March 11, 1969 J. L. MORELLI 3,432,021

RIBBON SPOOL

Filed July 14, 1967 Sheet 1 of 3

Fig_1

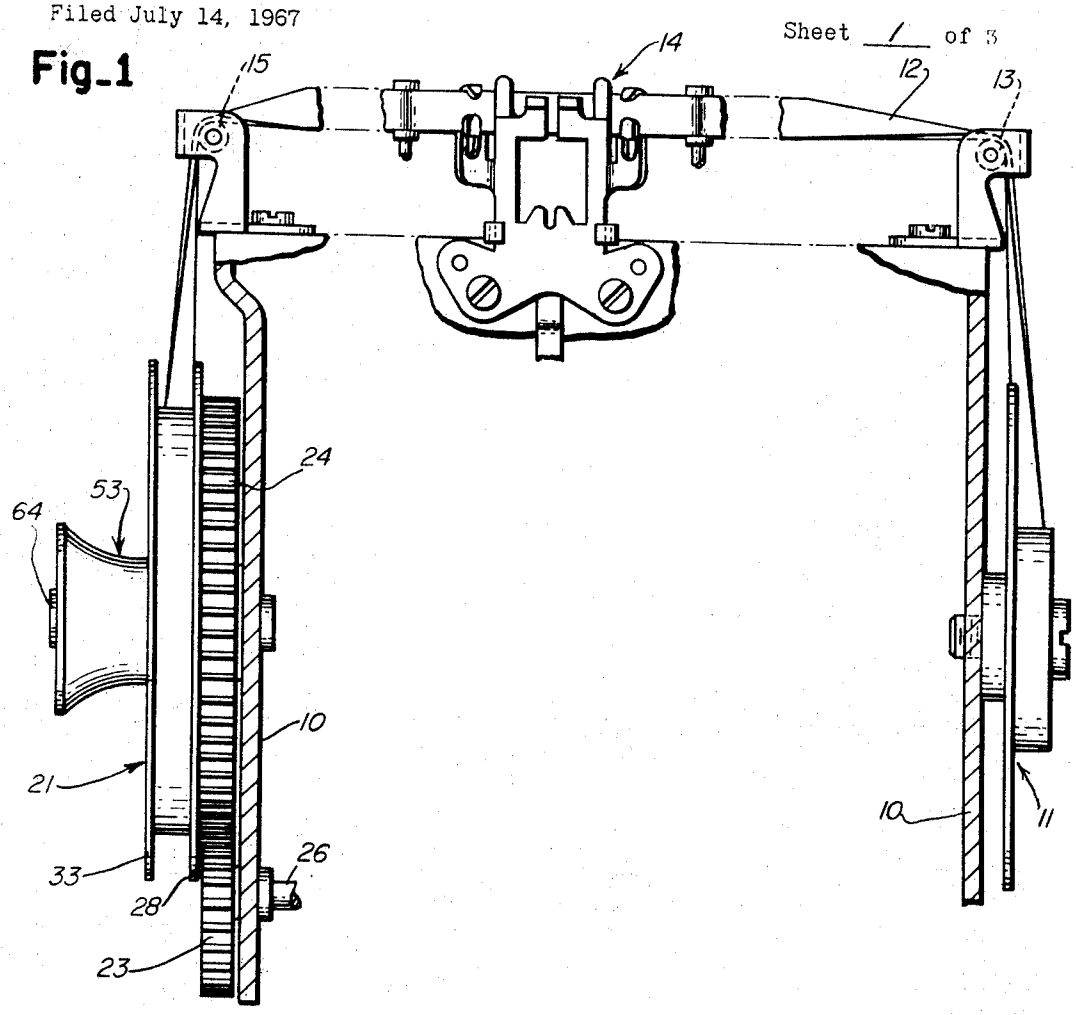
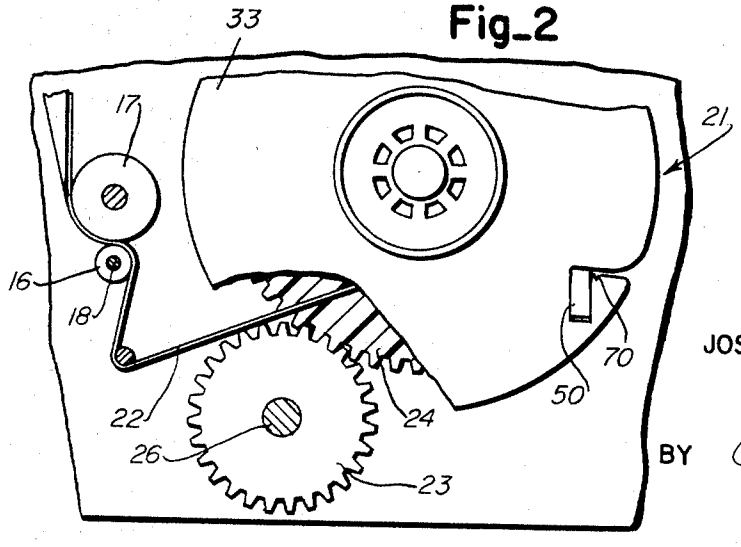


Fig_2



INVENTOR
JOSEPH L. MORELLI

BY C. P. Quinn

ATTORNEY

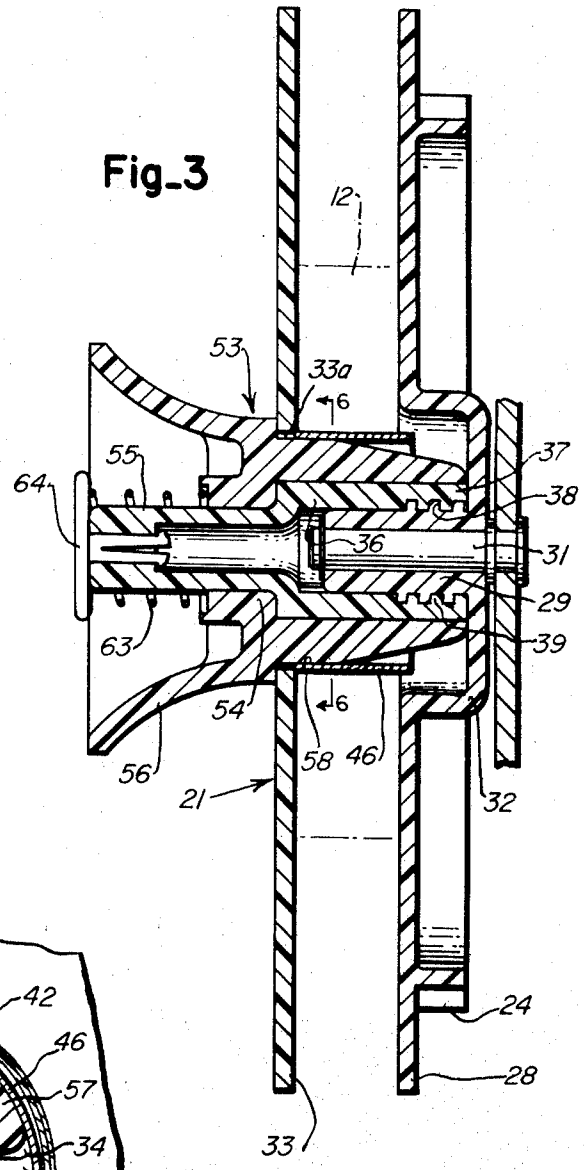
March 11, 1969 J. L. MORELLI 3,432,021

RIBBON SPOOL

Filed July 14, 1967

Sheet 2 of 3

Fig_3



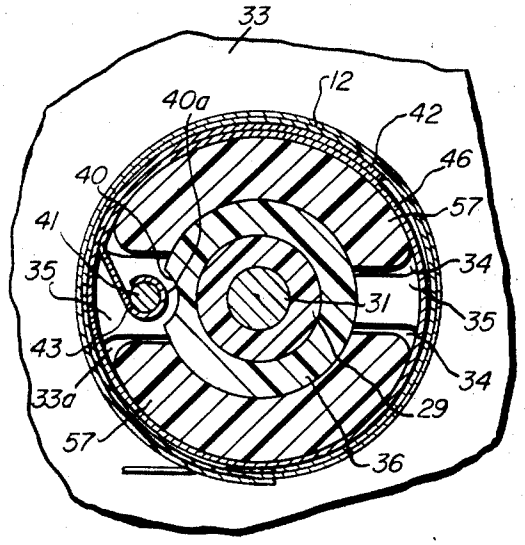


Fig_6

INVENTOR
JOSEPH L. MORELLI

BY C. P. Quinn

ATTORNEY

March 11, 1969 J. L. MORELLI 3,432,021

RIBBON SPOOL

Filed July 14, 1967 Sheet 3 of 3

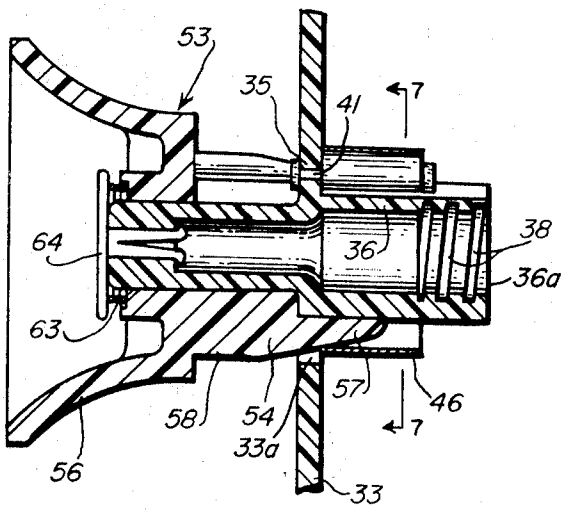


Fig_4

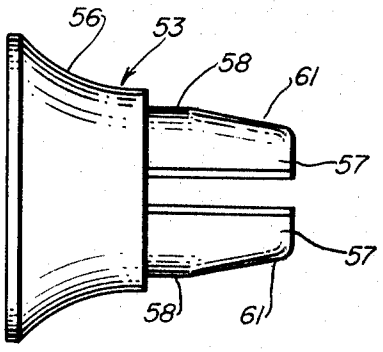


Fig_5

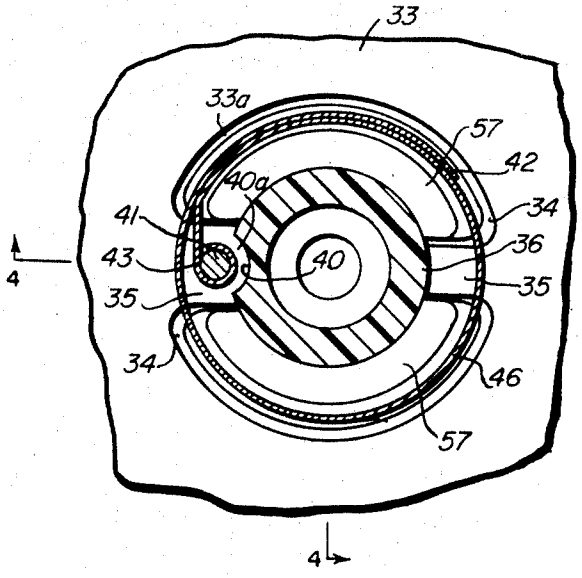


Fig_7

INVENTOR
JOSEPH L. MORELLI

BY C. P. Quinn

ATTORNEY

United States Patent Office 3,432,021
Patented Mar. 11, 1969

3,432,021

RIBBON SPOOL

Joseph L. Morelli, Hartford, Conn., assignor to Litton Business Systems, Inc., a corporation of New York

Filed July 14, 1967, Ser. No. 653,551
U.S. Cl. 197—151 4 Claims
Int. Cl. B41j 33/14, 35/00; B65h 75/18

ABSTRACT OF THE DISCLOSURE

A carbon ribbon spool for winding used ribbon having, a pair of separable flanges one of which has a hub of variable diameter which is easily contracted to release the used ribbon wound thereon.

Background of the invention

This invention relates to a carbon ribbon spool and more particularly to a take-up spool for facilitating easy ejection and disposal of used ribbon therefrom.

Carbon ribbon is becoming more and more popular for use on correspondence typewriters because of the clarity and excellence of the copy produced thereby. In machines employing carbon ribbons a desirable objective is to provide a carbon ribbon take-up spool which can accommodate all or at least sufficient amounts of the ribbon on a supply spool as to reduce the necessity for frequent disposal of used ribbon from a full take-up spool. To accomplish this objective with a take-up spool of similar dimensions as the supply spool, the run of the carbon ribbon between the ribbon index mechanism and take-up spool is maintained under tension to thereby wind the ribbon as tightly as possible on the take-up spool. As the take-up spools are reuseable it is necessary that the ribbon wound tightly thereon be easily removed and discarded.

While various means for the removal of the used carbon ribbon have been suggested in the prior art, none of them have proven entirely satisfactory and as a result, heretofore, the removal of tightly wound ribbon from the take-up spool has often been difficult, inconvenient and time consuming.

Summary of the invention

In accordance with the invention there is provided a carbon ribbon spool characterized by an inner flange adapted to be rotatably mounted on a machine frame and driven to wind used carbon ribbon on the spool, and an outer flange having an axially extending hub adapted to be releasably secured coaxially to the inner flange. The hub between the flanges supports a flat spirally wound spring mounted and fulcrumed at one end to a pin riveted to the outer flange. The other end of the spring is free enabling the spring to serve as a support core or as the hub of a support core of wound used ribbon.

In a preferred embodiment of the present invention an element is mounted on the outer flange hub for axial movement relative to and between the hub and spring to support the coil spring or to permit the coil spring to contract in which case the wound ribbon is readily released from the spool. Another feature of the present invention is the provision of one or more toothed notches in the rim of its outer flange into which the leading end of the ribbon to be wound may be inserted and secured.

A principal object of the present invention is to provide a carbon ribbon take-up spool which facilitates the release of tightly wound used ribbon therefrom.

Another object of the present invention is to provide a carbon ribbon take-up spool which is easily disassembled for removal of used carbon ribbon and easily assembled to permit winding of ribbon thereon.

Another object of the present invention is to provide a carbon ribbon take-up spool having an expandable hub which may easily be contracted to release used ribbon wound on the spool.

Another object of the present invention is to provide a carbon ribbon take-up spool having an expandable hub which provides the minimal support necessary to support a flat coil spring so that used ribbon may be wound thereon.

Other details, objects and advantages of the present invention will become apparent from the following description, taken in conjunction with the drawing which accompanies and forms part of the specification.

Brief description of the drawing

FIGURE 1 is a fragmentary front elevation view showing a carbon ribbon supply and take-up spool operatively mounted on portions of the frame of a typewriter;

FIGURE 2 is an outside left hand elevation view partly in section of the carbon ribbon take-up spool and the ribbon index wheels which permit ribbon to be drawn from a supply spool by a ribbon take-up and tensioning drive means associated with the take-up spool;

FIGURE 3 is a sectional elevation view showing the spool hub and the coil spring supporting a wound ribbon;

FIGURE 4 is a fragmentary sectional view taken along line 4—4 of FIGURE 7 showing the hub contracted to release ribbon wound on the coil spring;

FIGURE 5 is a plan view showing the means for varying the diameter of the coil spring;

FIGURE 6 is a sectional elevational view taken along lines 6—6 of FIGURE 3 showing the expanded coil spring, the spool hub and associated elements in more detail; and

FIGURE 7 is a sectional elevational view taken along lines 7—7 of FIGURE 4 showing the spring coil hub in a contracted or ribbon release poistion.

Description of the preferred embodiment

Referring to the drawing there is shown in FIGURE 1, a typewriter frame **10** which rotatably supports a carbon ribbon supply spool **11** on the right side of the machine associated with conventional drag means (not shown) to control the rate at which the spool rotates. The ribbon **12** from the supply spool **11** is directed around a right guide roller **13**, through a ribbon vibrator structure generally designated by reference numeral **14**, and around a left guide roller **15**. As viewed in FIGURES 1 and 2, the ribbon **12** passing around the left guide roller **15** passes between ribbon indexing rollers **16** and **17** which normally grip the ribbon **12**, and permit a predetermined amount of ribbon **12** to be drawn from the supply spool **11** subsequent to each type action. More particularly, the roller **16** is supported for rotation by a shaft **18** which is indexable by a conventional mechanism subsequent to each type action, and roller **17** is supported for rotation on a bracket (not shown) which is spring biased toward roller **16**, whereby when roller **16** is indexed the ribbon **12** is permitted to be drawn between the rollers **16** and **17** by, and wound on, a take-up spool generally designated by reference numeral **21**. Associated with the take-up spool **21** is a conventional drive means to rotatably urge the take-up spool **21** in a counterclockwise or take-up direction as viewed in FIGURE 2 to take up the ribbon **12** permitted to pass by rollers **16** and **17** and to maintain the length **22** of ribbon **12** between the index rollers **16** and **17** and the take-up spool **21** taut. Such a drive means may be a gear **23** engaging a geared portion **24** of the inner take-up spool flange **28** and driven by a slip connection (not shown). Accordingly, the ribbon **12** will be maintained taut at all times and will be tightly wound on the take-up spool **21** giving rise to the problems hereinbefore men-

tioned which have been solved by the spool construction of this invention.

Referring now to FIGURES 3–7 which best show the structural details of the invention, the take-up spool shown in FIGURE 3 is preferably made of plastic and comprises an inner circular flange **28** having a central bored hub **29** whereby the inner flange **28** may be rotatably mounted on a spindle **31** secured to the left side of the typewriter frame **10**. The hub **29** is integral with and extends from the bottom of an annular rightwardly extending cup-like projection **32**. A gear **24** projecting from the inner take-up spool flange **28** may be used to drive the take-up spool **21**. The pickup spool **21** further comprises an outer circular flange **33** having a central circular opening **33***a* bisected by, as viewed in FIGURES 6 and 7, 180° spaced webs **35** which extend inwardly from the flange **33** to centrally support a hollow hub generally designated by reference numeral **36** which extends to either side of the flange **33**. Thus, chordal openings **34** are formed on either side of the webs **35**. The rightwardly extending portion **37** of the hub **36** is preferably open at its end **36***a* and formed, though alternative quick connect-disconnect means may be used, with spiral grooves **38** which are adapted to mate with spiral ribs **39** in the periphery of the inner flange hub **29** whereby counterclockwise movement of the inner flange **28** will secure the hubs **36** and **29** together in a tight but readily separable relationship.

As viewed most clearly in FIGURES 4, 6 and 7, a post or pin **41** is rivetedly mounted on one of the webs **35** of the outer flange **33** and extends inwardly toward the inner flange **28**. A groove **40** is provided in the outer surface of hub **36** providing a pocket **40***a* for the pin **41**. A flat spirally found coil spring generally designated by reference numeral **46** is mounted and fulcrumed at one end **43** to the post or pin **41**. The other end **42** of the spring **46** is free and overlaps the end **43** assuming a substantially concentric attitude enabling the spring **46** to be expanded and contracted.

The flat spirally wound coil spring **46** has a width which is slightly larger than the distance between the inner and outer spool flanges **28** and **33** and extends from the outer flange **33** into the cup-like member **32** of the inner flange **28**. In spools for conventional size ribbons $\frac{5}{16}$ of an inch in width, the flat spirally wound coil spring **46** is approximately $\frac{3}{8}$ of an inch in width.

In order to provide support for the flat spirally wound coil spring **46** so that it may serve as the core for wound used ribbon, as shown in FIGURES 3–5, a camming element designated by reference numeral **53** is mounted for axial movement about and relative to the outer flange hub **36**. The camming element **53** comprises a central annular body portion **54** which is slidably mounted on the leftwardly extending portion **55** of the outer flange hub **36**. Extending leftward from the annular body portion **54**, the camming element **53** flares outward providing a handle **56** which may be manipulated in cooperation with the leftward extending hub portion **55** to withdraw the camming element **53** as will hereinafter be discussed in more detail.

Extending to the right of the annular body portion **54** are a pair of oppositely spaced camming fingers **57** which extend through the chordal openings **34**. Each of the fingers **57** as shown in FIGURE 5 comprises a straight body section **58** shaped to be accommodated by the chordal openings **34**. The terminal ends **61** of the camming fingers **57** are tapered and slope toward the axis of the spool **21**.

As viewed in FIGURES 6 and 7 the cam fingers **57** are adapted to move between the rightwardly extending portion **37** of the hub **36** and the flat spirally wound coil spring **46** mounted thereon to support and release the flat spirally wound coil spring **46**.

The camming element **53** is biased toward the right by a coil spring **63** mounted about the left end of the hub **55** against the annular portion **54** of the camming element **53** and held in place by a cap **64** press fit into the hub **55**. The coil spring **63** is calibrated so as to provide sufficient force to prevent inadvertent movement of the camming element **53** due to vibration. The straight portion **58** of the camming element **53** is adapted to extend to the right past the outer flange **33** a distance equal to approximately one third the width of the flat spirally wound coil spring **46** in order to adequately support the flat spirally wound coil spring **46** and the ribbon **12** subsequently wound thereon. In ribbon spools manufactured for winding conventional size typewriter ribbon in which the spool flanges **33** and **28** are approximately $\frac{5}{16}$ of an inch apart, the straight portion **58** of the camming finger **57**, when in its normal postion, extends past the outer flange **33** and under the flat sprially wound coil spring **46** a distance of approximately $\frac{1}{8}$ of an inch. In this manner the camming element **53** provides excellent support and release for the flat spirally wound coil spring **46**.

In use, with the flanges **33** and **28** separated and the camming element **53** positioned to support the flat spirally wound coil spring **46**, the terminal portion **50** of a carbon ribbon **12** will be secured in a toothed notch **70** in the outer flange **33** as shown in FIGURE 2 and the outer flange **33** is automatically joined to the inner flange **28** by threading the hubs **29** and **36** together.

By providing toothed notches **70** about the periphery of the outer flange **33**, should a break occur in the carbon ribbon **12** being wound, the new end formed may be quickly secured in one of the notches **70** and the winding of the ribbon **12** continued without the necessity of removing the ribbon **12** already wound from the take-up spool **21**.

When the take-up spool **21** is fully loaded, the operator cuts off the power to the drive shaft **26** and manually rotates the outer flange **33** in a direction opposite to the winding direction unthreading the hubs **29** and **36** and separating the flanges **33** and inner flange **28**. With the outer flange **33** so separated, an operator need only grasp the finger piece **56** of the camming element **53** between the index finger and middle finger, place a thumb on the cap **64** of the hub **55** and pull the fingers against the force of spring **63** to withdraw the camming element **53** so that the straight portion **58** of the camming element **53** will clear the flat sprially wound coil spring **46**. The flat spirally wound coil spring **46** will then pivot and contract under the tension exerted by the wound used ribbon **12** reducing the circumference of the flat spirally wound coil spring **46** and free the used wound ribbon **12** from the spool **21** so that it may be dropped into a waste receptacle.

I claim:

1. A carbon ribbon take-up spool comprising a first circular flange rotatably mounted on a machine frame and driven to wind used carbon ribbon,

a second circular flange,

a coaxial hub centrally supported by a pair of webs on said second circular flange,

means for releasably securing said hub coaxially to said first circular flange,

a pin mounted on one of said pair of webs of said second circular flange,

a flat spirally wound coil spring mounted and fulcrumed at one end on said pin, said flat spirally wound coil spring extending outward from said pin and wound about said hub in a substantially concentric attitude,

at least one notch in said second circular flange for releasably attaching the lead end of a used ribbon to said take-up spool,

and camming means axially movable relative to said hub from a position outside of said second circular flange to a position between said first and second circular flanges and between said hub and flat spirally wound coil spring, said camming means when positioned between the flanges, serving to support said

flat spirally wound coil spring whereby said flat spirally wound coil spring acts as a core for said ribbon attached to said take-up spool as it is wound thereon, and when positioned outside of said second circular flange releases said spirally wound coil spring to pivot about said pin and contract evenly about its center under the tension exerted by the wound ribbon, freeing the used wound ribbon from said take-up spool.

2. A carbon ribbon take-up spool as defined in claim 1 wherein said camming means includes a tapered portion for facilitating contraction of said flat spirally wound coil spring and a straight portion axially extending under said flat spirally wound coil spring a distance approximately equal to ⅓ the width of said flat spirally wound coil spring for supporting said flat spirally wound coil spring.

3. A carbon ribbon take-up spool as defined in claim 2 wherein said first circular flange includes a cup-like member centered about its axis and said coil spring extends from said second circular flange into said cup-like member.

4. A carbon ribbon take-up spool as defined in claim 3

including resilient means for biasing said camming means to a position between said first and second circular flanges.

References Cited

UNITED STATES PATENTS

1,040,536	10/1912	Hansen	242—72
2,203,101	6/1940	Pausin	242—71.8
3,002,707	10/1961	Noble	242—71.8 X
3,317,155	5/1967	Geissler	242—71.8

FOREIGN PATENTS

4,196	12/1931	Australia.

OTHER REFERENCES

IBM Technical Disclosure Bulletin, Disposal of Typewriter Ribbon, Caudill et al., vol. 8, No. 8, January 1966, pp. 1127, 1128, 197–151.

ERNEST T. WRIGHT, JR., *Primary Examiner.*

U.S. Cl. X.R.

197—175; 242—71.8, 72