Feb. 4, 1958 A. W. METZNER 2,822,167

STRIP FEEDING DEVICE

Filed May 12, 1955 2 Sheets-Sheet 1

Fig. 1

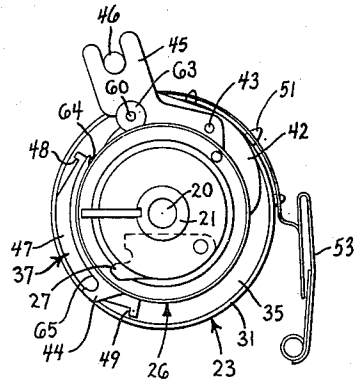


Fig. 2

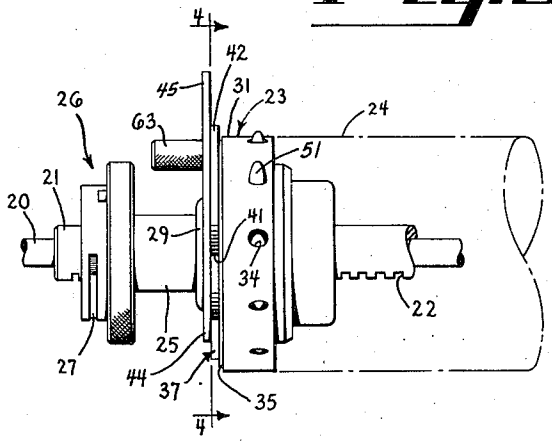


Fig. 3

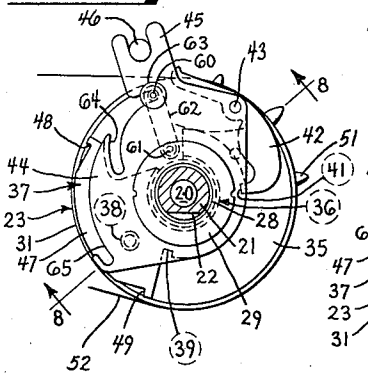


Fig. 4

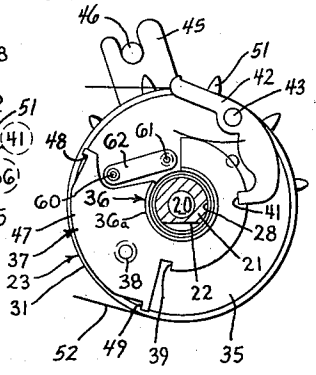
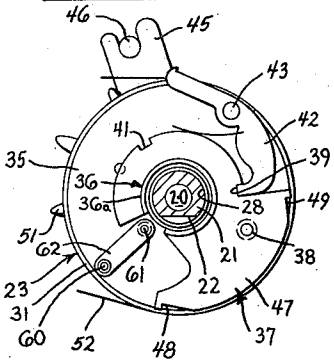


Fig. 5



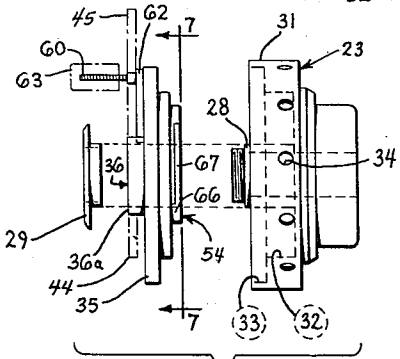


Fig. 6

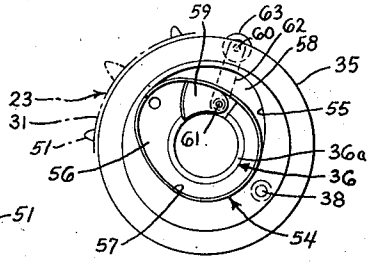


Fig. 7

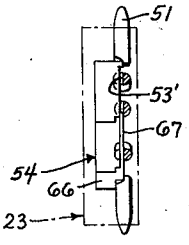


Fig. 11

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Feb. 4, 1958 A. W. METZNER 2,822,167

STRIP FEEDING DEVICE

Filed May 12, 1955 2 Sheets-Sheet 2

Fig. 12

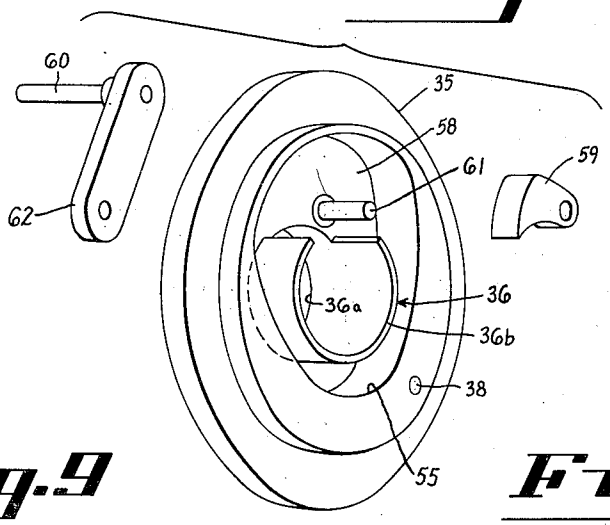


Fig. 9

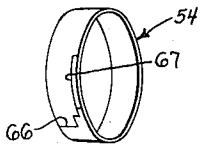
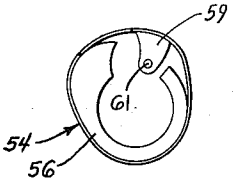


Fig. 10



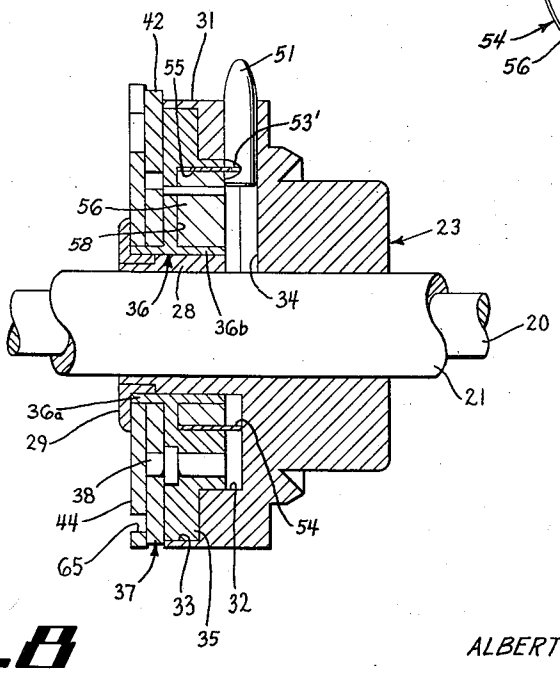


Fig. 8

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STRIP FEEDING DEVICE

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Application May 12, 1955, Serial No. 507,845

14 Claims. (Cl. 271—2.3)

This invention relates to strip feeding apparatus, and more particularly to a rotary pin wheel feeding device of the disappearing pin type, having particular adaption to high speed feeding operations.

In the usual strip feeding apparatus for the advance of marginally perforated record strip material and the like, the progressive extending and retracting movements of a pin wheel feeding device need cover only a relatively small circumferential area of the pin wheel body and the actual feeding of the strip is accomplished in the main by single successive pins. In ultra high speed record making machines of recent design, however, it is desirable to extend the area of engagement of the feeding pins with the strip in order that two or more of the successive pins may be in feeding position at the same time. More accurate and positive registration is thus possible and there is also avoided a concentration of tearing forces upon the strip upon each of the high frequency starting and stopping impulses of the strip.

It has been known heretofore to mount feeding pins on a belt or chain and so obtain multiple engagement of feeding pins with the perforations in the strip, but it is contemplated in the instant invention to adapt a substantially rotary pin wheel feeding device for high speed operation as described.

The object of the invention is to simplify the construction as well as the means and mode of operation of strip feeding apparatus, whereby such apparatus may not only be economically manufactured, but will be more efficient and satisfactory in use, adaptable to a wide variety of applications, and be unlikely to get out of repair.

Another object of the invention is to provide for selective adjustment of the pin wheel feeding device for normal or low speed operation and for high speed operation.

A further object of the invention is to achieve the inventive objectives as above noted while utilizing a generally conventional pin wheel construction and mode of operation.

A further object of the invention is to provide pin wheel guide cam in the form of an expansible band wherein the high point of the cam may be lengthened at will by expansion of the band in order to lengthen the circumferencial area of projection of the feeding pins.

A further object of the invention is to provide a strip feeding apparatus possessing the advantageous structural features, the inherent meritorious characteristics and the mode of operation herein mentioned.

With the above primary and other incidental objects in view as will more fully appear in the specification, the invention intended to be protected by Letters Patent consists of the features of construction, the parts and combinations thereof, and the mode of operation as hereinafter described or illustrated in the accompanying drawings, or their equivalents.

Referring to the accompanying drawing wherein is

shown one but obviously not necessarily the only form of embodiment of the invention,

Fig. 1 is a view in end elevation of a platen assembly of a typewriting machine embodying a pin wheel feeding device in accordance with the illustrative form of the invention;

Fig. 2 is a view of one end of the assembly of Fig. 1, in front elevation;

Fig. 3 is a view similar to Fig. 1 with some parts of the platen assembly omitted and with additional parts of the pin wheel feeding device shown in dotted outline;

Fig. 4 is a view in cross section of the pin wheel feeding device, taken substantially along the line 4—4 of Fig. 2;

Fig. 5 is a view similar to Fig. 4, showing the pin wheel feeding device adjusted to project the feeding pins in a different (non-feeding) circumferential area of the pin wheel body;

Fig. 6 is an exploded view of the pin wheel feeding device;

Fig. 7 is a view in cross section, taken substantially along the line 7—7 of Fig. 6;

Fig. 8 is a view in longitudinal section, taken substantially along the line 8—8 of Fig. 3 and enlarged relatively to Fig. 3;

Fig. 9 is a detail view in perspective of the expansible guide ring for the feeding pins;

Fig. 10 is a detail view in side elevation of the expansible ring and cam assembly adjusted to expand the high point of the cam;

Fig. 11 is a top plan view of the ring of Fig. 10, showing the feeding pins interengaged therewith;

Fig. 12 is an exploded view, in perspective, of the relatively stationary cam disc assembly comprised in the pin wheel unit.

Like parts are indicated by similar characters of reference throughout the several views.

Referring to the drawings, the invention is disclosed as part of a platen assembly of a typewriting or like machine wherein two or more rotary pin wheels are mounted on or form a part of the platen and are engageable with perforate margins of a continuous strip of record material for intermittent step by step advance of the strip in response to rotation of the platen.

Thus, a shaft 20 is fixedly mounted in the typewriter carriage and in turn has secured thereto a sleeve 21 formed with a longitudinal series of transverse cuts 22. A pin wheel body 23, of which there may be two or more, is mounted on the sleeve 22 and is connected thereto for unison rotary motion in a manner not here shown. The body 23 is held normally against longitudinal motion relatively to the sleeve 22 by a platen roll 24 which engages one side of the body and by a cylindrical spacer 25 which engages the other end of the pin wheel feeding device of which the body 23 is a part. The spacer 25 is interposed between the pin wheel feeding device and longitudinally adjustable lock collar means 26 having a latch 27 engageable in a cut 22.

The body 23 includes a central longitudinally extending hub portion 28 which is threaded at its outer end to receive a retaining nut 29, the body 23 and nut 29 cooperating to hold the parts of the pin wheel feeding device in a unitary relation. The nut 23 is directly abutted by the spacer 25. Further comprised in the body 23 is a relatively elevated annulus 31, a concentric recess 32, and a counterbore 33. Still further, radial holes or slideways 34 open at their outer ends through the periphery of the annulus 31 and at their inner ends communicate with the recess 32. Mounted in the counterbore 33 is a relatively stationary disc 35 having a central hub 36 rotatably mounted on the hub 28 of the pin wheel body. A plate

37 is arranged alongside the disc 35, being rotatably mounted on a leftwardly extending portion 36*a* of the hub 36 and connected as by a pin 38 to the disc 35 for unison rotation therewith.

The plate 37 has circumferentially spaced apart peripheral notches 39 and 41 engageable by a finger on a pawl 42 pivotally connected at 43 to a reactant member 44 also rotatably mounted on the extension 36*a* of the hub 36. An arm 45 on the reactant member 44 is bifurcated and engages a transversely extending machine rod 46. The reactant member 44 is thus held against rotation and is in turn effective through the pawl 42, plate 37 and pin 38 to prevent rotation of the disc 35. The assembly of parts comprising the reactant member 44, plate 37 and disc 35 accordingly does not partake of the rotary motion of the pin wheel body 23.

As indicated, however, the pawl 42 represents a releaseable coupling between the reactant member 44 and the plate 37. Release of the pawl 42 from the notch 41, for example, frees the plate 37 for limited motion in a rotary direction. This motion may be continued until the notch 39 is in position to be engaged by the pawl 42, it being apparent that the construction and arrangement of parts is one providing for arcuate adjustment of the plate 37, and therefore of the disc 35, between opposed limits as represented by the notches 39 and 41 with means being provided in the form of pawl 42 to lock the parts so moved in adjusted position. A fan shaped portion 47 is provided on the plate 37 and has oppositely disposed spaced apart indentations 48 and 49 lying adjacent to the peripheral area of the annulus 31 facilitating the rotary adjustment of the disc 35, as through use of a hook, pick or the like.

The holes or slideways 34 in the annulus 31 slidingly mount feeding pins adapted to have their outer tapered ends project through and beyond the surface of the annulus 31 to engage perforations in a strip 52 which is guided about the platen 24 by means including a hold-down bracket 53. The strip 52 has its one marginal edge in intimately contacting relation to the surface of the annulus 31 over a part, substantially half, of the circumferential area of the pin wheel feeding device. Within this part of the circumferential area the feeding pins 51 may be successively projected in response to rotation of the pin wheel body whereby progressively to engage the perforations in the strip and so advance the strip.

At their inner ends the feeding pins 51 have transverse notches 53' having common engagement with the edge of an expansible split ring 54 tensioned to assume normally a cylindrical shape. The opposite edge of the ring 54 is received in a cavity or recess 55 in the disc 35 in eccentric surrounding relation to a rightwardly extension 36*b* of the disc hub 36. Also in surrounding relation to the hub extension 36*b* is a cam 56 secured to the hub extension 36*b* as by staking in such manner as to cause the cam 56 to assume the character of an eccentric boss formation on the bottom of the cavity or eccentric recess 55. Over a major part of its length, the cam 56 defines with the wall of the cavity 55 a relatively narrow crevice 57, the opposite ends of which terminate in a relatively large approximately crescent shaped space 58. The ring 54 is received in the crevice 57 in such manner as in effect to become a part of the relatively stationary disc 35, and the ring is moreover of a size as closely to hug and correspond to the configuration of the cam 56, the ring being unexpanded into the space 58. The eccentric formation given the ring 54 by the cam 56 effects a gradual extension of the feeding pins 51 as they are carried to the high point of the cam and fully projects such pins as they reach and pass through the high point. As indicated, for example in Fig. 3, the shape of the cam 56 and the other construction and arrangement of parts is such that only one of the feeding pins 51 is fully extended at any one time, the immediately preceding pin being at this time largely retracted and the immediately succeeding pin just starting to project above the surface of the annulus 31. While this presentation of feeding pins to the perforations in the strip 52 is satisfactory and normal for usual operational speeds, it is proposed according to the present invention to permit modification in the shape of the guide ring in effect to expand the high point of the cam 56 to increase the duration of travel of the feeding pins thereover and thereby enable two or more of such pins to be fully projected at one and the same time.

In the illustrative embodiment of that concept, the cam 56 includes a segment 59 lying adjacent to the crescent shaped space 58 and displaceable in the manner indicated in Fig. 10 to expand the ring 54 outward into the space 58 whereby substantially to increase the length of the high part of the ring. The segment 59 is secured to a pin 61 which is rotatably mounted in the disc 35, and, outside the disc 35, is secured to one end of an arm 62. On the other end of the arm 62 is a knob 63, the arm 62 being adapted for manipulative rocking motion to move the segment 59 between the noneffective position of Fig. 7 and the effective position of Fig. 10. The effect of expansion of the ring 54 is as indicated in Fig. 4 wherein two adjacent feeding pins 51 are fully extended and fully engaged with the strip at the same time, with a further and immediately preceding pin just starting to withdraw from the strip.

The previously described arcuate adjustment permitted of the disc 35 serves to adjust the pin wheel feeding device to feeding and non-feeding positions. Thus, set in the position shown in Fig. 3 the disc 35, through the cam 56 thereon, is effective to project the feeding pins above the surface of the annulus 31 in that circumferential area of the feeding device in which there is intimate contact with the strip 52. This then is the feeding adjustment position. The non-feeding adjustment position is shown in Fig. 5 wherein the disc 35 and its cam 56 have been adjusted arcuately a distance to bring the high point of the cam rearwardly or out of line with that part of the circumferential area of the feeding device contacted by the strip. In this position of the parts the feeding pins 51 are projected as before but are ineffective to engage the strip so that no feeding results.

The reactant member 44 is formed with appropriate slots 64 and 65 to permit free rocking motion of the arm 62 in adjusting the segment 59 and also in moving with the disc 35 between feeding and non-feeding positions of adjustment. The knob 63 is threaded onto a screw stud 60 on the arm 62, and may be tightened and loosened thereon relatively to the reactant member 44 in order selectively to hold the cam segment in its adjusted positions.

The guide ring 54 is, as noted, a split resilient band. The free ends have oppositely extending complementary stepped formations 66 and 67 which when the ends are brought together interfit with one another and allow overlapping of the ends of the band without forcing such ends into different planes. The feeding pins 51 accordingly have a continuous endless track on which to revolve in acompaniment with the pin wheel body 23 and it will be understood in this connection that the maximum permitted expansion of the ring 54, as determined by the cavity or recess 55, is less than the distance required to separate the ends of the ring. The depth of the grooves or slots 53 in the feeding pins 51, it further will be understood, is such as to maintain engagement with at least a part of the edge of the ring in any position of expansion of the ring.

From the above description it will be apparent that there is thus provided a device of the character described possessing the particular features of advantage before enumerated as desirable, but which obviously is susceptible of modification in its form, proportions, detail construction and arrangement of parts without departing from the principle involved or sacrificing any of its advantages.

While in order to comply with the statute the invention has been described in language more or less specific as to structural features, it is to be understood that the invention is not limited to the specific features shown, but that the means and construction herein disclosed comprise but one of several modes of putting the invention into effect, and the invention is therefore claimed in any of its forms or modifications within the legitimate and valid scope of the appended claims.

Having thus described my invention, I claim:

1. In strip feeding apparatus, a rotary pin wheel body, radially extensible and retractable feeding pins carried by said body, a radially deformable circular guide for said feeding pins supported in relatively stationary relation to said body, means for expanding said guide in a limited circumferential area for relative extension of the feeding pins in that area, and means for increasing the length of circumferential area of expansion of said guide for lengthening of the circumferential area of projection of said pins.

2. Strip feeding apparatus according to claim 1, characterized in that said last named means is selectively operable, said expanding means imparting a fixed eccentric shape to said guide, which shape may be changed by operation of said last named means.

3. Strip feeding apparatus according to claim 1, characterized by a relatively rotatable mounting for said expanding means providing for alternate adjustment thereof between positions defining different circumferential areas of projection of said feeding pins.

4. Strip feeding apparatus, including a rotary pin wheel body, radial holes therein, feeding pins slidably mounted in said holes, relatively stationary cam means serving as a guide for progressive extending and retracting movements of said pins in response to rotation of said body, said cam means having a high point of relatively short circumferential length, and selectively operable means for circumferentially expanding said high point.

5. Strip feeding apparatus, including a pin wheel body, means for guiding record strip material over a part of the circumferential area of said body, feeding pins carried by said body for relative radial motion, guide means for effecting a progressive extension and retraction of said feeding pins as they are carried through said circumferential area, and selectively operable means for expanding said guide means in a direction to increase the length of the circumferential area in which said pins are extended.

6. Strip feeding apparatus according to claim 5, characterized by an adjustable mounting for said guide means whereby said guide means may be adjusted to effect extending and retracting movements of said feeding pins in another part of the circumferential area of said body.

7. In strip feeding apparatus, a rotary pin wheel body, said body having a circumferential series of radial holes, feeding pins slidably mounted in said holes, relatively stationary disc means received in the side of said body, said disc means having in one side thereof an eccentrically shaped recess, an expansible ring mounted in said recess and engaged by said pins as a guide for radial reciprocation thereof, said ring having a first eccentric formation in which it defines with the wall of said recess an approximately crescent shaped space outside said ring, and selectively operable means for expanding said ring into said crescent shaped space.

8. Strip feeding apparatus according to claim 7, characterized in that said ring is in the form of a split expansible band installed on end in said recess, there being an eccentric cam in said recess surrounded by said band and defining the said eccentric formation thereof.

9. Strip feeding apparatus according to claim 8, characterized in that said selectively operable means includes a substantially radially displaceable segment of said cam, and means for displacing said segment.

10. In strip feeding apparatus, a rotary pin wheel body having a recess in one side thereof and radial holes opening at their one or outer ends through the periphery of said body and communicating at their other or inner ends with said recess, feeding pins having a sliding mounting in said holes and formed with transverse notches near their inner ends, and an expansible split ring received in said recess and having one edge thereof in common engagement with the notches in said feeding pins, said ring being variably expansible to present high points of varying circumferential distance.

11. Strip feeding apparatus according to claim 10, characterized in that the ends of said ring are cut back on opposite sides thereof to interfit in substantially the same plane and to prevent complete separation of the ends of the ring upon expansion thereof, the notches in said feeding pins being sufficiently deep to engage the said edge of said ring in any expanded position thereof within the limits of said recess.

12. In strip feeding apparatus, a rotary pin wheel body having a recess in one side thereof and radial holes opening at their outer ends through the periphery of said body and communicating at their inner ends with said recess, feeding pins slidably mounted in said holes, a relatively stationary disc having on one side thereof a hub received in said recess, an eccentric cavity in said hub, an eccentric cam formation in said cavity fixed relatively to said disc and defining with the wall of said cavity a relatively narrow crevice extending over the major part of the periphery of said cam formation and terminating at its ends in a wider approximately crescent shaped space, an expansible split ring received in said crevice and conforming to the shape of said cam formation, said ring presenting an edge interengaged with the inner ends of said feeding pins to control the radial movements of said pins in response to relative rotation of said body and said disc, and means for selectively expanding said split ring into said crescent shaped space.

13. Strip feeding apparatus according to claim 12, characterized in that said last named means includes a displaceable segment of said cam formation, and means accessible from the other side of said hub for displacing said segment.

14. Strip feeding apparatus according to claim 12, characterized by releasable means for holding said disc stationary relatively to said pin wheel body, said disc being rotatably adjustable to shift the high point of said cam formation circumferentially with respect to said body.

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