United States Patent

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[73] Assignee **International Business Machines Corporation Armonk, N.Y.**
Continuation of application Ser. No. 495,774, Oct. 14, 1965, now abandoned.

[54] **AUTOMATIC RIBBON TAKEUP**
6 Claims, 4 Drawing Figs.

[52] **U.S. Cl.** **197/151,** 197/175, 242/74
[51] **Int. Cl.** **B41j 33/14**
[50] **Field of Search** 197/151, 172, 175; 242/74, 74.1, 74.2; 226/91, 92, 93, 94

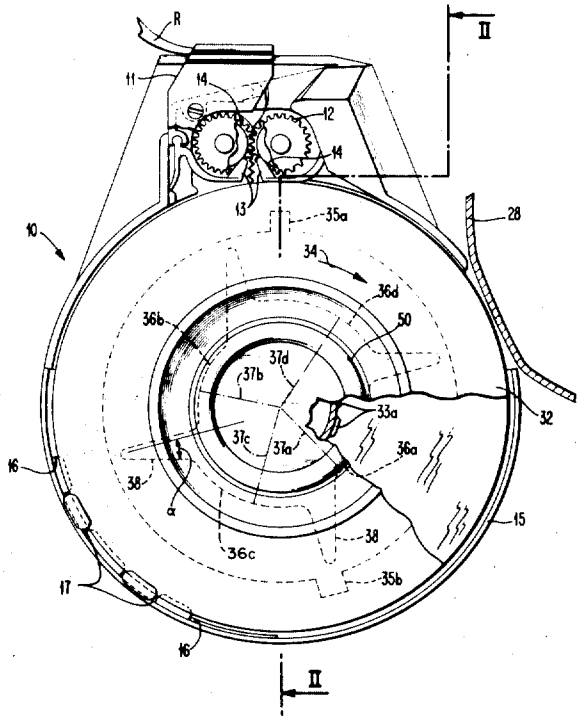
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ABSTRACT: Typewriter carbon ribbon is automatically attached to a takeup reel by the combined provision of: (1) a flexible camming plate that creates significant friction interaction between the reel and the ribbon and is constructed to be effective even when substantial amounts of ribbon have been previously wound on the reel; (2) an electrically neutral flange to eliminate the adverse effects of static electricity on automatic attachment; (3) a reel enclosure for maintaining loose ribbon in the proximity of the reel; (4) several selective control modes of operation to assist the operator; and (5) several other features of construction relating principally to effective handling of a loose flimsy ribbon end.



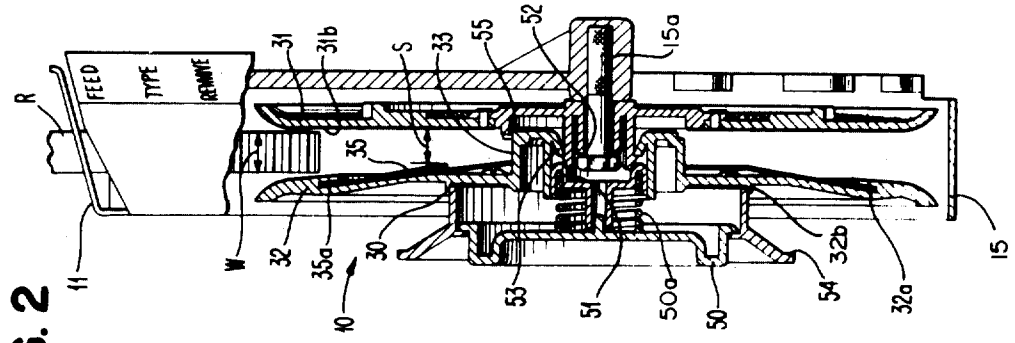


FIG. 2

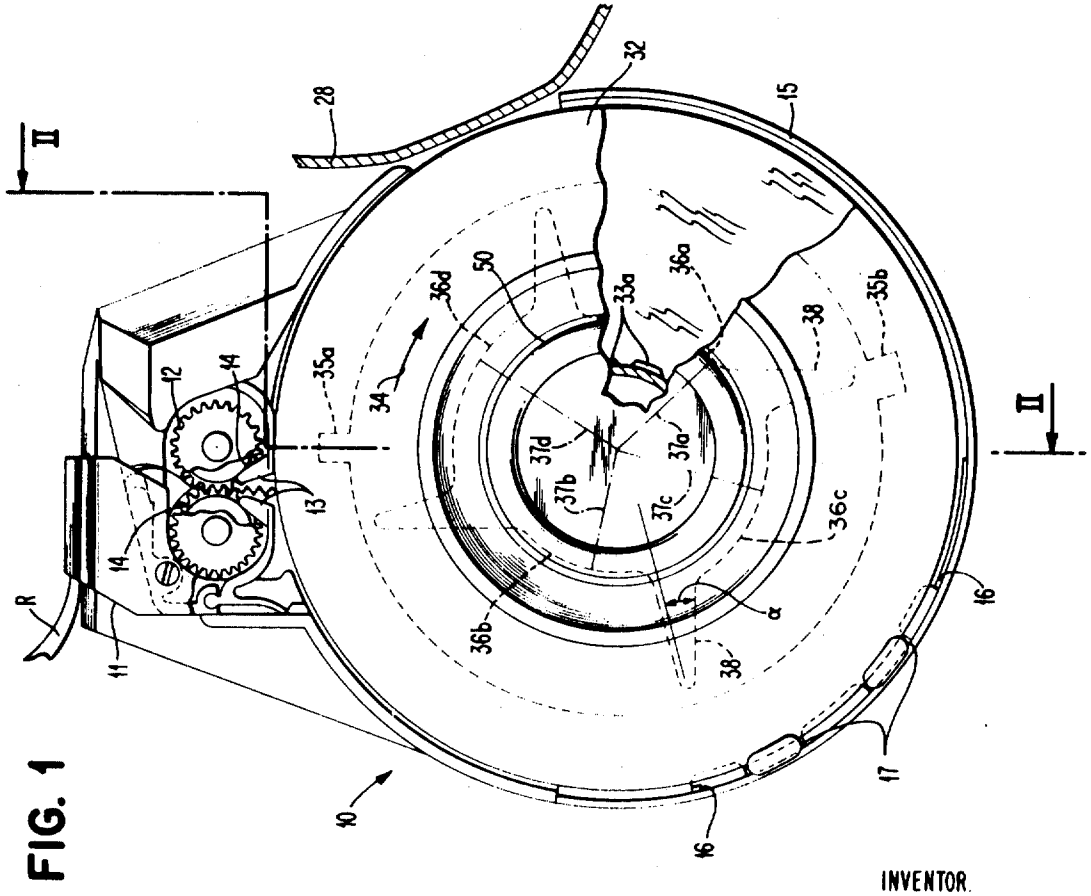
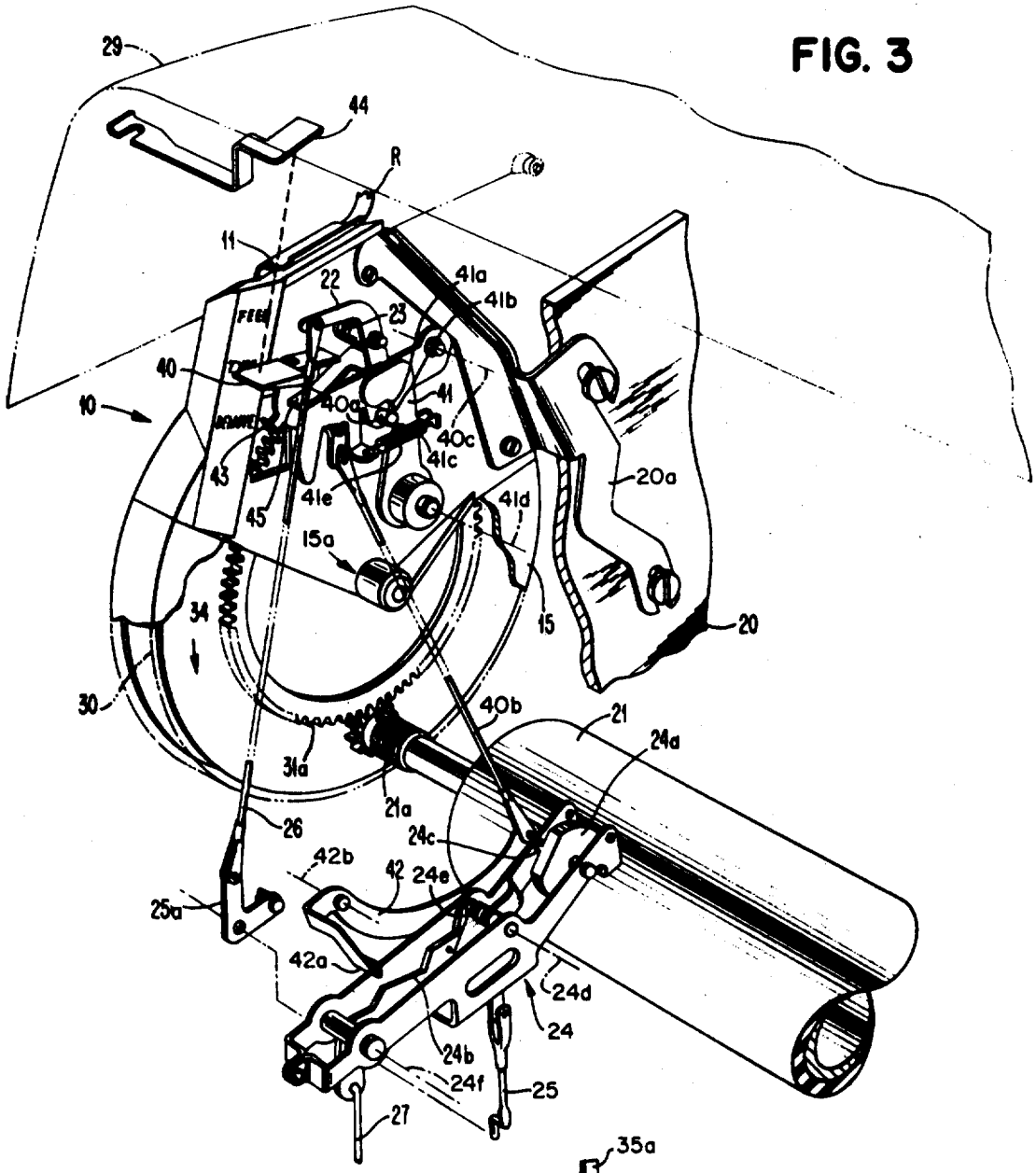


FIG. 1

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FIG. 3


29
44
R
11
22
41a
41b
23
40
10
40a
41
40c
41c
43
45
41e
41d
15a
20a
15
20
34
30
40b
21
24a
31a
21a
26
24c
42b
42
24e
25a
42a
24d
24
24b
24f
25
27

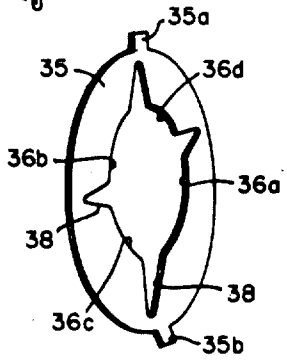

35a
35
36d
36b
36a
38
38
36c
35b

FIG. 4

AUTOMATIC RIBBON TAKEUP

DISCLOSURE OF THE INVENTION

This application is a continuation of our copending application Ser. No. 495,774, filed Oct. 14, 1965, now abandoned.

We have devised and successfully demonstrated an automatic ink ribbon pickup mechanism for ribbon impact printers. Our automatic pickup mechanism is capable of attaching the free end of a flimsy ribbon, either during the initial loading thereof, or in the event of ribbon breakage.

High-quality typewritten material is currently prepared through the use of a so-called "total release ribbon" that is fed from a supply, past a printing station, and ordinarily to a takeup reel for efficient disposal. Ribbon changes are relatively frequent since the ribbon passes only once through the machine. Also, it is occasionally necessary to change ribbons for different print colors. The ease and cleanliness of changing ribbons thus represent significant economic considerations to the commercial acceptability of a typewriter or other similar printer.

Attachment of a flimsy ink ribbon to a conventional takeup reel is a time-consuming and dirty job. These ribbons have a tendency to twist and slip, as well as to cling to adjacent parts by static electricity. Even where a leader is provided for the ribbon, the job can be dirty since the takeup reel is coated with carbon ink from preceding ribbons. If a ribbon breaks, as occasionally happens with paper and acetate ribbon, the already wound ribbon ordinarily is removed from the takeup reel before the broken free end can be reattached. Similarly, if it is desired to change ribbon color, the previously wound ribbon is removed from the takeup reel to permit conventional threading attachment of the new ribbon.

In some ways, typewriter ink ribbons are similar to other continuous webs, such as movie film and magnetic recording tape. It is well known that the industries using film and recording tape have developed certain automatic pickup techniques to eliminate total manual threading. However, the differences between the webs themselves and the particular industry's problems have outweighed these similarities and have heretofore prevented adoption of known pickup techniques for use in impact-printing ribbon handling. For example, a typewriter ribbon-handling system must operate satisfactorily on ribbons made of paper, cellophane, polypropylene, polyethylene, acetate, Mylar and ribbon leaders which are often made of vinyl with tabs and/or adhesive attached thereto. Even ribbon materials not yet known must be considered when developing a practical takeup that places limitations on the physical properties of suitable ribbons. In addition to material differences, different manufacturers employ different ribbon thicknesses and maintain different tolerance limitations on their ribbon, although most ribbons are generally in the thickness range of 1 mil. If a movie projector film pickup or tape recorder tape pickup fails to attach properly, the result is a limited mess of unwound material which is ordinarily readily visible due to the inherent construction of these machines. On the other hand, if a typewriter ribbon is not properly picked up, it will become tangled in the typewriter-operating mechanism, especially the high-speed power roll, requiring a service call and considerable downtime for the machine. Experience has shown that other differences between the arts become apparent by the problems presented as old techniques are attempted to be applied to the typewriter field.

Accordingly, it has been an object of our invention to devise and develop an automatic ink ribbon takeup that is capable of receiving and automatically attaching ink ribbons which have a wide range of different physical characteristics as are currently available from ink ribbon suppliers.

Another object of our invention has been to devise and develop an automatic ribbon takeup mechanism having an adequate reliability to permit its commercial use in high-quality typewriters.

Another important object of our invention has been to devise and develop an automatic ribbon takeup mechanism that is capable of totally handling the free end of a ribbon inserted within range of its outer flange periphery, to minimize the manipulative effort required for ribbon threading and to provide pickup capability for loose ends of broken ribbons.

A further object of our invention has been to achieve the foregoing objects at a practical cost considering the increased efficiency to be achieved.

By one concept of our invention we employ a rotating takeup reel having a side flange and means for creating a relatively large frictional interaction between the moving side flange and the ribbon. The increased frictional interaction is preferably accomplished by providing a second flange having means defining a spacing between the flanges slightly less than the width of the ribbon and which extends over a substantial area radially outwardly from the reel hub. We have demonstrated, however, that successful operation is obtainable by simply providing one flange with a high coefficient of friction and mounting the reel at an angle to the horizontal to allow gravity to induce the large frictional interaction. Returning to our preferred implementation, the cramped spacing amplifies the inherent radially inwardly directed frictional interaction between the ribbon and the rotating flange wall, and causes the ribbon to seek the reel axis and there to wind upon itself and form a friction grip attachment.

In accordance with the preferred version of our invention we obtain the cramped spacing by a laterally flexible surface formed by a thin, resilient wedging plate that forms the inner surface of one reel flange and tapers inwardly to provide a yieldable wedge spacing in conjunction with the opposed reel flange. The wedging plate is formed with a plurality of independently flexible fingers, each having swept-back leading edges that cam the ribbon towards the reel axis. The fingers are of varied radial extent to permit rapid automatic ribbon pickup even after considerable ribbon has been wound on the reel and one or more of the wedging fingers have been displaced to the extent of their available flexibility. Although a variety of materials are operable for use as a cam plate, we have found a stable plastic, such as Mylar, to be particularly easy to work with and to provide the additional benefit of a lack of sharp edges, which would cut weak ribbons. The flexible surface can be achieved by other means, such as urethane foam, felt, or other compressible materials. However, these materials flex independently over their entire surface and tend to impose excess drag on the ribbon.

Ancillary to the reel construction itself, we have provided several ribbon-handling construction features, all of which are directed to the problem of handling the free end of a ribbon. We have disclosed the outer periphery of the takeup reel in a housing to assure containment of the ribbon within the moving flanges of the reel. While the frictional effect contributes principally to the speed of takeup, containment contributes to its reliability. So long as the ribbon is contained, it will eventually pick up. We have determined that the housing can be somewhat loose in its circumscribing cooperation with the reel, and the greatest tendency for the ribbon to escape sideways from between the flanges at its periphery occurs about 225° from the entrance of the tape into the reel. Accordingly, we have provided a special containment configuration at this location. We have also provided some radially, inwardly directed ridges on the inner surface of the housing that are judiciously placed to engage a ribbon free end and cause the ribbon to buckle inwardly towards the reel center where it will be picked up by the wedging plate. The ribbon feed is provided by a pair of gearlike soft rubber rollers that meter a precise amount of ribbon with each type stroke. We have provided feed roll stripper means for preventing entanglement of the ribbon with these feed rolls as might occur upon encountering the free end of a ribbon.

A further phase of our invention relates to control of the static electric charge frequently encountered in handling thin plastic films. We have provided one flange of the takeup reel with an electrically conductive plating by which it remains substantially neutral in charge. Different ribbon materials

have different static electric characteristics. For example, acetate ribbon will develop a charge opposite to that developed by polyethylene ribbon in passing through a typewriter feed mechanism. Paper ribbon will pick up no effective static charge. Furthermore, static electricity is quite temperature and humidity dependent, making it impracticable to devise mechanisms based on any one set of static electric conditions. Depending upon the circumstances of ribbon material, weather, ribbon feed construction, and other less obvious considerations, the static charge may actually assist takeup, it may oppose takeup to the point that takeup is impossible, or it may have no effect whatsoever. By neutralizing the takeup reel we have eliminated the possibility that static forces will seriously oppose takeup action. Ordinarily, it can be expected that the attraction between a statically charged ribbon and a neutral takeup reel will assist the takeup. However, this benefit cannot be totally relied on for the reasons enumerated above. Furthermore, we have chosen to provide less than total electrical neutrality for practical considerations and it is possible that a slight charge on the reel might exist under certain conditions.

These and other objects, features, and advantages of our invention will be apparent to those skilled in the art from the following more particular description of a preferred embodiment of our invention wherein specific reference is made to the accompanying drawing, of which:

FIG. 1 is a front elevational view of a ribbon takeup mechanism constructed in accordance with our invention and shown together with certain fragmentary portions of an associated typewriter;

FIG. 2 is a vertical cross-sectional view of the mechanism shown in FIG. 1 taken along line II—II to reveal the internal details thereof;

FIG. 3 is a rear partially exploded perspective view of the ribbon-driving mechanism to assist in explaining the operation of the mechanism of FIGS. 1 and 2; and

FIG. 4 is a perspective view of a camming plate forming part of the typewriter ribbon takeup reel shown in FIGS. 1 and 2.

More specifically, in the drawing there is shown an automatic ribbon takeup mechanism 10 for a typewriter or other ribbon impact printer represented principally by its frame 20 in FIG. 3 and by other fragmental structure hereinafter described. An ink ribbon R is received by the takeup mechanism through a carbon shield 11 after passing the printing station (not shown) of the typewriter and passes through meshing toothed gearlike soft rubber feed rolls 12 which meter its linear displacement. A pair of flexibly mounted stripper fingers 13 ride in Delrin-lined grooves 14 between gear tooth portions of the feed rolls 12 to prevent the ribbon R from entanglement therewith.

The ribbon R thus delivered is wound on a takeup spool assembly or reel 30, formed of opposed side flanges 31 and 32 operatively connected to a central hub or core 33. The reel 30 is rotatably supported by the frame 20 through bracket 20*a*, reel housing 15, and bearing 15*a* is yieldably driven in the direction of arrow 34 by the typewriter power roll 21 (FIG. 3) through a limited-force-transmitting spring clutch or power means 21*a* and flange-mounted gear 31*a*. This portion of the mechanism is similar to the ribbon feed disclosed in IBM Customer Engineering Instruction Manual—Standard Typewriter Model C—I, Form 241—5065—0, copyright 1960 by International Business Machines Corporation, on pages 106, 107, 114 and 115. Normally, the reel 30 is prevented from turning by the ribbon R connected between the feed rolls 12 (see FIG. 1) and the reel 30. Ribbon R is metered by movement of the feed rolls 12 which is accomplished by an oscillating drive link 22 connected to one of the feed rolls 12 through a one-direction spring clutch 23. The output of clutch 23 is connected to the right-hand feed roll 12 in FIG. 1 to drive it counterclockwise as the link 22 is oscillated clockwise in FIG. 3. Oscillating link 22 is driven from a power assembly 24 pivoted about axis 24*f* and including a rollover cam 24*a* of known construction, through links 25, 25*a* and 26. Movement of the assembly 24 is controlled by a control link 24*b* that is pivoted to assembly 24 at axis 24*d* and is biased clockwise by torsion spring 24*e*. The control link 24*b* engages a latch pin 24*c* that normally holds the rollover cam 24*a* out of contact with the power roll 21. A print cycle indicative input linkage 27 moves the control link 24*b* during the print cycle of any character to release pin 24*c* and drop the cam 24*a* into contact with power roll 21 thereby pivotally moving assembly 24 and oscillating the feed member 22 to cause a ribbon feed stroke of rolls 12.

REEL CONSTRUCTION

The reel 30 is enclosed within a peripheral housing or casing 15 which, as shown in FIG. 1, cooperates with a portion of a typewriter key plate 28 to provide total enclosure. The outer housing 15 prevents the free end of ribbon R from leaving the space between the flanges 31 and 32 during automatic takeup. The flanges 31 and 32 of the reel 30 provide a cramped spacing S therebetween by means of a flexible or resilient laterally yieldable wedging plate 35 that forms the internal surface of flange 32. Spacing distance S is slightly less than the ribbon width W, thus causing amplified frictional interaction between the rotating reel 30 and the ribbon R that pulls the ribbon R towards the reel axis. The ribbon R quickly winds on itself forming a friction grip about the reel core 33.

The wedging plate 35 is constructed preferably of Mylar and is mounted in an inwardly facing annular slot 32*a* of flange 32, as best shown in FIG. 2. The plate 35 is held circumferentially by a pair of key tabs 35*a* and 35*b* which are of different size to assure proper assembly and fit into complementary radial slots in the flange 32. A plurality of independently flexible fingers or projections 36*a*, 36*b*, 36*c* an 36*d*, as shown most clearly in FIGS. 1 and 4 are provided by the wedging plate 35. These fingers 36*a*–36*d* each emanate from a radially outward base that is relatively nonyieldable compared with the fingers themselves. The fingers extend inwardly from their base portions to inward extremities that are spaced different distances into the center of the reel 30 as shown by dimension lines 37*a*, 37*b*, 37*c* and 37*d*. The fingers 36*a*–36*d* thus are radially separated for operation when the ribbon R has built up to different depths on the core 33. The forward or leading edges 38 of the fingers 36*a*–36*d* are swept back from the radial at an acute angle α to provide a radially inwardly directed engaging force with the ribbon R when encountered. It will be seen that as a free end of the ribbon R is fed into the reel 30 between flanges 31 and 32, some portion thereof will contact the flanges 31 and 32 where the wedging plate 35 frictionally drags the ribbon R inwardly towards the center of the reel 30.

A pair of radially inwardly projecting ribbon buckling ridges 16 are provided on the internal periphery of the housing 15 to engage the free end of any ribbon R that is slow to pick up. Upon engagement with a buckling ridge 16, the ribbon R will buckle inwardly bringing an intermediate part thereof into the effective range of the wedging plate 35. A plurality of side-edge-forming projections 17 are provided in the region approximately 225° from the ribbon R entrance to retain the ribbon R within the housing 15 and between the reel flanges 31 and 32. We have found that the remainder of the spacing between the housing 15 and the reel flanges 31 and 32 can remain laterally open without substantial danger of malfunction. As shown in the broken portion of FIG. 1, the central core 33 is made nonsmooth by the provision of ridges, such as 33*a*, to assist in the rapid gripping attachment of the ribbon thereto. As typing proceeds and ribbon is built up around the core 33, the wedge plate finger 36*a* will be flexed laterally outwardly against the body of flange 32 rendering it ineffective for further automatic pickup operation. The wedge plate fingers 36*b*–36*d*, however, will not be adversely affected since they do not extend radially inwardly as far as the finger 36*a*. The ribbon may occasionally break between the reel 30 and the feed rolls 12 as this is the point of maximum stress in the system. A broken ribbon R will present a free end within the

flanges 31 and 32 and pickup will occur again just as previously described. The difference being that only three of the four wedge plate fingers are now effective. Thus, it will be seen that the mechanism described is capable of rapidly picking up the free end of a ribbon at all times as long as one of the fingers 36*a*–36*d* remains unflexed and thus presents a flexible wedging surface to the ribbon.

As explained above, many common typewriter ribbons will develop a static electric charge when passing through a ribbon feed mechanism having various dielectric parts. This charge occasionally could be helpful to automatic pickup, but is quite unpredictable. We provide a metal-plated surface 31*b* on the plastic reel flange 31 which is large relative to the charge involved to act as a sink and effectively dissipate any charge that may be received thereby by leakage to adjacent parts over a period of time. These sink and leakage effects prevent development of a charge on the reel surface itself so that the reel 30 presents a statically neutral charge to ribbons being received. Ribbons having a static charge thus will not be strongly repelled by the reel assembly 30, but may very well be attracted thereto by a weak induced polarization to assist in radially inward movement during takeup.

ANCILLARY HANDLING MECHANISM

In FIG. 3 there is shown a ribbon feed control constructed to assist automatic pickup and contribute generally to efficient ribbon handling. The control is centered around a feed control lever 40 for selecting any of three operational modes—FEED, TYPE or REMOVE. The lever 40 is pivoted about axis 40*c* and is maintained in any of its three positions by a detent lever 41 having detent surfaces 41*a*, 41*b*, and 41*c* for selectively engaging a pin or dowel 40*a* on lever 40. Detent lever 41 is pivoted about axis 41*d* and is urged against pin 40*a* by spring 41*e*.

In the TYPE position shown, control lever 40 is positioned for ordinary typing where through connecting link 40*b*, it holds a continuous feed lever 42 that is pivoted about axis 42*b*, out of contact with control link 24*b* and maintains a brake tooth 43 out of contact with the reel gear 31*a*.

The FEED position is employed during ribbon loading. The typewriter cover 29 is raised to allow access to the ribbon mechanism and the control lever 40 is moved upwardly to the FEED position. Connecting link 40*b*follows upwardly to pivot the continuous feed lever 42 counterclockwise. Contact end 42*a* is driven into depressing engagement with the control link 24*b* and thus causes repeated feed cycles of power assembly 24. As a safety feature to assure that the feed control lever 40 will not be inadvertently left in its FEED position, and ribbon wasted, a bracket plate 44 is attached under the typewriter cover 29 in alignment with the control lever 40. Upon closure of the cover 29, the lever 40 is automatically returned to its TYPE position by plate 44.

When the control arm 40 is moved downwardly to its REMOVE position, the brake tooth 43 engages teeth of the flange gear 31*a* and prevents the clutch 21*a* from rotating the reel 30. With the reel 30 thus held stationary, the ribbon-carrying flange 32 can be removed by operation of a pushbutton 50 (see FIGS. 1 and 2). The pushbutton 50 is normally biased outwardly by a spring 50*a* and when pushed bears on a camming disc 51 to pinch latching fingers 52 of flange part 31 radially inwardly away from cooperating latching flange 53 of flange 32 permitting separation of the flanges. The core 33 is formed as part of the flange 32 and thus the used wound ribbon can be carried to a wastebasket and allowed to fall from the flange by unspooling or through the use of eject means that form no part of this invention. The flange 32 is readily handled for these operations by an annular gripping part or handle 54 that is welded to annulus 32*b* thereof. The flanges 31 and 32 are press snapped together for further use. The torque-transmitting driving connection between the powered flange 31 and removable flange 32 is accomplished by an overlapping tab or loose key connection 55 therebetween. In the REMOVE position continuous feed lever 42 is held out of engagement with the control link 24*b* so that feed rolls 12 do not move. A kickback arm 45 is provided on the oscillating drive link 22 to automatically engage and restore the control lever 40 to the TYPE position upon the first operational cycle of the power supply assembly 24 by print cycle indicative linkage 27, in the event control lever 40 is inadvertently left in the REMOVE position.

OPERATION

The cover 29 of the typewriter is raised permitting access to the feed mechanism 10 and a new ribbon R is threaded thereto from a supply (not shown) past a printing station (not shown). The control lever 40 is moved upwardly to the FEED position causing continued stepping motion of the feed rolls 12. The ribbon R is slipped under the carbon guard plate 11. Its free end is brought sideways into the rolls 12 where it automatically falls by gravity to seek an aligned centralized position therebetween. During this operation the takeup reel 30 is rotating by spring clutch 21*a* and the ribbon R is fed in between its rotating flanges 31 and 32 and into contact with wedging plate 35. The frictional action of the flanges 31 and 32 is enhanced by the wedging plate 35 and especially the swept-back leading surface 38 thereof causes the ribbon to move to the center of the reel 30 and eventually the ribbon becomes wound upon itself making binding contact therewith. Further rotation of the reel assembly 30 is controlled by the feed rolls 12 through the tension in the ribbon R.

The control lever 40 is next moved manually to the TYPE position, or in the alternative the typewriter cover 29 is simply closed. The lever 40 is moved automatically by bracket plate 44. Control of feed rolls 12 is thus turned over to the print cycle indicative linkage 27. As typing proceeds, feed rolls 12 and takeup reel 30 operate in a generally conventional manner. If a weak ribbon, such as a paper ribbon, is employed, occasionally a typebar may make a cut. As the cut is advanced beyond the feed rolls 12 tension on the ribbon is increased and ribbon breakage can result. Upon breakage of a ribbon between feed rolls 12 and takeup reel 30, the takeup reel 30 is turned continuously by slip clutch 21*a* as such rotation is not opposed by a ribbon tension. Continued typing brings the free end of the broken ribbon further into the space between the flanges 31 and 32 and, so long as one of the flexible fingers 36*a*–36 remains free of wound ribbon, the broken ribbon end will quickly pick up without the operator's interference. Even if the flexible fingers 36*a*–36*d* are all completely depressed, a broken ribbon will eventually pick up automatically due to its containment between the rotating flanges 31 and 32 by the housing 15. After about 15 to 30 inches of loose ribbon is available between feed rolls 12 and takeup spool 30, the continuing rotation of flanges 31 and 32 sweeps the ribbon R around until it wraps upon itself and attaches. If the operator desires to change print color, the typewriter cover 29 is raised, the old ribbon is cut, and the new ribbon is inserted following the steps outlined above. Although some old ribbon remains on the reel 30, the new ribbon will automatically pick up so long as any of the fingers 36*a*–36*d* remain free of wound ribbon. When the reel 30 has been filled to capacity, the typewriter cover 29 is again lifted and the control lever 40 moved to the REMOVE position locking the flange 31 against rotation by the clutch 21*a*. Pushbutton 50 is depressed, separating the reel flanges 31 and 32 and permitting removal of the flange 32 together with the ribbon wound on the core 33. The used ribbon is dumped into a wastebasket and the flange 32 is snapped back onto the flange 31 ready to receive a new ribbon.

Those skilled in the art will recognize that we have provided an automatic ribbon takeup mechanism that is particularly versatile in its acceptance of different ribbons. Also, our mechanism is particularly useful in handling typewriter ribbons that may be cut or may break, since it is capable of picking up a free end, even after some ribbon has been wound on the takeup reel.

We claim:

1. An impact printer employing an ink ribbon, and having a frame; ribbon feed means including means engaging the ribbon for displacing the ribbon along its length; a takeup reel; means carried by said frame for rotatably supporting said reel below and adjacent said ribbon engaging means whereby said reel is positioned for receiving ribbon displaced thereby; and limited force power means for yieldably rotatably driving said reel; wherein the improvement comprises said takeup reel having:

a central core and a pair of spaced side flanges extending radially outwardly therefrom for receiving therebetween the ribbon displaced by said ribbon-engaging means,

a plurality of independent, resiliently yieldable fingers projecting into the space between said flanges for establishing an effective spacing distance therebetween that is effectively less than the width of the ribbon, and

said fingers each emanating from a relatively nonyieldable base portion that is spaced radially outwardly of said central core, and extending inwardly from said base portion towards said central core to an inward extremity, the inward extremity of at least two fingers of said plurality being spaced from said core by significantly different radial distances.

2. A printer as defined in claim 1 wherein each of said fingers have leading edges that are swept back from the radial at an acute angle to assist radially inward movement of the ribbon.

3. A printer as defined in claim 1 wherein said ribbon-engaging means comprises a pair of meshing gear-toothed feed rolls and said feed means further comprises stripper means positioned immediately adjacent said feed rolls for positively separating ribbon displaced by said feed rolls therefrom.

4. A printer as defined in claim 1 wherein one of said takeup reel side flanges has a relatively large electrically conductive inwardly facing surface.

5. A printer as defined in claim 1 wherein at least one of said fingers has an edge leading in the direction of reel rotation that is swept back from the radial at an acute angle to assist radially inward movement of the ribbon.

6. An impact printer employing an ink ribbon, and having a frame, ribbon feed means including means engaging the ribbon for displacing the ribbon along its length, said ribbon feed means comprising a one direction clutch, an oscillatable power assembly drivingly connected to said clutch for transmitting reciprocatory motion thereto, said power assembly including a control link, and means responsive to a print cycle of the printer for temporarily operating said control link to cause limited oscillation of said power assembly; a takeup reel; means carried by said frame for rotatably supporting said reel below and adjacent said ribbon-engaging means whereby said reel is positioned for receiving ribbon displaced thereby; and limited force power means for yieldably rotatably driving said reel; wherein the improvement comprises:

said takeup reel having a central core and a pair of spaced-apart side flanges extending radially outwardly therefrom; resilient, laterally yieldable surface means forming part of at least one of said flanges for establishing an effective spacing distance therebetween throughout a substantial radial region thereof that is effectively less than the width of the ribbon;

a manual control lever;

detent means for holding said manual control lever in any one of at least three positions;

a feed-operating lever controlled by said manual control lever when in a first position thereof for continuously operating said control link to cause continuous oscillation of said power assembly; and

brake means controlled by said manual control lever when in a second position thereof for positively restraining said reef from rotation by said limited force power means.