

July 14, 1942.

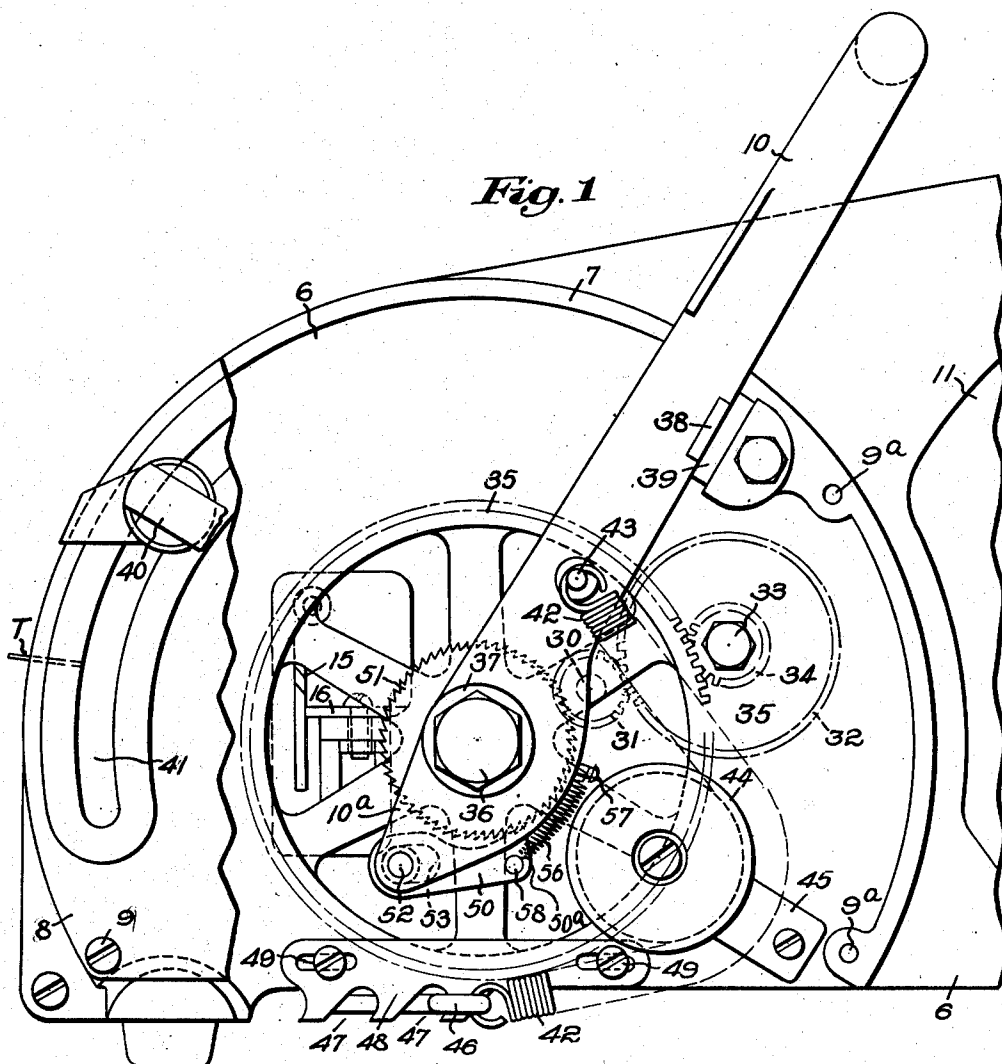
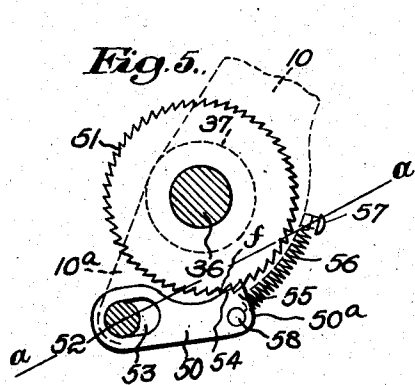
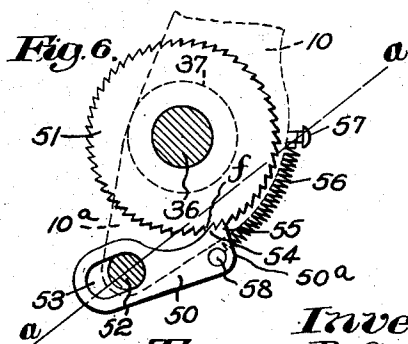
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2,290,041

FEED MECHANISM FOR STRIP SERVERS AND THE LIKE

Filed Dec. 13, 1941

2 Sheets-Sheet 1



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FEED MECHANISM FOR STRIP SERVERS AND THE LIKE

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2 Sheets-Sheet 2

Fig. 2

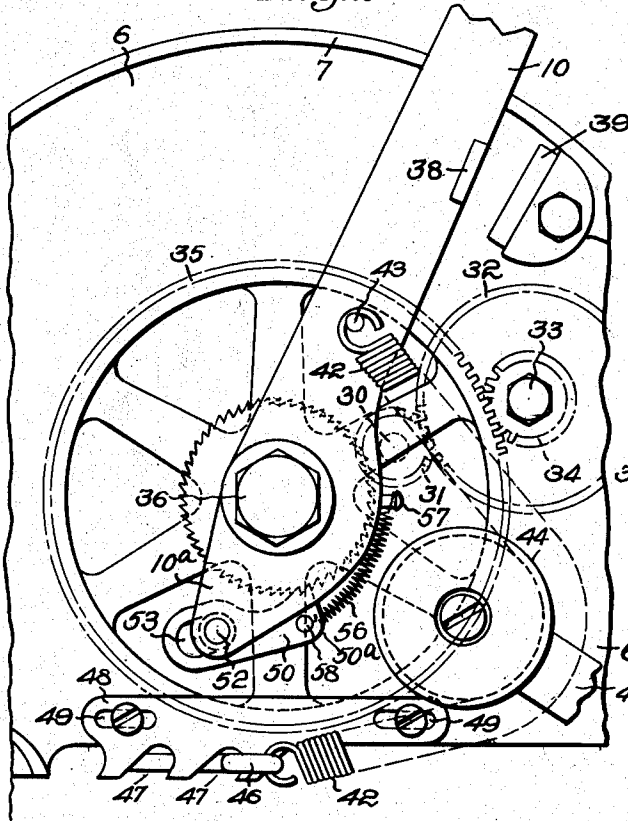


Fig. 3

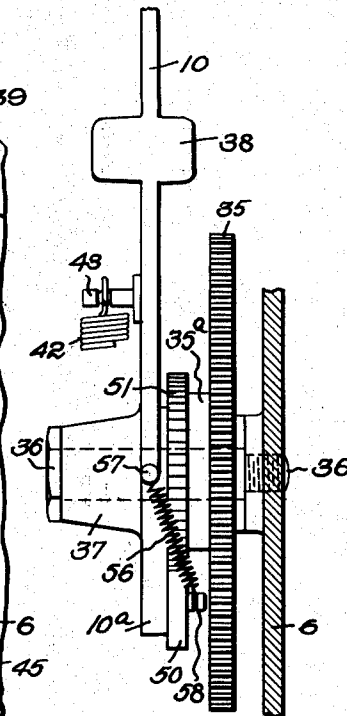
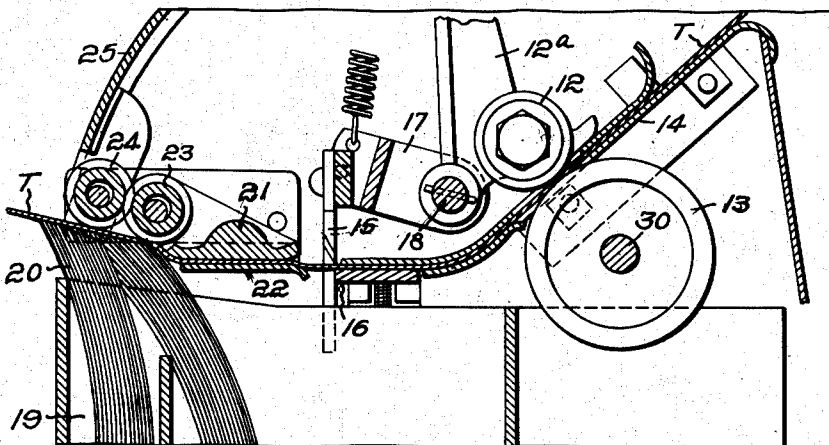


Fig. 4



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UNITED STATES PATENT OFFICE

2,290,041

FEED MECHANISM FOR STRIP SERVERS
AND THE LIKETrevor R. Gautier, Nashua, N. H., assignor to
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Application December 13, 1941, Serial No. 422,850

10 Claims. (Cl. 164—49)

My present invention pertains to machines and apparatus for feeding and delivering flexible webs and strips, being particularly useful in connection with machines for dispensing lengths of adhesively conditioned strip and tape material as represented for example in my Patents Nos. 1,540,724, 1,568,506, 2,082,733, 2,099,647, Des. 111,568 and 2,192,132 and in my herewith co-pending application Serial No. 320,301, the latter a division of said Patent No. 2,192,132. The invention especially aims to simplify and otherwise improve the feeding mechanism for machines and apparatus of the class described.

In the accompanying drawings of one exemplary embodiment of the invention:

Fig. 1 is a left side elevation of a forward portion of a strip server or tape dispenser, with the operating lever in its normal rear or rest position, part of the side cover plate being broken away to expose underlying parts;

Fig. 2 similarly shows a portion of the mechanism of Fig. 1, but with the operating lever at an initial stage of a feeding movement;

Fig. 3 is a front elevational view of the drive mechanism associated with the operating lever;

Fig. 4 is a partial vertical section lengthwise and substantially centrally of the machine; and

Figs. 5 and 6 are detail views of elements of the drive mechanism of the invention, positioned to correspond to the operating lever positions of Figs. 1 and 2 respectively.

The tape dispenser or strip server selected for the purposes of illustration comprises a main frame or housing including spaced side frames, one of which is seen at 6 in Figs. 1 and 2. It has a laterally projecting flange 7 of arcuate contour, defining at the outer face of this side frame a compartment in which several elements of the feed drive mechanism are accessibly housed. This compartment is further defined by a side cover plate 8, largely broken away in Figs. 1 and 2, demountably held in place as by screws or the like, one of which is seen at 9 at the lower left corner of Fig. 1, threaded apertures for two others being indicated at 9a, 9a. This side plate 8 has at its inner face a peripheral flange complementary to the flange 7 on the side frame and longitudinally slotted along its upper and forward portion to provide a path for the manual operating or feed lever 10.

The tape or like strip material T, Fig. 4, is conducted from a supply, generally a roll, supported as in a well 11, Fig. 1, on the machine housing. Lengths of the tape from such supply are advanced and guided along a path to the de-

livery station adjacent the front of the machine, at the left in Fig. 1. Referring to Fig. 4, such movement of the tape is herein effected by upper and lower rotary feed members, wheels or rolls 12, 13 engageable with its opposite faces, the tape being guided as through a throat 14 suitably apertured to give said feed members access to the tape.

The advancing tape is further guided to and past a severing device here comprising a vertically movable shear blade or knife 15 cooperable with a fixed blade 16 across which the tape passes. The movable blade 16 is mounted on a carrier 17 pivotally supported by a cross shaft 18. The latter serves also as the pivot for a lever 12a by which the upper feed roll 12 is yieldably presented in tape-feeding relation to the lower roll 13. Beyond the cutting mechanism the tape is conducted, gummed face down, to and past suitable moistening means, Fig. 4, represented as of the capillary type comprising a reservoir 19 supplying liquid to an inverted brush moistener 20 engageable with the under face of the tape. Between the cutter and the moistener the tape is guided by upper and lower guides 21, 22 and thence across the moistener, beneath one or more presser rolls 23, 24. The machine as a whole is preferably closed at the top, as by means of a cover plate, hinged or otherwise positioned on and between the side frames, a lower front portion of such cover plate being seen at 25 in Fig. 4.

At least one of the pair of feed wheels or rolls 12, 13, herein the lower member 13, is driven through connections with the operating lever 10. This driven feed roll 13 is fast on a shaft 30 journaled in the machine housing, as appears in section in Fig. 4 and in dotted line in Figs. 1 and 2. It has fast on it a pinion 31 forming part of a gear train between the operating lever 10 and the feed roll 13. This drive gearing further comprises an intermediate gear 32 rotatably supported by a stud shaft 33 and meshing with said pinion 31. Said shaft 33 also carries a pinion 34 coaxial with and angularly fixed relative to the intermediate gear 32 and itself meshing with a relatively large ring gear 35.

The ring gear 35 and said pinion 34 to be driven by it are located in the gear compartment previously mentioned, the ring gear being supported to rotate freely on a stud shaft 36 on the adjacent side frame 6; see Fig. 3. The operating lever 10 has formed at its lower portion a bearing collar or hub 37 by which it is

supported for rocking movement about this same stud shaft 36 as an axis.

The operating lever 10 reciprocates lengthwise the machine, pivoting on said shaft 36, moving forwardly from its normal rear or rest position of Fig. 1 to advance the tape and subsequently returning reversely. It is provided with a stop 38 adapted to abut a cushioning buffer or back stop 39 fixed on the machine at the appropriate location to limit the return movement of the lever and to define its rear or rest position. Said lever-carried stop 38 or an oppositely projecting portion of it, see Fig. 3, serves also to limit the forward feeding movement of the lever, as by engagement with a forward stop 40 variably positionable along an arcuate slot 41 in the side plate 8.

At the end of a forward feeding movement the lever 10, upon release by the operator, is automatically returned by spring means to its rear or rest position of Fig. 1. Such means as illustrated comprises a coil spring 42 attached at one end to the operating lever as by a laterally projecting pin 43 thereon. It passes around a grooved roller 44 on a bracket 45 and has its other end connected to a movable hook 46 extending transversely of the machine frame and engageable selectively in one or another of a plurality of downwardly opening notches 47 in an anchor block 48 adjustably secured to the side frame as by the screw and slot connections 49. The tension of the return spring 42 is thus variably controllable and the bowing of the spring around the roller 44 affords it a compound or differential action tending to equalize its tensioning throughout the feed lever travel, as in my said copending application Serial No. 320,301.

In accordance with the invention simplified and otherwise improved one-way drive mechanism is provided in association with the gearing between the operating lever 10 and the rotary feed means 12, 13. Said mechanism as illustrated is operatively disposed between the operating lever 10 and the initial element of the gear train, herein the ring gear 35, and during active forward movement of the lever positively connects the latter so as to advance the tape, while during return of the lever the feed means including the rolls or wheels 12, 13 and associated gearing remain at rest. Further, a comparatively short inactive or non-feeding movement is afforded the lever, in the forward direction.

Referring now to Figs. 1 to 3, particularly Fig. 3, this mechanism comprises ratchet means herein having but two main cooperative parts or elements, namely, a pawl 50 and a toothed ratchet disk or wheel 51. One or the other of these parts is connected to the operating lever and the cooperating one to the ring gear. In the example shown the ratchet disk 51 is fixed to the ring gear 35, coaxially on its hub 35a, while the pawl 50 is associated with the operating lever 10.

The location of the pawl 50 on the operating lever 10 may be at any convenient point circumferentially of the ring gear and if desired a plurality of similar pawls may be provided. As illustrated the pawl 50 is carried on a depending lever portion or arm 10a angularly spaced from the upper portion of the lever 10, herein substantially at the opposite side of the lever pivot or shaft 36, thus giving maximum leverage and operating ease for the feeding mechanism as a whole.

The pawl-carrying element, herein the lever 10, and the pawl are operatively connected by means providing for a compound relative movement between them. Such connecting means as shown comprises a laterally projecting pivotal supporting element 52 and a cooperable receiving element or bearing formation 53, either of said elements being on the lever and the other on the pawl. In this instance the pivot element is on the lever, in the form of a boss or pin 52, while the receiving element or bearing formation 53 is on the pawl.

Said elements 52, 53 are cooperatively constructed and arranged to afford the pawl a pivoting or rocking movement relative to the lever, to and from driving engagement with the ratchet disk, and also to make provision for a predetermined and comparatively short inactive shifting movement between the lever and pawl.

The receiving element 53 accordingly is of rounded-end slot-like form, giving it the character of a cam slot as well as a bearing formation, the pawl-connecting and supporting element 52 being therein pivotally and slidably received somewhat in the manner of a cam follower. Said element 52 is represented as a cylindrical boss or pin and may carry a rotary collar, roller or the like for reception in the slot 53. The latter is non-radial and eccentric with respect to the lever axis 36, so that the relative movement between the lever and pawl has both an angular and also a radial component, with respect to the axis of the ratchet disk and of the lever.

At a portion of the pawl spaced from the described sliding pivot connection, the pawl has a nose 50a formed with one or more teeth 54, 55, best seen in Figs. 5 and 6, for positive engagement with the teeth of the ratchet disk 51.

As stated, the pawl is presented and maintained in operative relation angularly and radially with respect to the ratchet disk 51, with capacity for the described compound relative movement. It is also held and guided in proper alignment with the ratchet disk, in the axial direction, that is, laterally of the ratchet disk. This latter function is of particular importance since if the pawl and ratchet should frequently engage at only a portion of the widths of their respective teeth, undue wear would result. Such lateral guiding may be effected by various means including guides, plates, ways or the like on either or both the pawl and the ratchet. But in the interest of mechanical simplicity and reduction in the number of parts, the triple function of angular, radial and also lateral positioning and guiding of the pawl is herein commonly afforded by a single control or positioning element 56, best seen in Fig. 3 and appearing also in Figs. 1 and 2.

Said positioning control element 56 as illustrated comprises a coil spring attached at one end to the lever 10 as by means of a pin 57 and having its other end attached to a button, pin or the like 58 projecting laterally from the pawl at its rear or toothed nose end 50a and spaced laterally from the lever. Thus the two ends of the spring are disposed in different vertical planes. Accordingly, as clearly seen in Fig. 3, it has a guiding and lateral biasing action on the pawl, keeping it in flat abutting and guided contact at its inner side face with the adjacent face of the lever portion 10a. The lever and the ratchet disk 51 are so relatively disposed that in said guided position of the pawl, the

ratchet disk and the pawl are in the correct lateral alignment, with proper full-width tooth-engagement between them.

Fig. 1 and correspondingly Fig. 5 show the lever and ratchet elements of the feeding mechanism in their inactive or non-feeding relation, while Fig. 2 and the corresponding Fig. 6 illustrate their active or feeding status. The pawl spring 56 is constructed and arranged so that it is under some tension when the parts are positioned as in Fig. 5, that is, with the pivotal pawl-connecting element 52 at the forward or left-hand end of the slot formation 53 of the pawl 50. Consequently the spring urges the pawl toward and tends to hold it in said rearward position, with the forward or left-hand portion of its slot 53 adjacent or in abutting contact with the pivotal connecting member 52 on the lever. Thus, with reference to the lever axis 36 as a center, the pawl spring 56 has an angular or circumferential positioning action on the pawl.

As best seen in Figs. 5 and 6 the spring anchorage point 58 on the pawl nose 50a is offset, in a direction radially of the lever and ratchet disk axis 36, so as to stand outside the straight line *a-a* through the center of the pivotal connector 52 and the point 57 at which the other end of this spring 56 is affixed to the lever 10. The spring being under tension, as explained, tends also to urge the toothed nose 50a of the pawl radially inwardly toward the toothed periphery of the ratchet disk 51, under a toggle-like action. In shifting from the inactive Fig. 5 to the active Fig. 6 position the pawl spring 56 is extended and hence further tensioned. Hence the described radial force component on the pawl is somewhat increased rather than otherwise, despite the fact that in said movement from the inactive to the active status the spring anchor point 58 on the pawl nose approaches the straight line *a-a* referred to, bringing the pawl and spring more nearly into that line and in that respect tending to slack the spring.

It will also be observed that in the inactive or rest position of Fig. 5 the rear or end tooth 55 of the pawl is substantially disengaged from the ratchet disk, fully so as illustrated. The adjacent tooth 54 also is not fully seated, but does have its radial face in line with or in partial abutting contact with the corresponding face of a tooth of the ratchet disk 51. This relative position of pawl and ratchet is maintained by the combined radial and angular or circumferential components of the pawl spring 56.

Assume now that a length of the tape T is to be advanced, and that the lever is in its normal inactive or rest position of Figs. 1 and 5. Forward movement of the upper handle portion of the lever, counterclockwise, toward the left in the figures, moves the pawl pivot connection 52, at the lower portion 10a of the lever, counterclockwise but toward the right. During a first portion of this lever movement, represented by the angular difference in position of the lever in Figs. 1 and 2 and correspondingly in Figs. 5 and 6, the lever and the pawl pivot connection 52 move relatively to the pawl, said pivot connection shifting in the slot formation 53 away from the forward end thereof as in Fig. 5 to its opposite end as in Fig. 6.

During this relative movement, the ratchet disk 51 and consequently the entire feed mechanism including the feed rolls 12, 13 remain at

rest. Due to the mentioned eccentric and cam-like nature of the slot formation 53, the stated movement has a positive rocking action on the pawl, tilting its forward or slot-formation end radially outward and its rear or nose end 58 radially inward, effecting full seated engagement of both its teeth 54 and 55.

The center point or fulcrum for this rocking pawl-seating action is at the flat or circumferential face of the inner pawl tooth 54, where the latter contacts the opposite tooth of the ratchet disk 51, substantially at the point indicated by the letter *f* in Figs. 5 and 6. This rocking action, while guided and assisted by the spring 56, is of a definite and positive character by reason of the described combined pivot and cam connection 52, 53 between the lever and the pawl. The end-most tooth 55 in effect swings pivotally down into the opposite notch or interdental space of the ratchet disk, rocking about the point *f* as a center. Hence in the active feed-effecting position of the parts as in Fig. 6, the pawl is insured an accurate and full seating engagement with the ratchet disk 51 with respect to both pawl teeth 54 and 55.

It will be understood that further forward movement of the operating lever 10, beyond the position of Figs. 2 and 6, acts to turn the ratchet disk 51 counterclockwise and hence to drive the feed means through the described gear train thereby to advance a length of the tape T.

On its subsequent release by the operator, the lever 10 is restored to its rear position of Fig. 1 by its return spring 42. During a brief initial part of any such return movement a reverse action from that just described occurs, as between the lever, the pawl and the ratchet disk. The ratchet nose rocks radially outward about the point *f*, the pawl as a whole being held lengthwise and in contact with the ratchet disk by the spring 56 and the cam-follower and pivotal connector 52 on the lever is shifted from the inner or rear end of the cam-like slot connection 53, Fig. 6, again to the opposite end thereof, Fig. 5. During the remaining major portion of the lever return the pawl 50 is drawn bodily around on the ratchet disk 51. The latter remains at rest, the lever-connected pawl spring 56 then traveling angularly with the lever and pawl about the lever axis 36. In this return movement contact between the pawl and the ratchet disk occurs only or mainly at the relatively flat circumferential face of the intermediate tooth 54, and at this time the spring 56 is in its comparatively slightly tensioned condition of Fig. 5. Hence the friction between the pawl and disk is but slight and wear of the parts is reduced to a minimum.

It will further be understood that the described inactive or non-feeding movement of the lever, through the relatively short angular distance as represented by the difference in positioning in Figs. 2 and 6 as compared with that of Figs. 1 and 5, takes place at the start of any forward movement of the lever following a previous return movement thereof. That is, it is not necessary to this end that the lever is started forward from its full rearward or normal rest position of Fig. 1. On completing a full or a partial forward lever stroke, the operator may permit the lever to return but part way, to any intermediate point, and he may then immediately again advance it, to any desired extent to increase the length of tape dispensed. The rapid automatic resetting of the ratchet mechanism facilitates such repeat-feed operation, the lever being advanced as many

times as desired before final release. The brief period of non-feeding forward lever movement occurs at the start of any advance stroke, whether from a full or a part-turned position of the lever.

This brief inactive or non-feeding advancing movement of the lever may be variously availed of to substantial advantage. It may provide for preparation or conditioning of the cutter mechanism, such for example as to insure that any movable blade is clear of the path of the tape, avoiding possible jamming. Also of importance is the neutralizing of otherwise possibly objectionable rebound effect at the full return of the operating lever. Such rebound tendency, particularly in a machine as illustrated, may be comparatively slight. Yet however slight or infrequent, its occurrence is likely to cause some over-running of the feed mechanism, with a proportionate further undesired waste feeding of the tape and possible interference with the operation of the machine. Any such possibility may be reduced to the minimum by provision for a predetermined and generally short inactive or non-feeding movement of the lever in the forward direction. The extremely simple and efficient lever, ratchet and feed mechanism as herein shown and described by way of example is well adapted to any such purposes, while within the scope of the invention it is applicable in any instance where a relative and inactive motion in the feeding direction is desired as between a reciprocating operating element, such as the feed lever herein, and the feed means to be driven.

My invention is not limited to the particular embodiment thereof illustrated and described herein, and I set forth its scope in my following claims:

I claim:

1. In a strip dispensing machine, a frame, a support for a strip supply, feed rolls to advance the strip from the supply, means including an initial gear element for driving the feed rolls, an operating lever pivotally supported on the frame coaxially with said initial gear member for forward and return motion, a peripherally toothed rotary ratchet concentric and fixed angularly with respect to said gear member, an elongated pawl adjacent the toothed periphery of the ratchet and having a ratchet-engageable tooth at one end portion and having spaced therefrom one element of a pair comprising a cam-like slot element and a pivotally connective follower element receivable in said slot element, the other element of said pair being carried by the operating lever, means laterally adjacent the pawl for guiding it in the direction paralleling the axis of the lever, the ratchet and the gear member, and spring means intermediate the lever and the pawl and having pawl-positioning components effective circumferentially and radially of the ratchet and cooperating with said cam-like slot and follower elements to afford a non-driving status for the pawl on initial forward motion of the lever during which the pawl is rocked to shift its toothed end portion radially of the ratchet into driving interengagement of the pawl and ratchet teeth.

2. In a strip dispensing machine, a frame, a support for a strip supply, feed rolls to advance the strip from the supply, means including an initial gear element for driving the feed rolls, an operating lever pivotally supported on the frame coaxially with said initial gear member for forward and return motion, a peripherally toothed

rotary ratchet concentric and fixed angularly with respect to said gear member, an elongated pawl adjacent the toothed periphery of the ratchet and having a plurality of ratchet-engageable adjacent teeth at one end portion and having spaced therefrom one element of a pair comprising a cam-like slot element and a pivotally connective follower element receivable in said slot element, the other element of said pair being carried by the operating lever, guide means defining a path for the pawl circumferentially of the ratchet and in the plane thereof, said pawl having by reason of said slot and follower elements a non-driving status on initial forward motion of the operating lever, an inner tooth of its plurality thereof then having fulcral pawl-rocking contact with a tooth of the ratchet, and a single coil spring having its opposite ends secured to the operating lever and to the toothed end of the pawl respectively at opposite sides of the ratchet in the direction axially of the latter, said spring acting to hold the pawl in said axial direction in guided relation to said path-defining guide means and also to bias the pawl lengthwise thereof and both angularly and radially relative to the ratchet axis and cooperating with said slot and follower elements to effect rocking of the pawl into full driving engagement of a plurality of its teeth with a like number of radially opposite ratchet teeth on continued forward motion of the operating lever.

3. In a strip dispensing machine, in combination, strip feed rolls, a manual operating lever having a normal rest position, a forward feeding movement and an opposite return movement, a lever return spring, a feed roll gear, the lever and gear mounted for independent rotation about a common axis, a circumferentially toothed ratchet disk coaxial and angularly fixed relative to the gear, an elongated pawl on the lever adjacent the toothed circumference of the ratchet disk and having a disk-engageable tooth at its inner end, a slot in the pawl disposed angularly of the ratchet disk axis and extending toward the outer end of the pawl, a pawl-supporting cam and pivot member projecting from the lever and received in said pawl slot, and spring means connecting the lever and pawl and urging the pawl toward abutment of the outer end of its slot with said cam and pivot member of the lever and permitting rocking disengagement of said pawl tooth from the disk and assisting opposite rocking engagement thereof under the cooperative action of the pawl slot and the cam and pivot member therein.

4. In a strip dispensing machine, in combination, strip feed rolls and actuating means therefor including an initial gear member and a hand lever member pivoted for feeding and return motions in one and the opposite directions, said members having a common supporting axis, and one-way-drive connections between the lever and gear members, said connections comprising a toothed ratchet disk coaxial with the lever and gear members and a cooperable toothed pawl, one of said lever and gear members carrying the ratchet disk and the other carrying the pawl for pivoting and for relative bodily movements, said pawl having thereon one element of a pair comprising a slot element and a pivotally connective follower element, the other element of said pair being on that one of the lever and gear members which carries the ratchet disk, and spring means connecting the pawl and its carrying member in a manner tending relatively to position them with

the connective follower element adjacent a given end of the slot element such as to require relative shifting of said elements to the opposite end of the slot element in order to transmit motion of the lever member in its feeding direction to the gear member.

5. In a strip dispensing machine according to claim 4, the construction and arrangement wherein the slot element is eccentric with respect to the axis of the ratchet disk and the lever and gear members and the relative shifting of the slot element and the connective follower element also effects a positive rocking of the pawl toward driving engagement with the ratchet disk.

6. In a strip dispensing machine according to claim 4, the construction and arrangement wherein the spring means is a coil spring serving the plural function of guiding and loading the pawl in directions axial, radial and angular with respect to the axis of the ratchet disk and the lever and gear members.

7. In a strip-serving machine of the feed-roll type having a roll-driving gear member and a manual lever member reciprocable in feeding and opposite return directions, one-way drive mechanism comprising a ratchet disk element and a coactive pawl element, said elements directly operatively interposing the gear and the lever members, and pin-and-slot connecting and pivotal supporting means for the pawl element mounted directly on and conjointly carried directly by and operatively between one of said elements and the operatively adjoining one of said members, whereby the lever member has an initial non-driving movement in its feeding direction.

8. In a strip dispensing machine having rotary feed means and an operating lever pivoted for feed-actuating motion in one direction and for non-feeding return motion in the opposite direction, in combination, a one-way transmission device intermediate the lever and the feed means, said device comprising a toothed ratchet-wheel member concentric with the pivotal axis of the lever and a coacting toothed pawl member, one of said members connected to the lever and the other to the feed means, and one of said members having a slot formation disposed eccentrically of the lever axis, a pivotal connector element fixed on the other of said members and movably received in said slot formation, and spring means operatively conditioning said ratchet-wheel and pawl means relatively to each other, whereby on movement of the operating lever in the feed-actuating direction there is an initial drivingly-inactive relative movement between said members as permitted by said slot formation and pivotal connector element therein and during

which the pawl member is biased by the spring means both angularly and radially of the lever axis and is positively rocked by coaction of the slot formation and connector element therein into driving engagement of the then radially opposite teeth of the pawl and ratchet-wheel members.

9. In a tape dispensing machine having rotary tape feed means with drive gearing therefor including an initial gear and having an operating lever pivoted upon the same axis with said gear for motion in one direction to operate the feed means and for opposite non-driving return motion, in combination therewith, one-way drive mechanism intermediate the initial gear and the lever and adapted to afford the latter a non-actuating movement at a first stage of its feed-operating motion, said mechanism comprising a pawl element and a ratchet disk element, one movable with the lever and the other with said gear, one of said elements having a slot formation disposed non-radially of the axis of the lever and gear, and the part with which said slotted element is movable having a pawl pivot movably received in said slot formation, and spring means tensioning the pawl element both angularly and radially of the lever and gear axis, respectively to effect positioning of the pawl pivot and slot formation relative to each other and for the purposes of engagement and disengagement of the pawl element relative to the ratchet disk element.

10. In strip feeding apparatus having rotary feed means to be driven, a rotatively reciprocable operating element having a feed-actuating motion in one direction and an inactive return motion in the opposite direction, and a rotative driven element operatively connected to the feed means, in combination, a toothed ratchet disk coaxial and angularly fixed relative to one of said elements, a cooperable toothed pawl movably connected to and carried by the other of said elements with capacity for pivotal movement radially of the ratchet disk to engage or disengage the latter and also for relative bodily movement between it and the disk circumferentially of the latter to afford an initial non-driving movement for the operating element in the direction of its feed-actuating motion, and spring means interposing and carried jointly by the pawl and the pawl-carrying element so as to impose force components on the pawl effective both angularly and radially of the ratchet disk axis, respectively for restraining and biasing the pawl circumferentially of the ratchet disk for the purposes of said initial non-driving movement for the operating element, and for the purposes of relatively engaging and disengaging the pawl and ratchet disk.

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