# United States Patent [19]

Glover

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[54] **UNIVERSAL RIBBON SPOOL HAVING A MAGNETIC ADAPTER WITH A RUPTURABLE DIAPHRAGM**


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[52] **U.S. Cl.** ..... **197/175**

[51] **Int. Cl.** ..... **B41j 35/00**

[58] **Field of Search** ..... 197/151, 175



[56] **References Cited**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 3,042,180 | 7/1962 | Bishop | 197/175 |
| 2,998,878 | 9/1961 | Biedinger et al | 197/175 |
| 2,873,839 | 2/1959 | Bishop | 197/175 |
| 2,925,164 | 2/1960 | Murphy | 197/175 |
| 3,002,707 | 10/1961 | Noble | 197/175 UX |
| 3,045,800 | 7/1962 | Landgraf | 197/175 X |
| 3,094,204 | 6/1963 | Landgraf | 197/175 X |

FOREIGN PATENTS OR APPLICATIONS

| | | | |
|---|---|---|---|
| 571,798 | 3/1933 | Germany | 197/175 |



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*Attorney, Agent, or Firm*—Colton & Stone



[57] **ABSTRACT**

There is disclosed a typewriter ribbon spool comprising a spool for receiving a spirally wound inked ribbon and an adapter received by the spool for accommodating typewriter spindles of different diameter. The adapter comprises a hub having a central passageway for receiving the typewriter spindle and a rupturable diaphragm spanning the passageway. Upon insertion of the typewriter spindle into the passageway, the diaphragm is ruptured in accordance with the size of the spindle and acts to center the spool on the spindle. The adapter hub is magnetized.


**13 Claims, 6 Drawing Figures**

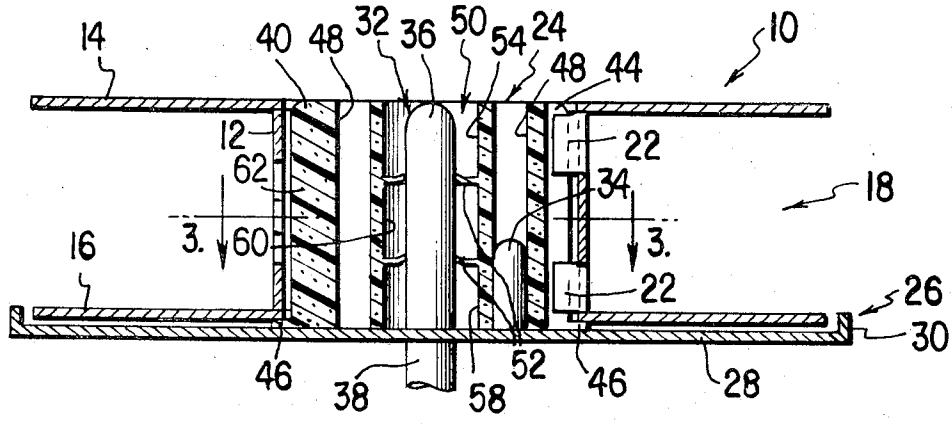


FIG. 1

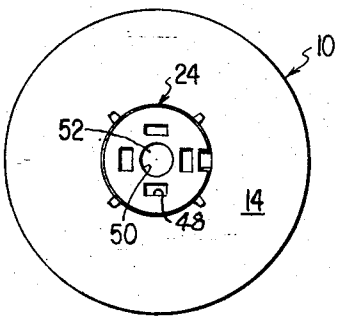



FIG. 3

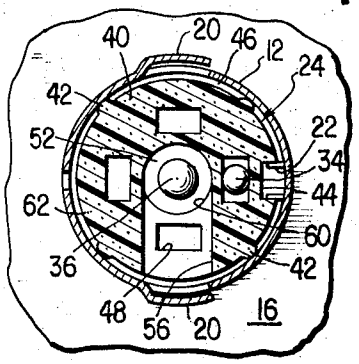



FIG. 2

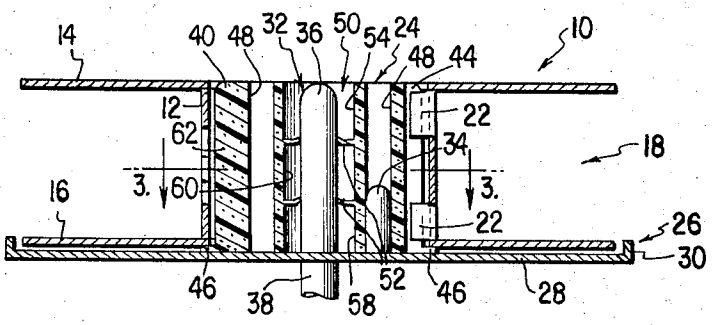



FIG. 4

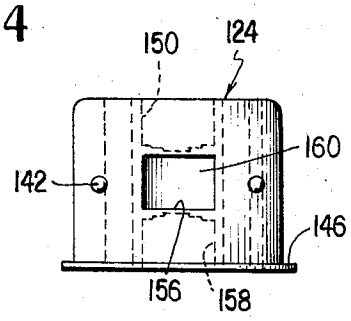



FIG. 5

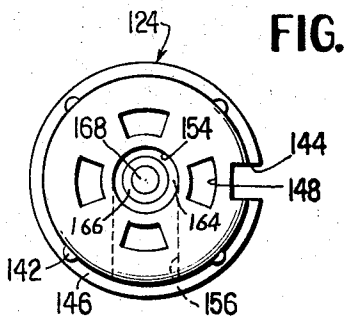
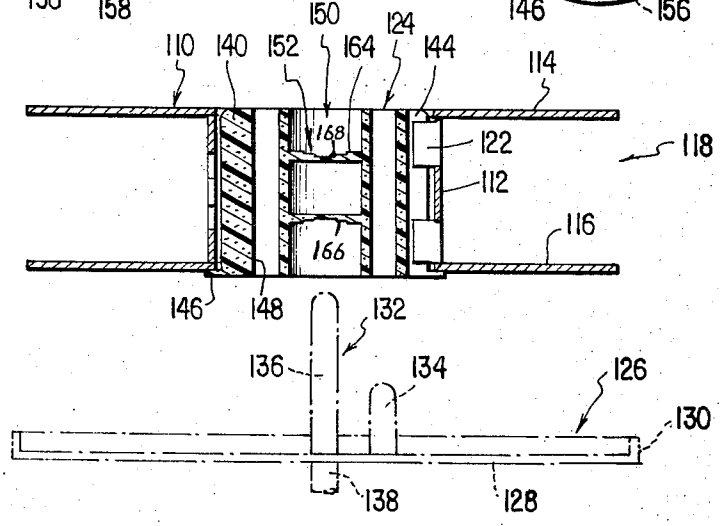



FIG. 6



# UNIVERSAL RIBBON SPOOL HAVING A MAGNETIC ADAPTER WITH A RUPTURABLE DIAPHRAGM

## BACKGROUND OF THE INVENTION

This invention relates to a universal typewriter ribbon spool and adapter therefor which may be used on a variety of typewriters.

Since typewriter mechanisms have different designs for the reversing of the inked ribbon, typewriter manufacturers have designed different type spools for holding the inked ribbon. Typewriter manufacturers have not standardized the inked ribbon spools but instead have chosen different spools to suit their particular typewriter. The inked ribbon per se is fortunately fairly standard and is normally ½ inch in width and 10 to 12 yards long.

The spool is normally two inches in over-all diameter and comprises flanges extending from a ¾ inch core to keep the ribbon wound neatly in a spiral. Although the spool diameter, width and core are fairly uniform, spools differ in two significant parts of the mechanism that holds the ribbon spool in place. The ribbon well, which receives the spool, contains a spindle of a predetermined diameter which fits snugly into the center hole of the ribbon spool and defines an axis of rotation for the spool. The diameter of the spindle of different make typewriters varies significantly. In addition, the mechanism in the ribbon well for rotating the spool normally comprises a driving pin spaced from the spindle for rotating the ribbon spool to take up the inked ribbon. The diameter of the driving pin also varies appreciably in typewriter design. Although other types of driving and centering mechanisms exist on typewriters, the central spindle and adjacent driving pin is the most common type.

It will be appreciated that there is a substantial number of typewriter manufacturers each of which produces typewriters of many different models. The number of spools particularly designed for each of these typewriters is large. The problem of providing replacements for typewriter ribbons is aggravated since the models of manufacturers change periodically and replacement spools are necessary for obsolete models which are still in use. It is accordingly apparent that the variety of inked ribbon spools that would be needed in the market to supply replacement ribbons is prohibitively large.

The prior art has recognized the desirability of providing spools which are usable as replacements on a large number of typewriters. Exemplary disclosures in the prior art are found in U. S. Pat. Nos. 2,873,839; 2,925,164; 3,042,180; Design U.S. Pat. No. 200,122; and Germany Pat. No. 571,798. Becuase of the problem of stocking enormous numbers of spools of various types, universal spools have met substantial commercial acceptance.

Another aspect of the invention resides in magnetically attracting an inked ribbon spool to the typewriter well. This concept is broadly disclosed in U.S. Pat. No. 2,998,878.

## SUMMARY OF THE INVENTION

It is an object of this invention to provide an inked ribbon spool and adapter therefore for providing replacement ribbons for typewriters of varying design.



It is another object of this invention to provide an inked ribbon spool and adapter therefor in which a rupturable diaphragm is forcibly inserted onto the typewriter spindle to provide an opening therethrough in accordance with the spindle diameter.

Another object of this invention is to provide an inked ribbon spool and adapter therefor comprising a hub made of a magnetic material.

In summary, one aspect of this invention comprises an inked ribbon spool and an adapter therefor including a hub having passage means extending along a central axis of the hub, rupturable diaphragm means spanning the passage means for rupturably receiving spindles of different diameter and means for cooperative engagement with the inked ribbon spool for rotating the spool.

## BRIEF DESCRIPTION OF THE DRAWING

FIG. **1** is a top plan view of a spool and adapter in accordance with this invention;

FIG. **2** is an enlarged cross sectional view of the spool and adapter of this invention illustrated in position on a typical ribbon well;

FIG. **3** is a cross sectional view of the device of this invention taken substantially along line **3—3** of FIG. **2** as viewed in the direction indicated by the arrows;

FIG. **4** is a side elevational view of a modified form of the adapter of this invention;

FIG. **5** is a top plan view of the embodiment of FIG. **4**; and

FIG. **6** is an enlarged cross sectional view of the embodiment of FIGS. **4** and **5** illustrated in juxtaposition to a typical ribbon well.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIGS. **1–3**, there is illustrated an inked ribbon spool **10** of typical design comprising a core **12**, an upper flange **14** and a lower flange **16** defining therebetween an inked ribbon receiving area **18**. The core **12** typically comprises one or more prongs **20** upon which the end of an inked ribbon may be secured in a conventional manner. The core **12** also typically comprises two pair of spaced aligned parallel ribs **22** providing a driving connection between the spool **10** and an adapter **24** which provides important features of this invention.

The spool **10** and adapter **24** are illustrated in FIGS. **2** and **3** as being in operative relation with respect to a ribbon well **26** comprising a circular metallic support **28** having an annular flange **30** thereon. The ribbon well **26** also comprises a central spindle **32** and a radially spaced driving pin **34**, both of which are normally rigid with the metallic support **28**. The spindle **32** comprises a centering spindle portion **36** above the support **28** providing an axis of rotation for the spool **10** and a driving spindle portion **38** below the support **28** for transmitting operation of the ribbon advancing mechanism (not shown) of the typewriter into revolution of the driving pin **34** about the centering spindle portion **36**.

The metallic support **28** of conventional typewriters is typically made of iron or alloys thereof which are attractable by magnetic forces, the importance of which will be more fully apparent hereinafter. As previously mentioned, the two variable features of typical typewriter ribbon wells are the diameters of the centering

spindle portion **36** and the driving pin **38.** As will be more fully apparent hereinafter, the adapter **24** satisfactorily accommodates centering spindles and driving pins of different diameter.

The adapter **24** comprises a hub **40** of generally cylindrical configuration having a plurality of compressible projections **42** thereon for binding against the spool core **12** and thereby maintaining the adapter **24** within the spool **10.** A notch **44** extends axially of the hub **40** for receiving the ribs **22** and provides a driving connection between the adapter **24** and the spool **10.** As shown best in FIG. **2,** the hub **40** comprises a flange **46** larger than the inside diameter of the core **12** to position the adapter **24** accurately within the spool **10.** As is apparent from FIG. **2,** the flange **46** is captivated between the lower spool flange **16** and the support **28** thereby ensuring that the adapter **24** is not dislodged from the core **12.** Accordingly, the projections **42** act only to retain the adapter **24** in the spool **10** during normal handling prior to use.

The hub **40** comprises a plurality of spaced driving slots **48** extending axially therethrough. The slots **48** are conveniently sized to receive the largest driving pin of typewriters using the central spindle-driving pin type ribbon advancing mechanism. The driving pin **34** may accordingly be loose in the slot **48** as indicated in FIG. **3.** This is of no substantial importance since rotation of the ribbon well **26** rotates the driving pin **34** until it is in driving engagement with the slot **48** and accordingly remains in driving engagement therewith until the ribbon drive is reversed.

Extending along the central axis of the hub **40** is a passage **50** for receiving the centering spindle portion **36.** The passage **50** is spanned by one or more rupturable diaphragms **52** which divides the central passage **50** into a plurality of blind sub-passages **54, 56, 58.** As will be appreciated by a comparison of FIGS. **2** and **3,** the blind sub-passage **56** includes a portion **60** coaxial with the blind passages **54, 58** for receiving the centering spindle **36.**

During insertion of the adapter **24** onto the centering spindle portion **36,** the diaphragms **52** are ruptured in accordance with the spindle diameter to closely receive and grasp the spindle portion **36.** Accordingly, the adapter **24** and spool **10** are mounted for rotation about the axis of the centering spindle portion **36.** It will accordingly be seen that the adapter **24** comprises means for receiving centering spindles of different diameter.

The adapter **24** is conveniently made by conventional injection molding techniques. It will be apparent that the blind sub-passages **54, 58** allow the retraction of mold parts upwardly and downwardly respectively with the adapter **24** oriented as shown in FIG. **2.** The blind sub-passage **56** allows the retraction of a mold part downwardly with the adapter **24** oriented as shown in FIG. **3.** Accordingly, the various mold parts which form the blind sub-passages **54, 56, 58** may be retracted in order to free the completed adapter **24** from the mold.

Another desirable feature of the adapter **24** is that it is magnetically attracted to the circular metallic support **28.** In order to provide the magnetism to the adapter **24,** the material from which it is molded is loaded with magnetizable particles **62.** To meet this requirement, one would select a moldable resin or rubber which is easily molded while carrying substantial quantities of magnetizable particles. Polyethylene and Butyl rubber are well known molding materials capable of loading to 40–50 percent filler. The quantity of magnetizable particles **62** added to the molding material should be sufficient to impart substantial magnetism to the adapter **24** while not exceeding the carrying capacity of the molding material. Any suitable magnetizable particle that is compatible with the molding material may be used. Acceptable magnetizable particles include powdered iron, magnetic iron oxide $Fe_3O_4$ and molybdenum disulfide. After the adapter **24** is removed from the mold, it is passed through a suitable magnetizing field to orient the particles **62** molded therein in a conventional manner.

It will be appreciated that the magnetized adapter **24** is attracted to the metallic support **28** of conventional typewriters so that lateral movement of the adapter **24** from the spindle portion **36** is substantially minimized. It will be appreciated that this assists the diaphragms **52** in holding the adapter **24** centrally to the spindle **32.** The magnetic attraction between the adapter **24** and the support **28** also assists in holding the spool **10** down to prevent the ribbon spool **10** from unseating.

Referring to FIGS. **4–6,** there is illustrated another embodiment of the invention. The embodiment of FIGS. **4–6** is identical in many respects to the embodiment of FIGS. **1–3.** For purposes of brevity, identical features in the embodiment of FIGS. **4–6** are referenced by numbers having identical digits in the tens and units position with only the differences between the embodiments being specifically discussed. The first difference between the adapters **24, 124** resides in the configuration of the driving slots **48, 148.** The slots **148** are arcuate in horizontal cross section and present radially disposed driving faces for engagement with the driving pin **134.**

The most important distinction between the adapters **24, 124** resides in the configuration of the rupturable diaphragms **52, 152.** Each of the diaphragms **152** comprises a plurality of circular concentric sections **164, 166, 168** of decreasing thickness toward the axis of the passage **150.** This feature tends to ensure that the diaphragms **152** are ruptured from the center thereof and thereby minimizes eccentricity between the centering spindle portion **136** and the adapter **124.** In all other respects, the adatpers **24, 124** are the same.

I claim:

**1.** An adapter for an inked ribbon spool comprising a hub having a passage extending along a central axis of the hub, at least one diahragm spanning the passage for rupturably receiving spindles of different diameter, and means for cooperative engagement with an inked ribbon spool for rotating the spool.

**2.** The adapter of claim **1** wherein said one diaphragm divides the passage into a plurality of blind subpassages.

**3.** The adapter of claim **2** further comprising another diaphragm spanning the passage at a location spaced from said one diaphragm, the diaphragms dividing the passage into at least three blind sub-passages.

**4.** The adapter of claim **3** wherein the blind subpassages include coaxial portions.

**5.** The adapter of claim **3** wherein two of the blind sub-passages extend in the same direction as the hub axis and the remaining blind sub-passage is transverse thereto.

6. The adapter of claim 1 wherein said one diaphragm is of substantially constant thickness.

7. The adapter of claim 1 wherein said one diaphragm is of a predetermined thickness adjacent the central axis of the hub and increases in thickness at locations radially spaced therefrom.

8. The adapter of claim 1 wherein the hub is made of a magnetized material.

9. The adapter of claim 1 wherein said one diaphragm is imperforate.

10. An inked ribbon spool comprising a core and flanges extending radially away therefrom and defining therewith a ribbon receiving area; and an adapter for connecting the spool to typewriter ribbon wells having spindles of different diameter, comprising a hub in driving engagement with the spool and providing a passage extending along a central axis of the spool, at least one



diaphragm spanning the passage for rupturably receiving spindles of different diameter, and means for cooperative engagement with the ribbon well for rotating the hub.

11. The spool of claim 10 wherein said one diaphragm divides the passage into a plurality of blind sub-passages.

12. The spool of claim 11 further comprising another diaphragm spanning the passage at a location spaced from said one diaphragm, the diaphragms dividing the passage into at least three blind sub-passages.

13. The spool of claim 10 further comprising means assisting said one diaphragm in preventing lateral movement between the spool and the ribbon well, the assisting means comprising magnetized material carried by the hub.

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