereof, as illustrated by full lines in Figure 7.

It is now obvious that as the central portion of the cap is progressively engaged by the bag from the center outwardly under gradually increasing pressure, the central portion of the cap or cover will be firmly pressed against the flat head portion of the spool, and as the peripheral portion of the bag is forced around and about the peripheral edge of the flange *f* of the spool under increased pressure, that the cap or cover will be automatically stretched over the face of the flange so as to present a smooth, sleek surface corresponding to the contour of said flange.

As the plunger approaches the uppermost position, the respective stop pin 30' will engage in the recess 37 of the respective latch member 33 and the corresponding plunger 21 and cam follower lever 24 will be maintained thereby in the uppermost position, while the cam is permitted to continue its rotary motion for a period of time sufficient to permit the glue to become sufficiently fixed or set for permanently maintaining the cap or cover to the spool S after which the respective lever 24 will be released by the release pin 39 engaging the lower end of said lever and rocking said lever rearwardly out of the path of movement of the stop pin 30'.

The spool may then be taken from the spindle 21 while said spindle is in its lowermost position and a disk may be applied to the other end of the spool in the same manner as previously described, after which the spool is again placed upon the spindle and in so doing, the portion of the previously applied cap covering the bore S' will be pierced by the extension 56 so that as the plunger is again moved upwardly and the cover brought into contact with the mold 42, this second cover may be applied to the opposite end of the spool in the same manner described for applying the previous cap to the other end of the spool.

It is also obvious that during the engagement of the cap with the bag 51 that any air collected or trapped between the cover and upper end of the spool may readily pass therefrom through the bore S' and aperture 58 provided in the upper end of the plunger 21.

The cap or cover, as hereinbefore mentioned, is stretched and securely applied to the upper face and around the flange of the spool so as to present a smooth neat appearance while the peripheral edge of the cover is folded or crimped upon the central portion of the spool inside of the flange, as indicated in Figure 8, and after the spool has had the covers applied to both surfaces thereof, these rough irregular crimped portions of the cover are removed by cutting that portion inside of the flange away, as indicated at A, Figure 8, so as to produce a spool which when wound with twine such as fish line, has the exposed surface thereof entirely covered by the celluloid cap, while that portion of the spool which is not covered by the cap is covered by the twine, thereby providing a spool which is very neat and attractive in appearance and one which enhances the sale of the product to an appreciable degree.

It is now obvious that I have produced a simple, durable and efficient machine which may be readily operated and one which may be readily adjusted to work of various thicknesses by merely adjusting the relative height of the mold-supporting bar 44 and also which may be readily adapted to covers of various thicknesses and flexibility by providing a suitable amount of pressure in the mold bag 51, and although I have shown and particularly described the preferred embodiment of my invention, I do not wish to be limited to the exact construction shown, as various changes in the form and arrangement of the parts thereof may readily be made without departing

from the spirit of this invention as set forth in the appended claims.

I claim:

1. In a device for applying a cover to a spool having a bore therethrough, means for applying a cover to the ends of the spool consisting of a mold and a work-supporting plunger adapted to carry the spool into and out of operative engagement with said mold, said plunger having a surface adapted to support the spool, and a reduced extension portion adapted to enter said bore, said plunger having a vent associated therewith adapted to register with the bore in the spool for permitting the escape of air through said bore as the cover is applied to the spool.

2. In a device for applying a flexible cover to an article of manufacture, a case having a chamber therein provided with a contracted inlet opening adapted to receive an article therethrough, a pliable pressure member mounted in the chamber for yieldingly engaging said cover whereby the cover will be applied to the surface of the article as the article and cover enter said chamber.

3. In a device for applying a flexible cover to an article of manufacture having an irregular surface, a case having a chamber adapted to receive the article therein, a flexible mold mounted in the case chamber, said mold having the major portion of the marginal surface thereof supported by the case whereby the cover will be applied to the surface of the article as said article and cover enter the chamber.

4. In a device for applying a flexible cover to an article of manufacture, a support for the article, a case having a chamber therein provided with a contracted inlet opening adapted to receive the article therethrough a pliable pressure member mounted in the chamber for yieldingly engaging the cover, and operating means for producing relative movement of the support and case whereby said article and cover will be brought into operative engagement with the pressure member.

5. In a device for applying a flexible cover to an article of manufacture, a plurality of supports for the articles, a mold for each support comprising a case having a chamber therein provided with a contracted inlet opening adapted to receive an article therethrough, a pliable pressure member mounted in each chamber for yieldingly engaging the cover carried by the respective article, and operating means for producing relative movements of the supports and molds whereby said articles and covers will be brought into successive operative engagement with said molds.

6. In a device for applying a flat disk cover to a spool having marginal flanges, a mold for applying said cover to the spool head, a work support, and means for producing relative movement of the mold and support toward each other, said mold comprising a pliable pressure means adapted to progressively engage the cover from the center outwardly with variable gradual increasing pressure during said relative movement, and means engaging the outer portion of the pressure means whereby the greatest degree of pressure is applied to the margin of the spool about said flange.

7. In a device for applying a flat disk cover to a spool having marginal flanges, a mold for applying said cover to the spool head, a work support, and means for producing relative movement of the mold and support toward each other, said mold comprising a pliable pneumatic pressure bag adapted to progressively engage the cover from the center outwardly with variable gradual increasing pressure during said relative movement, and a case member containing the bag and adapted to supportably engage the outer portion of the bag as the bag is flexed by the engagement of the article therewith whereby the bag will be forced inwardly beneath the flange for stretching and tightly pressing the cover about said flange.

8. A device for applying an imperforate flexible cover to the ends of an article of manufacture having a bore therethrough comprising a mold for enveloping an end of the article, a work support, means for producing relative movement of the mold and support towards each other to bring the article into operative relation with the mold, said support having means for perforating the cover on one end of the article at said bore as the article is placed thereon for permitting the escape of air through the bore when the cover is applied to the other end of the article.

F. MARION WOMELDORFF.