Sept. 17, 1968 A. S. GOODRICH, JR., ET AL 3,401,630

RECORD MATERIAL FEEDING MEANS

Filed Nov. 12, 1964 3 Sheets-Sheet 1

Fig. 1

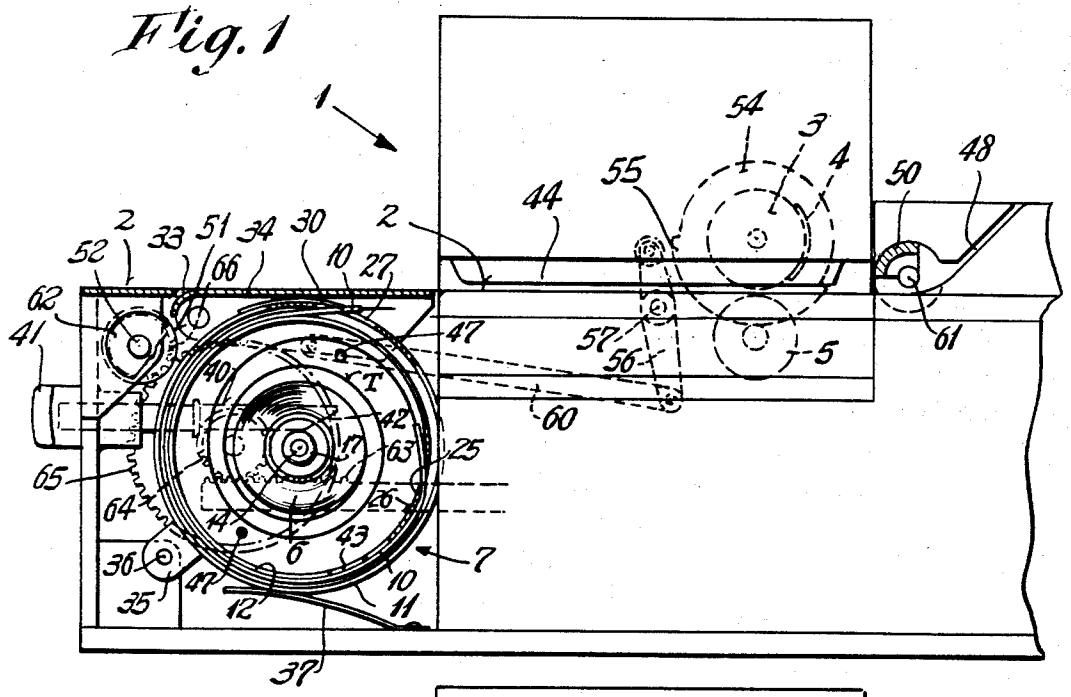

Fig. 2

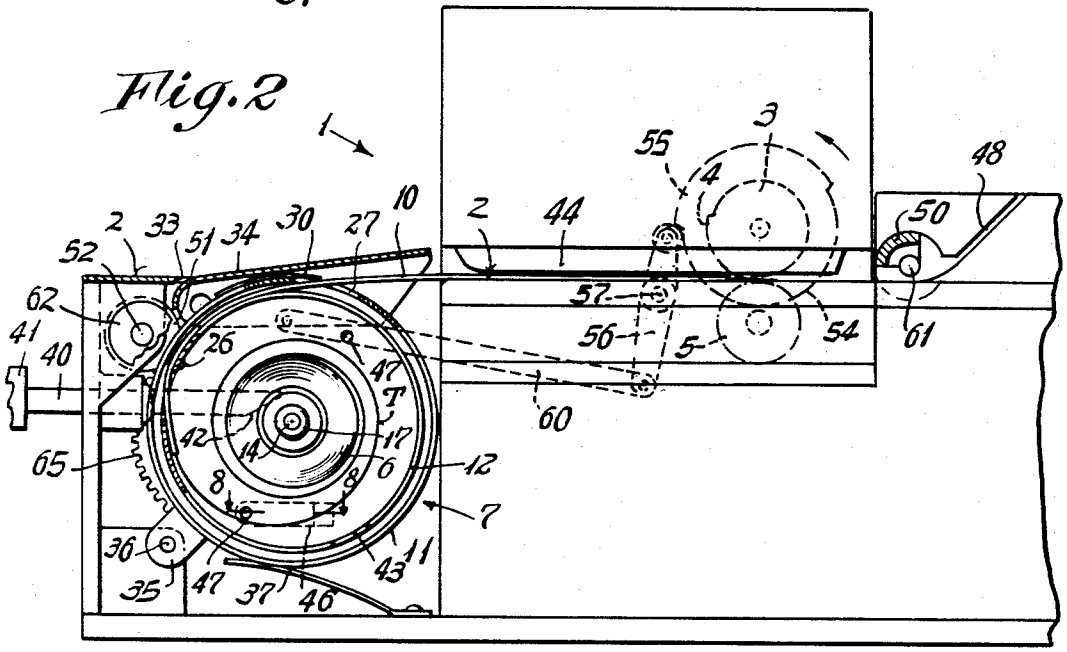

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Fig. 3

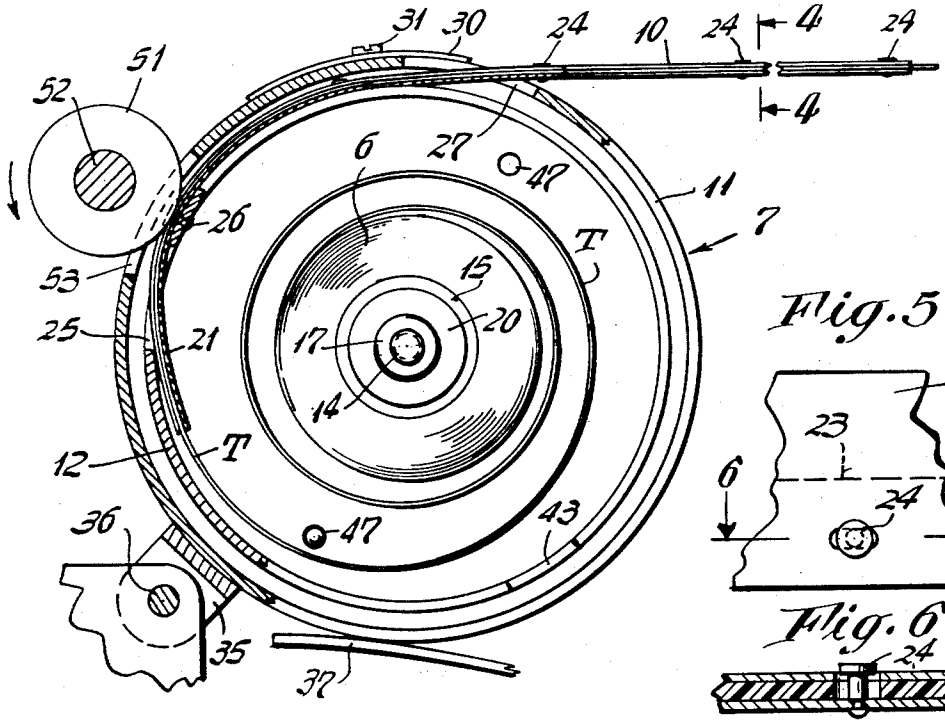

Fig. 5

Fig. 6

Fig. 4

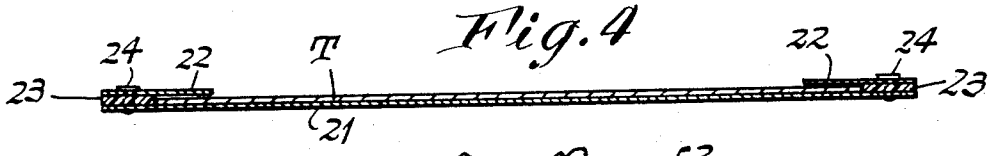

Fig. 11

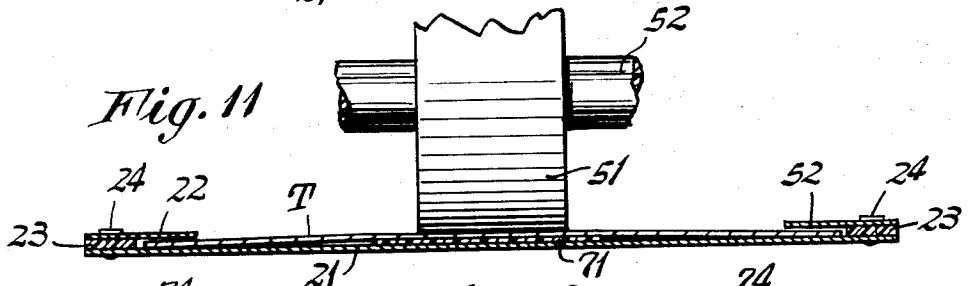

Fig. 12

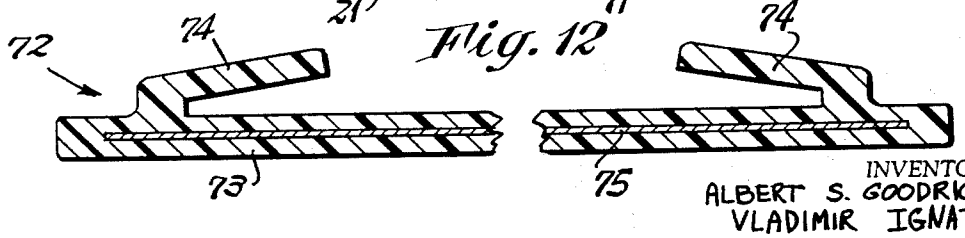

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Fig. 9

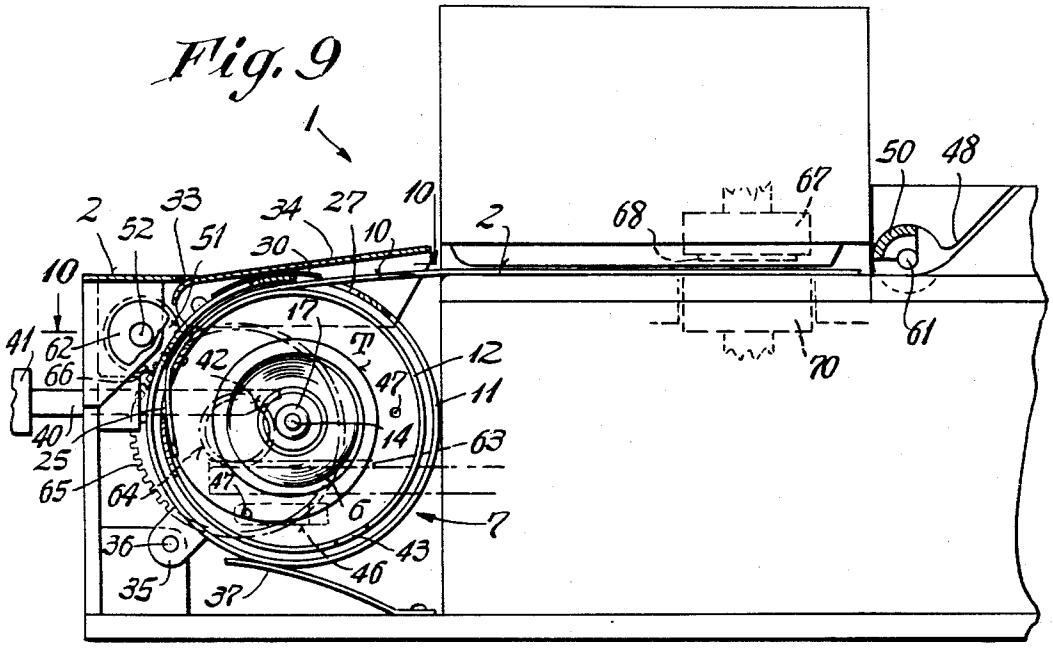


Fig. 10

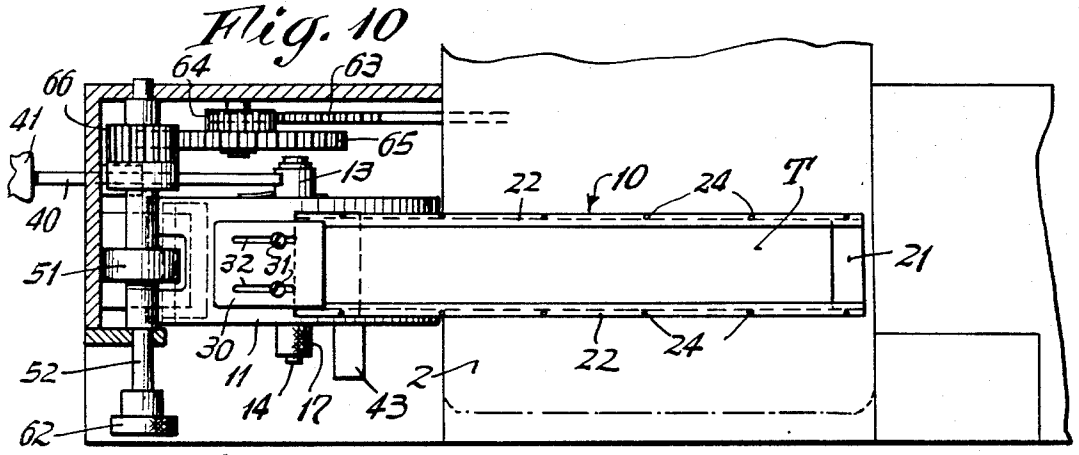


Fig. 7

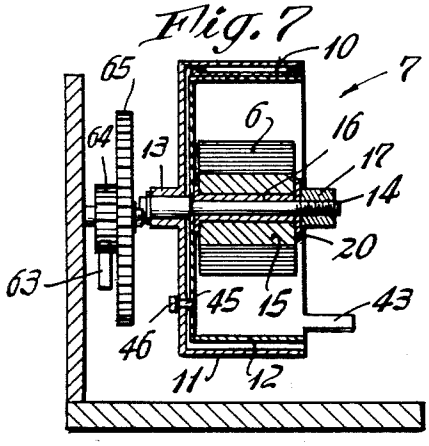
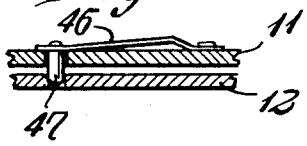


Fig. 8



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3,401,630

RECORD MATERIAL FEEDING MEANS

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Filed Nov. 12, 1964, Ser. No. 410,559
7 Claims. (Cl. 101—228)

ABSTRACT OF THE DISCLOSURE

Apparatus for feeding a strip of record material to a work station from a remote magazine wherein a guide track containing the strip of record material is fed from the magazine to the work station and the strip of material is advanced through the guide track. The magazine consists of two concentric cylindrical shells having apertures in the periphery thereof and the guide track is stored in the magazine between the concentric shells and the supply of record material is stored inside the inner shell so that the strip of material extends through the aperture of the inner shell and through the guide track to the work station.

The present invention pertains to mechanism for controlling the feeding and guiding of strip web material. More particularly, it relates to feeding and guiding tape such as is used as the record medium in imprinting machines.

In accordance with the features of the present invention, there is provided an elongated flexible track along which the tape is fed and which serves to constrain and guide the tape to move in the desired direction. When not in use, the flexible track can be retracted within a protective housing, which also serves as a container or magazine for a supply of the tape. For use, the track is extended from the housing to a station where the tape is to be acted upon as by being imprinted or otherwise. The imprinting operation can be performed on a portion of the tape projecting beyond the leading end of the track, or on the tape in the track, the track being open-sided whereby the tape is exposed. The tape is fed along the track by a feed element, such as friction roller, bearing against the tape in the track and serving to push it along the track. After the imprinted portion of the tape has been cut or torn off beyond the track's leading end, the tape can be fed backwardly along the track by operating the feed roller in the reverse direction. When not in use, the track and the tape carried therein are once again selectively returned to the protective housing.

In business machines which imprint or otherwise apply indicia to limp tape, it is often required that the tape be fed in opposite directions to and from a work station. Feeding such tape by pulling it from a point at or downstream of the station is customary, whereas feeding by pushing any significant length of the tape at an upstream point is difficult because of the limpness of the tape. Furthermore, it is often desired that when tape is not being used, all portions of its feeding mechanism be away from the printing station to allow another type of record medium, for example individual pieces or sheets, to be brought to the printing station for imprinting.

Heretofore, tape feeding mechanisms which meet these requirements have been relatively complicated.

The present invention, however, provides a novel and considerably simplified approach. As indicated above, a flexible track is provided for guiding the tape to and from the printing station. Since the tape is closely confined by the track, the limp tape can be fed in either direction by applying an appropriately directed feeding force thereto at a point well upstream of the tape's free end. Being flexible, the track can be moved easily from a storage

area to and from the work station. If the printing means is of the rotary type, the track can be moved to place its free end closely adjacent the printing rollers and the tape fed beyond the track for imprinting. If the printing means is of the reciprocatory type, the track can be moved to lie directly on the platen, and the printing operation performed directly on the tape lying in the track, either the printing head or the platen being movable to effect imprinting.

It is therefore a major object of the invention to provide a novel means for controlling the feeding of strip material such as tape.

It is a further object to provide a strip feeding means in which the strip is fed by pushing rather than pulling it.

It is a further object of the invention to provide a strip feeding mechanism in which the strip can easily be advanced to and retracted from a desired area of use by a single feeding element.

Another object is the provision of strip feeding mechanism which can be placed at and removed from a work station, as desired.

Another object is the provision of a selectively positionable flexible track for guiding the feeding movement of strip material.

A further object is the provision of such a flexible track which can be advanced from and retracted into a protective housing structure.

The above and other objects, advantages, and features of the invention will be readily apparent to those skilled in the art from the following detailed description of exemplary embodiments of the invention, when read in conjunction with the accompanying drawings, in which:

FIG. 1 is a side elevational view partially in section of a rotary imprinting machine in which the tape feeding mechanism of the invention can be incorporated, the track being retracted into its housing which is in lowered, ineffective position.

FIG. 2 is a similar view but with the housing raised and the track advanced from the housing to the printing station.

FIG. 3 is an enlarged front elevational view, partially in section, of the housing.

FIG. 4 is an enlarged cross-section of the track, taken on line 4—4 of FIG. 3.

FIG. 5 is an enlarged fragmentary top plan view of a portion of the track.

FIG. 6 is a longitudinal sectional view of the track taken on line 6—6 of FIG. 5.

FIG. 7 is a fragmentary left side elevational view, partially in section, of the housing and the drive train for the feed roller.

FIG. 8 is a section taken on line 8—8 of FIG. 2 showing the detent for the inner shell.

FIG. 9 is front elevational view similar to FIG. 2, showing a modified form of printing machine, namely a reciprocatory printer, in which the invention can be incorporated.

FIG. 10 is a top plan view, partially in section, taken on line 10—10 of FIG. 9.

FIG. 11 is a cross-sectional view similar to FIG. 4, of a modified form of track.

FIG. 12 is a cross-sectional view of a third form of track.

Referring now to the drawings, the reference numeral 1 designates generally a printing machine in which the present invention can be embodied. The machine includes a supporting deck 2 providing a guide surface leading to a printing station comprising a conventional rotary printing mechanism including a printing roller 3 having a printing die plate 4 affixed thereto, and a cooperable pressure roller 5 (FIGS. 1, 2).

A roll **6** of the tape T which is to receive imprinting impressions from the printing mechanism is contained in a magazine in the form of a housing **7** which also serves to house the track **10** in which the tape is confined and guided for longitudinal feeding movement. The housing comprises two concentric, closely spaced, telescoped, cylindrical shells **11**, **12**. The outer shell **11** has a rearwardly extending tubular hub portion **13** (FIG. 7) in which is rotatably journalled the rearward end portion of a shaft **14** on which the inner shell **12** is secured. Thus, the inner shell can be rotated relative to the outer shell, for selective advancement and retraction of the tape track **10** as will be described shortly. The tape roll **6** includes the usual core **15** which is loosely supported on a sleeve **16** mounted on shaft **14**. A nut **17** threaded on the right end of shaft **14** abuts a washer **20**. The latter holds sleeve **16** in place and also retains the tape roll **6** in position.

The track **10** in which the tape is confined and guided for longitudinal feeding movement will now be described. As best seen in FIGS. 3 and 4, the track comprises an elongated base strip **21** along whose opposite sides extend narrow strip portions **22** separated from the base strip by narrower spacer strips **23**. The tape T is held in the track by the portions of outer strips **22** which extend inwardly of spacers **23**, and the tape is exposed between inner facing edges of strips **22**. The base strip **21** and the outer strip portions **22** are made of thin resilient, smooth-surfaced material such as blue tempered spring steel. The spacers **23** may be made of any suitable material, such as the aforementioned spring steel, or any other suitable metal or plastic.

These three layers making up the track are secured together at spaced intervals by rivets **24** which pass loosely through the two upper layers **22**, **23**. To permit the track to have the desired transverse flexibility, the rivet holes in the spacer strips **23** and the outer strip portions **22** are elongated in the direction of the track length. This allows the three layers of the track to slide longitudinally relative to one another, whereby the track can readily be flexed transversely to its length and will not have the characteristics of a rigid beam. The track is of the cross-section shown in FIG. 4 throughout its length. It is open at its respective opposite ends, whereby the tape can enter the track at one end thereof and leave at the other end.

The inner end of the track is disposed within the inner housing shell **12**. From there, it extends through an opening **25** in the inner shell into the space between the two shells and along the outer surface of the inner shell, being fastened to the inner shell adjacent opening **25**, as by rivets **26**. The track passes outwardly of the housing through an opening **27** in outer shell **11**, resiliently pressing against the end of a plate **30** (FIGS. 3, 10) which extends partially across opening **27**. Plate **30** is adjustable angularly by virtue of its screw and slot connection **31**, **32** with the outer shell. The tape T extends from roll **6** thereof through the inner end of the track and along the base strip **21**, being held on the track by the inwardly extending narrow strip portions **22**.

When the track is not in use, it is retracted into housing **7** by rotating inner shell **12** counterclockwise to the position shown in FIG. 1. Most of the track length then lies between the inner and outer shells **11**, **12**. Since the track is resiliently flexible, it can without difficulty assume the curved position shown in the narrow space between the two shells.

At this juncture, it should be noted that the entire housing is rockable between a lowered position (FIG. 1) to a raised effective position (FIGS. 2, 9, 10) through an opening **33** in the work deck **2**. A pivoted door **34** is biased downwardly by gravity or any suitable spring means to cover opening **33** flush with the adjacent portion of the work deck.

Two rearwardly extending lugs **35** at the bottom of housing **7** support it for rocking movement about a shaft **36**. A leaf spring **37** acting on the under side of the housing biases it upwardly. The housing is adapted to be blocked in its lowered position by a horizontally movable control finger **40** whose under edge lies in the path of movement of hub **13** of the outer shell **11** when the control finger is to the right. To release the housing for upward movement to raised effective position, a knob **41** attached to finger **40** is pulled toward the left (FIGS. 2, 9), releasing the housing for upward movement under the urge of spring **37**. To return the housing to its lowered ineffective position, control knob **41** is pushed in, whereby the forward sloping cam edge **42** of finger **40** will engage hub **13** and cam the housing down to retracted position below work deck **2** where it is held by the lower horizontal edge of the finger.

After housing **7** has been partially raised to lift door **34** partly open, inner shell **12** is rotated clockwise to advance track **10** from the housing. This rotational movement of the inner shell can be effected by any suitable power or manual means. For example, a manually engageable finger piece **43** extending laterally from the inner shell can be provided for this purpose.

As the inner shell is rotated, it will push track **10** secured to it out of the housing through opening **33**. The track is directed by plate **30** to an elongated slot or throat defined between work deck **2** and a closely spaced overlying member **44**.

In the machine of FIGS. 1 and 2 having rotary printing means, the track is advanced as described above to a point just short of the nip of the cooperating printing rollers **3**, **5** (see FIG. 2). As the track is advanced from the later retracted back into the housing, there is no relative longitudinal movement between the tape and track. The tape has a substantial amount of slack between the inner end of the track and roll **6**, and the small frictional forces between the track and tape are sufficient to carry the tape along with the track when the latter is moved.

The inner shell is releasably held in its clockwise (track-advanced) and counterclockwise (track-retracted) positions by a pin **45** (FIG. 8) mounted on and urged inwardly by a spring **46** secured to outer shell **11** through an opening in the latter into one or the other of two appropriately positioned holes **47** in the side face of inner shell **12**.

After the track has been advanced to the printing station, the tape therein is fed along the track to lie in the nip of the printing rollers. Then, when the latter are operated in a printing cycle, the tape will be imprinted and will also be driven by the rollers toward the right to pass into a discharge chute **48**. A rotary cut-off knife **50** will subsequently sever the imprinted portion of the tape, which protrudes through the upper end of the discharge chute whence can be removed.

The feeding of the tape relative to track **10** is effected by a resilient rubber or the like feed roller **51** secured on a shaft **52**. Feed roller **51** is so positioned that when housing **7** is in raised effective position, the roller extends through an opening **53** in outer shell **11** and firmly presses against the tape in the underlying portion of track **10**, the track itself being pressed by the roller against inner shell **12**. Roller **51** will not contact the tape until housing **7** is fully raised. In this regard, it will be recalled from the previous description that the housing is only partially raised when inner shell **12** is rotated clockwise to project the track for use. This is so that when the track is advanced, the tape will be carried with it without roller **51** engaging and thus holding the tape back and thereby causing relative movement between the two.

The roller shaft **52** is driven counterclockwise to feed the tape forwardly relative to the track, and is driven in the reverse direction for return movement of the tape. After the tape has been fed along the track to lie between the cooperating printing rollers **3**, **5** the latter are operated under control of any suitable mechanism to cause roller **3** carrying the printing die plate **4** to go through

one full revolution, during which die plate **4** will print on the tape and also feed it to the right.

During the portion of the printing cycle when die plate **4** engages the tape, housing **7** is rocked a short distance clockwise to remove the tape from contact with feed roller **51** and thereby free the tape for longitudinal movement caused by the printing rollers, between which the tape is gripped during printing. This movement of the housing is effected by a cam **54** mounted for rotation with die roller **3**. The cam includes a lobe **55** shaped so that just before die plate **4** contacts the tape, it will rock a lever **56** pivoted intermediate its ends at **57** counterclockwise which, through a link connection **60** to the outer housing shell **11** will swing the entire housing **7** down a short distance away from feed roller **51**. The housing will be held in this position by cam lobe **55** until the die plate has rotated past the tape, and therefore is no longer feeding the tape rightwardly. Housing **7** is now restored upwardly by spring **37** so that feed roller **51** is again in effective driving contact with the tape in the track.

After the imprinting operation, the feed roller **51** is once again operated in counterclockwise direction to feed the imprinted portion of the tape into the discharge chute **47**, and the rotary cutter **50** is operated by rocking its shaft **61** counterclockwise to sever the imprinted tape. Thereafter, the feed roller is operated in the reverse (clockwise direction) to feed the tape backward to a point where its free end again lies in the nip of the printing rollers in position for a subsequent imprinting operation.

When the tape feeding mechanism is not being used, the housing can be partially lowered, the track retracted back into it, and the housing rocked clockwise fully down shaft **36** back to its lowered position of FIG. 1. In this movement it will be followed downwardly by door **34** until the latter lies flush with the work deck **2**.

The particular means used for driving the feed roller shaft **52** is not important to the present invention. This can be done either manually by rotating a hand wheel **62** secured to the shaft, or by any suitable drive train from the motor of the machine. A portion of such a drive train is shown in the drawings. It includes a rack **63** meshed with a small pinion **64** which is rigid with a larger pinion gear **65**. The latter drives a pinion **66** rigidly mounted on the feed roller shaft **52**. By any suitable arrangement, rack **63** can be driven appropriate amounts and in the appropriate direction to cause the desired rotation of the feed roller.

Substantially the same tape feeding mechanism is shown in FIGS. 9 and 10 embodied in a machine having a reciprocatory rather than a rotary printing mechanism. Here, printing is effected by a vertically reciprocatory printing head **67**, carrying a printing die plate **68**, and cooperable with a stationary platen **70**. Alternatively, the platen could be moved vertically and the printing head stationary.

In the reciprocatory printing machine of FIGS. 9 and 10, when the track **10** is fully advanced or projected from housing **7** for use, it overlies platen **70** and its free right-hand end is closely adjacent to the cut-off knife **50**. The printing operation is actually performed on the tape lying in the track. That is to say, when the printing head **67** descends for the printing stroke it will carry die plate **68** into printing contact with the underlying tape disposed in track **10** which is resting on platen **70**.

If the printing head is stationary and the platen the vertically movable element, when the platen rises in the printing stroke it will push up the track containing the tape to press the tape against die plate **68**. Because of its resilient flexibility, the portion of the track on deck **2** can readily be carried upwardly by the platen even though the remainder of the track is held down by the housing.

In any event, after the tape in the track has been imprinted, feed roller **51** is operated in counterclockwise direction to advance the tape into the discharge chute to be severed by the cut-off knife **50**. The feed roller is then operated in the reverse direction to return the free end of the tape in the track leftwardly to lie just ahead of die plate **68** in position for the next printing operation (FIG. 10).

As in the rotary printing machine of FIGS. 1 and 2, in the FIGS. 9–10 reciprocatory printer, when the track is not in use it can be retracted into the housing by rotating inner shell **12** counterclockwise and the housing lowered beneath work deck **2**. It will be understood that in the reciprocatory printing machine of FIGS. 9–10, the cam **54** and associated lever **56** and link **60** are omitted, since the feeding of the tape is solely under the control of the feed roller **51**.

The feature whereby the housing when not in use is lowered beneath work deck **2** and the opening **33** in the latter covered flush by door **34**, is particularly useful if it is desired to use the machine for imprinting individual workpieces as well as tape. The work deck then presents a substantially continuous flat surface along which the individual workpieces can be moved to either the rotary or reciprocatory printing mechanism, without any obstructions on which the individual documents might be caught or deflected. When individual workpieces are to be imprinted, the track can either be retracted into the housing or left in place in projected position. In the latter case, the individual workpieces are fed to the printing station over the track and, in fact, can even be imprinted while resting on the track in the reciprocatory type of printing machine. Door **34** can be omitted if necessary, if the track is to be left in projected position when individual workpieces are being fed.

FIG. 11 shows a modified form of the track, which includes a strip or pad **71** of very low-friction material such as "Teflon" (polytetrafluoroethylene) secured to the upper surface of base strip **21** and positioned to underlie feed roller **51** when track **10** is in its fully advanced position projected from housing **7**. It has been found that when tapes having higher friction coefficients are used, the inclusion of pad **71** will facilitate the feeding of the tape along the track by roller **51**.

If it should be difficult to feed tapes made of any particular material having a high coefficient of friction, another alternative which can be used is to coat the tape-contacting portions of the track with very smooth material such as the aforementioned "Teflon." For example, referring to the FIG. 4 form of track, the upper surface of base strip **21** could be so coated. The tape-contacting portions of strips **22** and **23** could also be so coated, if found necessary.

FIG. 12 shows another form of track. Here, the track comprises an integral molded or extruded plastic body **72** comprising a base portion **73** and overhanging lip portions **74**. The material of which the body **72** is made can be any suitable synthetic resin having a low coefficient of friction e.g. polyethylene, polytetrafluoroethylene, etc. Since many such materials have a tendency to take on a permanent set when coiled, as they would be when retracted into housing **7**, the track of FIG. 12 preferably includes a resilient spring steel insert strip **75** running the full length of the strip and around which the body **72** is formed. Thus, even though the plastic track body **72** may lose its transverse resiliency to some degree, the composite track will remain springy because of insert **75**. This prevents the track from becoming limp and therefore difficult to control.

It will be seen from the foregoing description of various forms of the invention and environments in which it can be used, that it provides a novel and efficient approach to feeding record material such as paper strips or the like. When not in use, the track can be stored at a substantial distance from the work station where the tape strip is to be operated on. For use, the track can be advanced to the work station. The tape, which is confined in and guided for feeding movement by the track, can readily be fed in either direction along the track by suitable means,

such as feed roller 51, located a substantial distance ahead of the work station. Thus, as contracted with prior art tape feeding arrangements, the present invention provides substantial flexibility as to where the tape feeding mechanism can be located relative to the work station. The present invention also is considerably simpler than prior art devices. It is therefore more economical and less likely to require servicing.

If desired, the tape feed mechanism of the present invention can be incorporated in a postage meter which prints on letters as well as tape. The present mechanism would be used as the tape feeding mechanism, and additional letter feed means provided, the latter being well known in the art.

It will be apparent that the present invention and its various features can be applied in numerous embodiments and in many different types of machines, other than those described herein. It is therefore intended that the foregoing disclosure of specific embodiments of the invention be illustrative only and not in any way limitative of the following claims.

We claim:

1. In a record material feeding mechanism:
a track for guiding the feeding movement of record materials;
a housing for said track and for record material;
said housing including an enclosed outer wall and an enclosed inner wall within said outer wall defining a space for the storage of said track between said walls and a space for record material within the inner wall;
means for allowing said track to be retracted into and advanced from the space between said walls;
said track being retractable into and advanceable from the space between said walls;
control means for selectively advancing and retracting at least a portion of said track into and out of said housing;
means for supporting a supply of record material within said inner wall;
and means for allowing the passage of the record material into said track.

2. In a record material feeding mechanism:
a track for guiding the feeding movement of record materials;
a housing for said track and for record material;
said housing comprising an enclosed outer wall and an enclosed inner wall within said outer wall defining a space for the storage of said track between said walls and a space for record material within the inner wall;
one end of said track being attached to the inner wall and the other end extending through the outer wall;
the inner wall being movable relative to the outer wall, whereby movement in one direction will cause said track to advance from the housing and in another direction will cause said track to retract into the housing;
and means for allowing the passage of record material into said track.

3. In a record material feeding mechanism:
a track for guiding the feeding movement of record materials;
a housing for said track and for record material;
said housing comprising an outer wall and a concentric inner wall within said outer wall defining a space for the storage of said track between said walls and a space for record material within the inner wall;
said track being attached to the inner wall and extending through the outer wall;
the inner wall being movable relative to the outer wall such that relative movement thereof in one direction will cause said track to advance from the housing and in another direction will cause said track to retract into the housing;
and means for allowing the passage of record material into said track.

4. Apparatus for intermittently feeding a strip of record material from a supply roll to a work station including a magazine positioned remote to the work station comprising:
a cylindrical outer shell having an opening in the periphery thereof,
a cylindrical inner shell concentric with the outer shell and spaced therefrom and having an opening in the periphery thereof,
an elongated guide track between the inner shell and the outer shell and having one end secured to the inner shell adjacent to the opening therein and the outer end extending out the opening in the outer shell,
and means within the inner shell to support a roll of strip material with a portion extended through the guide track,
the guide track being sufficiently flexible to be coiled around the inner shell and sufficiently rigid in a longitudinal direction to be advanced towards the work station, without buckling,
means to rotate the inner shell without rotating the outer shell to advance the guide track through the opening in the outer shell towards the work station and to withdraw the guide track from the work station into the space betwen the inner and outer shells,
and means to advance and retract strip material in the guide track.

5. The apparatus of claim 4 wherein the guide track is formed of a flat elongated base with spaced flanges overlying the edge portions of the base whereby a strip of record material passing through the guide track is directed between the flanges and the base.

6. The apparatus of claim 4 further including guide means to direct the guide track to the work station as it is advanced from the magazine.

7. In a business machine of the type wherein a strip of record material is intermittently positioned at a work station to receive printed indicia or the like and a portion thereof is advanced from the work station to be severed from the strip, apparatus to feed the record material to the work station and to position the record material at the work station including:
a cylindrical housing comprising an inner and outer shell concentrically mounted with a space between the shells, and opening in each shell and means to support a supply roll of record material in the inner shell, the inner shell being rotatable and the outer shell being held in a fixed position,
a flexible guide track secured at one end to the inner shell adjacent to the opening therein and coiled around the inner shell in the space between the inner and outer shells with the free end extending out of the opening in the outer shell;
means to rotate the inner shell to advance and retract the guide track through the opening in the outer shell;
guide means positioned to direct the free end of the track to a point adjacent to the work station, and
means to advance strip material in the guide track forward into and through the work station and to retract the strip material into the guide track.

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