Feb. 17, 1959 J. W. H. BISHOP 2,873,839

TYPEWRITER RIBBON SPOOL AND THE LIKE

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FIG. 4.

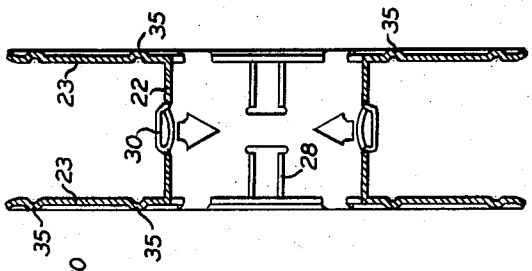



FIG. 3.

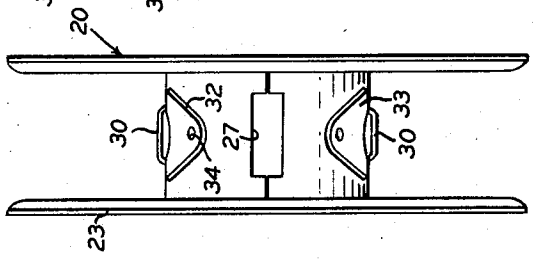



FIG. 1.

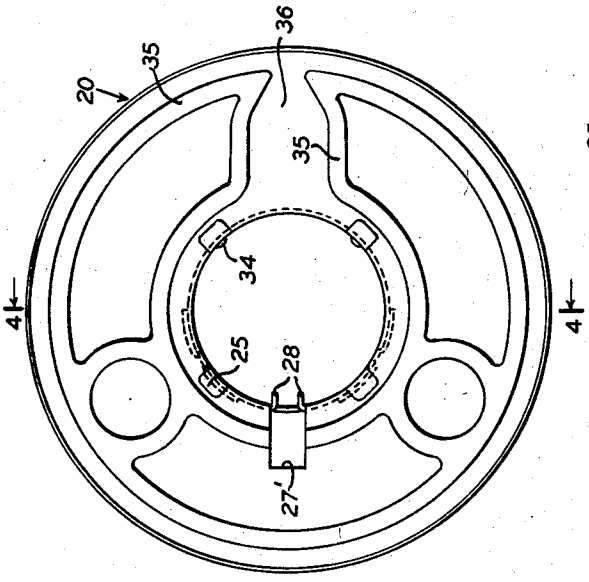



FIG. 2.

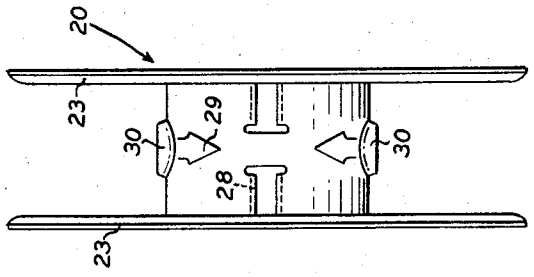



FIG. 5.

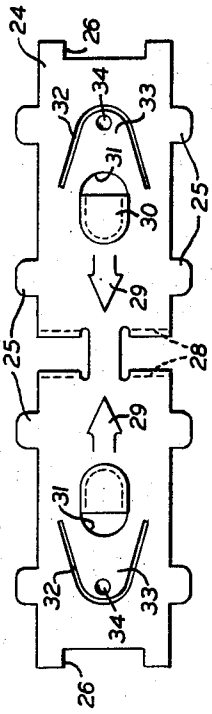
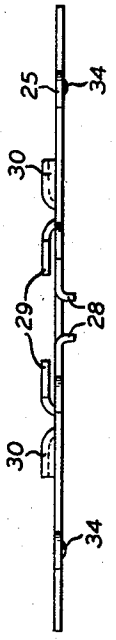



FIG. 6.




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FIG. 7.

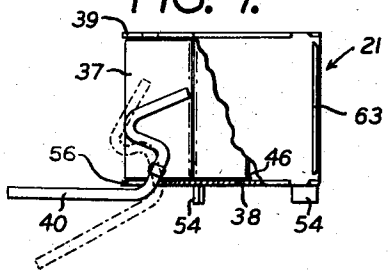



FIG. 8.

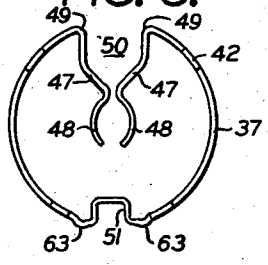



FIG. 9.

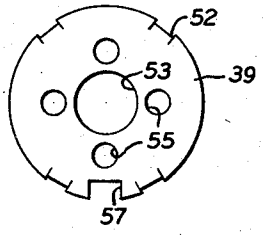



FIG. 10.

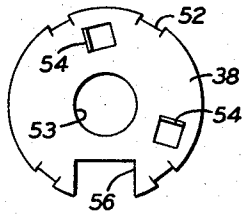



FIG. 11.

FIG. 11A.

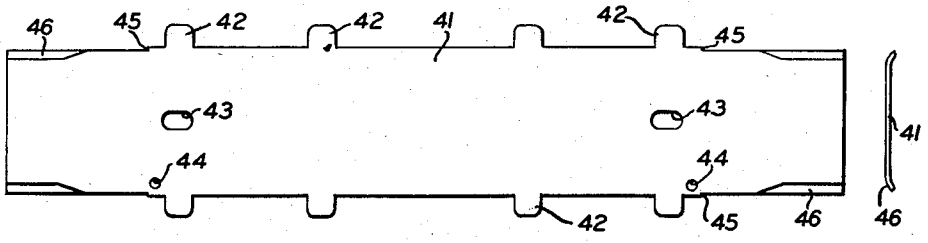



FIG. 13.

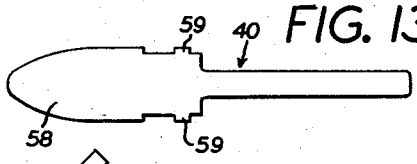
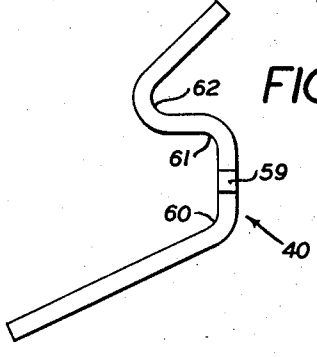



FIG. 12.




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FIG. 14.

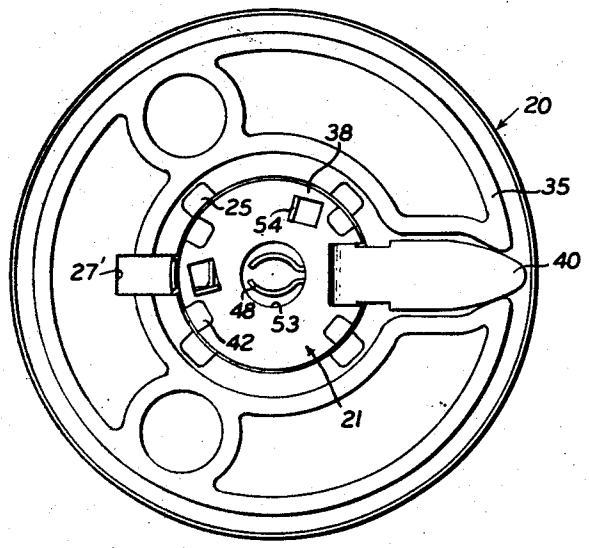
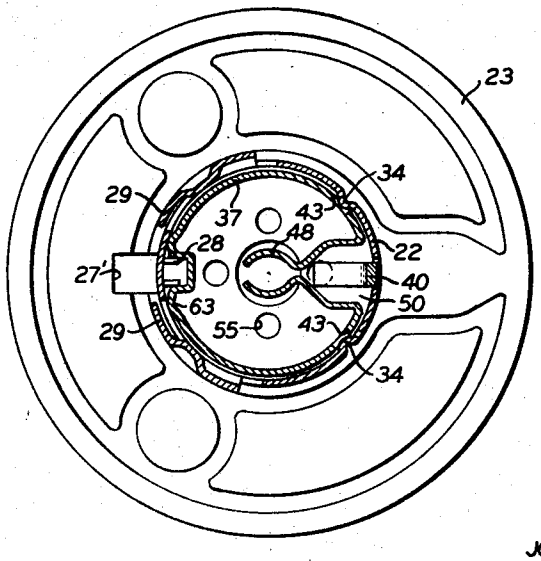



FIG. 15.




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United States Patent Office

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2,873,839

# TYPEWRITER RIBBON SPOOL AND THE LIKE

John W. H. Bishop, Essex, Conn.

Application December 15, 1955, Serial No. 553,380

32 Claims. (Cl. 197—175)

The present invention relates to a spool for an inked ribbon for business machines.

In many office business machines which require inked ribbons, such as typewriters, calculators, adding machines and the like, the inked ribbon is mounted on a pair of spools and, during the operation of the machine the ribbon pays off from one spool and is wound up on the other.

Basically, in current types of typewriters there are two principal types of spool holders in use; (1) the shaft type which is accommodated in a sleeve provided in the spool; and (2) the noiseless core type which has an enlarged hub which has to be accommodated within the spool. In the shaft type of spool holder, the shaft on various makes of typewriters varies in diameter from .100" to .250". The driving means for the spools also differ in size and radial distance from the axis of the shaft. Thus, up to the present time each of these different sizes of shafts and driving means required a special spool having a sleeve of a diameter approximately the same as the shaft diameter and a properly spaced opening or lug to cooperate with the driving means. With the noiseless core types, the hubs have been more or less standardized and usually have ribbon receiving slots and a ribbon reversing lever which is normally retained in flush position with the outer periphery of the hub by the ribbon when wound on the hub and said lever is urged outwardly from the hub when the ribbon has been unwound and is ready for reverse driving.

In the various types of typewriter spools the ribbon attaching means takes one of the following forms: an axially disposed prong for accommodating a loop on the ribbon; an eyelet on the ribbon for positioning on the inner side of a slot; a prong for engagement with the ribbon; or a hook on the ribbon for engagement with a bridge on the hub. On all noiseless core portable typewriters, a protective cover disc is provided to hold the spool or ribbon from dropping off from the hub support when the typewriter is carried in its case and also in the noiseless core type standard typewriter such disc is employed to hold the ribbon from rising on the hub in use due to centrifugal force when the machine is operated at high speed and to prevent the eyeleted end of the ribbon from being ejected from the hub slot at the reversing moment due to the action of the reversing lever tending to encourage the ribbon upward.

The driving mechanism for most spools used on type (1) spool holders consists of a vertically disposed pin carried by a flange collared on the driving shaft which pin registers with an opening formed in the lower disc of the spool. The driving means on the noiseless core type of spool is usually provided with a spline formed on the spool which mates with a slot provided in the hub of the noiseless core. In some instances the driving shaft is screw-threaded at its upper end and a nut is used to tighten the spool down into driving engagement with a collared member on the driving shaft. Another type of spindle drive is a combination of a longitudinally split shaft with



both halves resiliently arranged for firm engagement with the sleeve, such shaft also having collared thereon a vertically disposed pin for driving engagment with a hole in the bottom disc of the spool. As a matter of fact, almost every business machine using an inked ribbon employs a ribbon spool developed for the particular machine. Thus, through the years there has been developed a considerable variety of spools which are not interchangeable for use on different makes of machine.

The object of the present invention is to provide a substantially universal ribbon spool adaptable for use with most types of spool holders and driving mechanisms.

A further object of the invention is to provide a substantially universal ribbon spool whereby stationers and other ribbon supply houses can materially reduce their inventory of spooled ribbons without reducing their ability to serve their customers.

The foregoing and other objects of the invention, not specifically enumerated, I accomplish by providing a spool consisting of one or two discs connected to an enlarged hollow hub and a separate adapter having a circumferential wall for frictional holding engagement with such hub, whereby the spool can be used with most makes of typewriters having either the spindle type or the hub type of spool holders provided with any type of ribbon attaching means, and with any type of ribbon reversing mechanism located within the hub. Preferably, the hub of the spool is formed with the ribbon attaching means and with an inwardly directed spline for driving engagement with the adapter, and with integral resilient means for cooperation with the adapter. The adapter has two resilient arms which preferably extend substantially radially inwardly from the circumferential wall to provide a split expansible sleeve for accommodating the various sizes of spindles currently found in the shaft type of typewriter spool supports. The resilient arms provide at the periphery of the adapter a wide-angled V-slot within which is mounted a reversing lever capable of functioning in the same manner as the reversing lever found on those makes of typewriters wherein such lever is located within the hub of the spool driving mechanism. Diametrically opposite the V-slot, the wall of the adapter is formed with an inwardly directed, external groove which serves to accommodate the spline provided on the spool. Also arranged around the periphery of the adapter are a plurality of tightening ribs and detents to provide frictional holding engagement between the adapter and the spool hub. Preferably both ends of the adapter are formed with different types of means for cooperation with the different types of spool driving means on the various typewriters so that one end of the adapter will be placed in downward facing position on certain machines and the other end will be placed in downward facing position on other machines. For example, one end of the adapter is provided with driving lugs to fit the Royal typewriter ribbon-supporting spindle while the other end is provided with a plurality of circumferentially spaced holes located radially from the center in which the driving pins on other spindle types engage. Both ends are provided with large central holes to allow for the various sizes and conditions of the several types of spindles. On the noiseless core types of machines, the adapter is not required and may be discarded.

The construction of my universal ribbon spool will be better understood from the detailed description which follows when considered in connection with the accompanying drawings, wherein:

Figure 1 is a top plan view of a spool proper embodying certain features of the invention.

Fig. 2 is a side elevation of Fig. 1 as viewed from the left side thereof.

Fig. 3 is a side elevation of Fig. 1 when viewed from the right side thereof.

Fig. 4 is a diametrical section taken along the plane of the line 4—4 of Fig. 1.

Fig. 5 is a development of the hub portion of the spool shown in Figs. 1 to 4.

Fig. 6 is a side view of the development shown in Fig. 5.

Fig. 7 is a side elevation, partly broken away, of an adapter forming part of the invention.

Fig. 8 is a top plan view of the hub portion of the adapter.

Figs. 9 and 10 are plan views of the end closures of the adapter.

Fig. 11 is a development of the hub shown in Fig. 8.

Fig. 11*a* is an end elevation of the development shown in Fig. 11.

Fig. 12 is a side elevation of the reversing lever shown in Fig. 7.

Fig. 13 is a development of the reversing lever shown in Fig. 12.

Fig. 14 is a bottom plan view of an assembly of the spool proper shown in Figs. 1 to 6 and the adapter shown in Figs. 7 to 13.

Fig. 15 is a section through the hub of the spool shown in Fig. 14, said section being taken at a right angle to the axis of the assembly.

Referring to the drawings, the spool for an inked ribbon for business machines and more particularly, typewriters, may be said to consist of a spool proper **20** shown in Figs. 1 to 6, and a separable adapter **21** shown in Figs. 7 to 13, the spool as a whole being capable of use with certain makes of business machines, while the spool proper after the adapter has been removed therefrom is capable of use with other makes of machines.

The spool proper **20** as herein shown consists of a hollow, generally cylindrical hub **22**, to each end of which is secured a substantially flat, annular disc **23** extending outwardly perpendicularly to the hub. The hub **22** is preferably formed as a stamping **24** (Fig. 5) from a flat sheet of resilient material, preferably metal, which is bent or rolled into a cylinder and held in such form by the discs **23** to which it is attached, in a manner presently to be described. The stamping **24** is of generally symmetrical form with respect to both its longitudinal and transverse center lines and along its longitudinal edges has a plurality of tabs or ears **25** lying in the plane of the material. At each end the stamping **24** is formed with rectangular cut-outs **26** which, when brought together, provide a window or opening **27** in the hub. At either side of the transverse center line, the stamping is cut and bent inwardly to provide two pairs of aligned, parallel ribs **28** which, when the stamping is bent into cylindrical form, extend inwardly of the hub and provide a spline. Flanking the spline at substantially equal distances is a pair of struck-up spear prongs **29** upon which the end of an inked ribbon may be secured when such ribbon is to be wound on the spool. To either side of the spear prongs the material is struck-up to provide opposed pockets **30** to accommodate a hooked tab provided on the end of the inked ribbon for certain makes of machines for securing such ribbon to the spool. Adjacent the open end of the pockets the material is cut away to provide openings **31**. Beyond the pockets **30** and cut-out portions **31** the material has substantially U-shaped slots **32** cut therein to provide leaf-springs **33**, each of which near its free end is formed with a detent or dimple **34**. The annular discs **23** are formed at their inner peripheries with circumferentially spaced, shallow recesses (not shown) similar to the recesses **52** in the end closure members of the adapter, hereinafter described, said recesses being of a depth corresponding to the thickness of the sheet material **24** to accommodate the ears **25** which are then bent over the discs to hold the hub and discs in assembled relation. The discs **23** are preferably formed



with struck-up reinforcing ribs **35** which provide the outer faces of said discs with an axially-extending, depressed portion **36** substantially in axial alignment with the window opening **27**. Diametrically opposite the depressed portion **36** each disc **23** is formed with an opening **27'** which is in axial alignment with the ribs **28**.

The adapter **21** consists of four parts, namely, a hollow hub **37**, end closure members **38** and **39**, and a reversing lever **40**. The hollow hub **37**, like the hollow hub **22** of the spool proper, is formed of a flat stamping **41** from resilient sheet material, preferably metal, the development of which is shown in Fig. 11. This stamping is likewise symmetrical with respect to both its longitudinal and transverse center lines, and along its longitudinal edges is formed with spaced ears **42**. The body of the stamping along the longitudinal center line between the endmost ears is formed with elliptical recesses **43** and adjacent one edge of the stamping in proximity to the endmost ears with holes **44**. Beyond the endmost ears **42** the longitudinal edges of the material are cut back a distance equal to the thickness of the material, as shown at **45**, and at the ends of the stamping said longitudinal edges are bent or flared outwardly, as shown at **46** (see Figs. 11 and 11*a*). The stamping of Fig. 11 is bent to provide the hub **37**, as shown in Fig. 8, said hub having a pair of reentrant, opposed arms **47** which terminate at their free ends in arcuate portions **48** to provide a so-called split sleeve which is substantially concentric with the wall of the hub. The arcuate portions **48** serve to frictionally engage and locate spindles of different diameters truly coaxial with the adapter. The outwardly flaring ends of the split sleeve will facilitate engagement of the adapter over spindles of different diameter. The reentrant arms **47**, by virtue of their construction, provide a hinged connection at **49** with the hub proper where they extend inwardly, and the walls of said arms provide an axially-extending recess **50** which is herein referred to as a wide-angled V-slot. Diametrically opposite the V-slot **50**, the wall of the hub is bent inwardly to provide an axially-extending, outwardly open groove **51** of a width to snugly receive the ribs **28** or spline on the spool proper. To hold the hub **37** in its desired bent form, the end closure members **38** and **39** are secured to the hub by the ears **42** thereof engaging within peripheral slots **52** in the end closures and over which closures they are subsequently bent. Each of the end closures **38** and **39** is formed with a central hole **53** which is of larger diameter than the split sleeve provided at the inner ends of the resilient arms **47**. Each of the end closures is provided with means—struck-up lugs **54**—in closure **38** and circumferentially angularly spaced holes **55** in closure **39** adapted for cooperative engagement with cooperating means on the spool driving spindles found on different makes of typewriters for rotating the adapter, and, in turn, the spool, where such spool and adapter are conjointly used. The holes **55** are of a size and so radially spaced from the axis of the hub to insure wobble-free cooperation with the slightly different diameters of pins and slightly different radial spacing thereof on different makes of machines. The end closure **38** is formed with a peripheral recess or cut-out portion **56** for accommodating the reversing lever **40** in its pivotal action hereinafter to be explained, while the closure **39** has a peripheral cut-out recess **57** for registry with the groove **51** in the hub.

The reversing lever **40** is formed from a flat stamping as shown in Fig. 13, approximately one-half of the lever being enlarged, as shown at **58**, for a purpose presently to be described. Said enlarged portion is formed with trunnions **59** adapted to engage in the holes **44** which will be located within the V-slot in the hub **37**, and, in view of the resiliency of the arms **47**, said trunnions may be forced into position after the assembly of the end closures on the hub **37** or prior to the end closures being secured to the hub **37**. The stamping from which lever **40** is formed is angularly bent at **60** adjacent the trunnions **59**

and again bent at 61 at a right angle, and again bent at an acute angle, as shown at 62. The specific shape to which the lever is bent is to locate the trunnions above the center of gravity of the lever for the purpose of creating a gravity force-bias on the lever when mounted on its trunnions so that the heavier lower extending arm thereof will drop downwardly and withdraw the upper double bent portion of the arm outwardly from the slot 50 when not constrained to do so by the wound ribbon.

In the assembly of the adapter within the spool proper it will be evident that by inserting the adapter into the hollow hub of the spool, the groove 51 on the adapter will accommodate the spline provided by the ribs 28 in the spool hub and that, by virtue of the acute angle formed at the upper end of the reversing lever, it will be moved inwardly into the V-slot upon engaging the inner periphery of the spool hub and will, when the adapter is inserted within the hub, permit said double angular portion of the lever to pass outwardly through the window opening 27. It will be noted that the cut-out recess 56 in the end closure 38 will thus register with the V-slot 50 and that the end of the spline ribs 28 will engage a portion of the closure 38 which is diametrically opposite the cut-out recess 56 and thus limit the extent to which the adapter can be inserted in the spool. To eliminate play and truly centralize the split sleeve of the adapter within the spool hub when the parts are assembled, the dimples 34 in the leaf-springs 33 will engage in the openings 43. To further insure against looseness in the assembly, the hub 37 of the adapter may be formed with struck-up ribs 63 which, by virtue of the resilient character of the hub 37, will hold said hub in snug engagement with the inner peripheral wall of the spool.

The spool proper 20, with the adapter 21 removed, may be used on all Remington typewriters currently using the noiseless core type of spool and on all Underwood electric, Underwood Standard Model No. 150 (except Gray), Model No. 160 and subsequent models, and on all Underwood portables commencing with 1956 production. The resilient fingers will also serve to frictionally hold the spool on the core and thus eliminate the need for the protective cover discs now employed. The opposed pockets 30 in the spool hub permit the attaching of a ribbon to the hub if the said ribbon is supplied with a hook. Two oppositely disposed pockets are provided so that the hook may be attached irrespective of whether the spool is mounted on the right or left hand driving spindles and also permits the attaching of the ribbon regardless of which disc of the spool is facing upward.

By use of the adapter, the spool proper can be converted to an almost universal inked ribbon typewriter spool, in that, after insertion of the adapter in the spool, if the spool is placed in the machine so that the two driving lugs 54 are facing downward, the spool will function on the Royal Standard and Halda standard and portable typewriter. Although both the Royal and Halda spools currently require a spring to actuate the reversing lever, the spool of the present invention eliminates the necessity for this spring as the lever is fulcrumed above its center of gravity and force-biased by gravity so that the lower extending arm will drop down even though the spool is subjected to a temporary positioning at an angle of 90° with respect to the horizontal.

If the adapter is inserted so that the driving holes 55 face downwardly, the spool may be used, amongst others, on the following machines: Underwood Standard, prior to Model No. 150; Underwood Portable, prior to 1956 Model; Royal Portable; Teletype; Hermes Standard and Portable; Corona No. 5; Adler Standard and Portable; Monroe Adding 10 key; and Sundstrand Bookkeeping Models B, C, and D, as well as various other machines, such as Norm, Erika and Imperial, Models 65 and 66.

The outstanding advantage of the present spool is that the ribbon winder need only wind a single design of spool, and thus permit a greater mass production of winding which requires an investment in stock of one type spool and adapter, as against the stocking of many types. To the retail stationer, the purchase from the ribbon winder of spools with the adapters already inserted will thus require the stationer's inventory to be cut by a very considerable amount, as one wrapped and boxed spool will serve to furnish almost any spool required by the customers. Where a customer requires a spool for a machine using the noiseless core type driving spindle, the stationer need merely instruct the customer to push the adapter out and throw it away, or the stationer may remove the adapter when supplying the spool to the customer.

Although there has been shown and described a preferred embodiment of the invention, it will be understood that details of construction of the various parts may be varied within the range of engineering and mechanical skill without departing from the spirit of the invention as hereinafter claimed.

What I claim is:

1. A spool for an inked ribbon comprising a hub having a central expansible split sleeve which is formed, at least in part, by the free end of a resilient arm extending inwardly from the hub, and a disc secured to and substantially closing one end of the hub.

2. A spool for an inked ribbon comprising a hub having two resilient arms extending inwardly of said hub, each arm terminating at its free end in an arcuate portion substantially concentric with the hub, and a disc secured to one end of the hub perpendicular thereto.

3. A spool for an inked ribbon comprising a hub having two opposed resilient arms extending substantially radially inwardly of said hub, each arm terminating at its free end in an arcuate portion substantially concentric with the hub, and a disc secured to one end of the hub perpendicular thereto.

4. A spool for an inked ribbon comprising a hollow hub having two integral resilient arms extending inwardly of said hub, each arm terminating at its free end in an arcuate portion substantially concentric with the hub providing a split expansible sleeve and a disc closing one end of the hub, said disc having a central opening therein of larger diameter than the split sleeve.

5. A spool for an inked ribbon comprising a hollow hub having two integral resilient arms extending inwardly of said hub, each arm terminating at its free end in an arcuate portion substantially concentric with the hub providing a split expansible sleeve, a disc closing one end of the hub, said disc having a central opening therein of larger diameter than the split sleeve, and means on said disc adapted for cooperative engagement with means on a spool driving spindle for rotating the spool.

6. A spool for an inked ribbon comprising a hollow hub, the peripheral wall of which has two integral opposed reentrant resilient arms, each terminating at its free end in an arcuate portion substantially concentric with the peripheral wall, said arms forming at their reentering portion of the peripheral wall a wide-angled slot, and a disc secured to one end of the hub perpendicular thereto.

7. A spool according to claim 6 wherein a reversing lever is pivotally mounted for movement in the slot.

8. A spool according to claim 7 wherein the lever has divergent arms adjacent the pivotal mounting, one of said arms being adapted to be held in the slot by an inked ribbon when wound on the spool and said lever being force-biased to move the said one of said arms outwardly of said slot when the ribbon uncovers the slot.

9. A spool according to claim 8 wherein the lever is gravity activated by being pivotally mounted above its center of gravity.

10. A spool assembly for an inked ribbon consisting of a spool proper and a separable adapter, and cooperating means on said parts for holding them in assembled relation, the spool proper comprising a tubular hub formed

of resilient material having means for attaching a ribbon to the hub; the separable adapter comprising a hollow hub having an outer diameter to snugly fit within the tubular hub of the spool proper, and a central expansible split sleeve adapted to fit onto driving spindles of different diameter.

11. A spool assembly according to claim 10 wherein the tubular hub on the spool proper and the hub on the adapter have the cooperating means for holding the spool proper and hub in separable assembled relation.

12. A spool assembly according to claim 10 wherein the tubular hub of the spool proper has an inwardly directed resilient detent and the hub on the adapter has a complementally positioned recess for receiving said detent.

13. A spool assembly according to claim 10 wherein the tubular hub on the spool proper has an inwardly directed axially extending spline and a window opening therein diametrically opposite to the spline, the hub on the separable adapter has a spline groove for engaging the spline, and the split sleeve on the adapter is provided by the free ends of two opposed reentrant arms integrally formed with the peripheral wall of the adapter being bent into arcuate form substantially concentric with the axis of the adapter, said reentrant arms forming with said peripheral wall a wide-angled slot disposed diametrically opposite the spline groove, and an angled reversing lever fulcrumed in said slot, one arm of said lever being movable through the window opening in the spool proper.

14. A spool assembly according to claim 13 wherein the arms of the lever diverge adjacent the fulcrum, the upper of said arms being adapted to be held wholly within the window overlying the slot by an inked ribbon when wound on the spool and said lever being force-biased to move said upper arm outwardly through said window when the ribbon uncovers the window.

15. A spool assembly according to claim 13 wherein the arms of the lever diverge adjacent the fulcrum, the upper of said arms being adapted to be held wholly within the window overlying the slot by an inked ribbon when wound on the spool and said lever being force-biased to move said upper arm outwardly through said window when the ribbon uncovers the window, the upper of said arms having a V-bend therein whereby, in moving the adapter into the spool proper, the upper portion of the V-bent arm will, upon engaging the hub of the spool proper, be moved inwardly into the wide-angled slot in the adapter.

16. A spool assembly according to claim 13 wherein the spool proper includes an outwardly directed disc flange extending perpendicularly to the axis of the tubular hub, and the adapter has an end closure formed with a central opening therein of larger diameter than the split sleeve, said end closure serving to limit the insertion of the adapter into the spool proper by engagement with an end of the spline on the spool proper.

17. A spool assembly according to claim 16 wherein said end closure on the adapter has means adapted for cooperative engagement with means on a spool driving spindle for rotating the adapter and spool.

18. A spool assembly according to claim 16 wherein the lever is fulcrumed above its center of gravity, and the other arm of the lever is disposed below the disc flange on the spool proper.

19. A spool for an inked ribbon comprising a substantially cylindrical tubular hub and a disc flange extending perpendicularly outwardly at one end of the tubular hub, said tubular hub being formed of resilient sheet material having means for attaching a ribbon to the hub and a partially cut-out portion providing a leaf-spring, said leaf-spring being formed with a detent.



20. A spool according to claim 19 wherein said tubular hub is formed with a pair of inwardly directed, struck-up, axially extending ribs providing a spline.

21. A spool according to claim 20 wherein the disc is formed with an opening therethrough extending outwardly from the spline.

22. A spool according to claim 20 wherein the tubular hub has a window opening diametrically opposite the spline.

23. An adapter for a spool for an inked ribbon comprising a hollow hub having centrally thereof a split resilient sleeve adapted to fit onto driving spindles of different diameter and means on said hub adapted for cooperative engagement with a spool for an inked ribbon for rotating said spool.

24. An adapter for a spool for an inked ribbon, comprising a hollow hub formed of a strip of resilient sheet material, the end portions of which are bent inwardly substantially radially of said hub to provide two opposed resilient arms terminating at their free ends in a split sleeve substantially concentric with the hub, and a disc secured to and substantially closing one end of the hub.

25. An adapter according to claim 24 wherein the wall of the hub is bent inwardly to provide an outwardly open, axially extending groove.

26. An adapter according to claim 24 wherein the opposed resilient arms form at the periphery of the hub a slot and a lever is fulcrumed in said slot adjacent one end of the hub whereby at least part of the lever will be movable into the slot.

27. An adapter according to claim 26 wherein the lever has divergent arms adjacent the fulcrum and said lever is fulcrumed above its center of gravity so that the part of the lever that is movable into the slot will normally be biased out of the slot.

28. An adapter according to claim 26 wherein the wall of the hub is bent inwardly to provide an axially extending groove disposed diametrically opposite to the lever-containing slot.

29. An adapter according to claim 28 wherein the end closure is formed with a central opening therein of larger diameter than the split sleeve, said end closure being at the end of the hub adjacent which the lever is fulcrumed, said closure having a clearance for movement of said lever and a peripheral portion overlying an end of the axially extending groove.

30. An adapter according to claim 28 wherein the end closure is formed with a central opening therein of larger diameter than the split sleeve, and with the means adapted for cooperative engagement with means on a spool driving spindle, for rotating the adapter.

31. An adapter according to claim 24 wherein the disc closure has a central opening larger than the diameter of the split sleeve.

32. A spool for an inked ribbon comprising a substantially cylindrical one-piece tubular hub and a disc flange extending perpendicularly outwardly at each end of the hub and rigidly connected thereto, said hub being formed with a pair of circumferentially spaced inwardly directed struck-up axially extending ribs providing a spline and with a window opening diametrically opposite the spline.

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