

Dec. 2, 1958

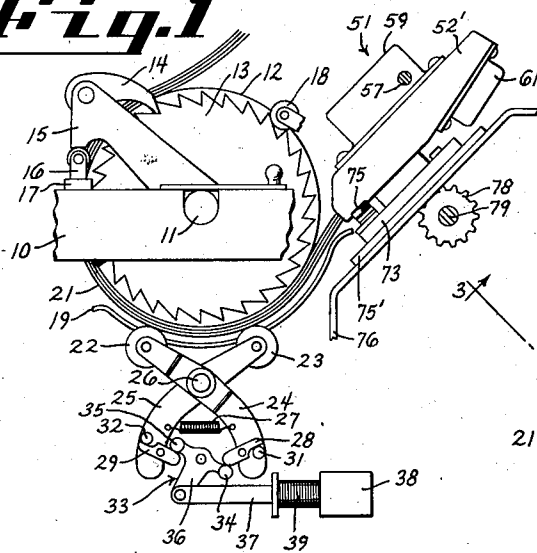
A. W. METZNER

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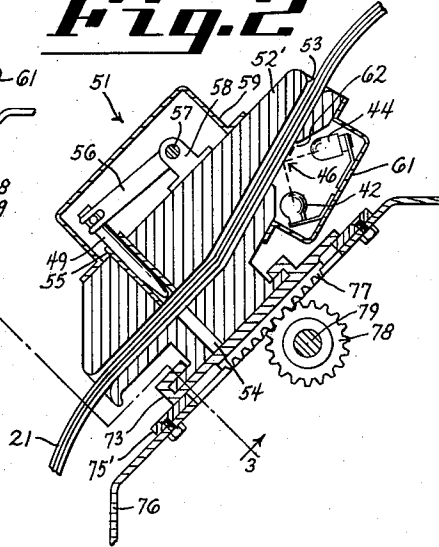
STRIP FEEDING DEVICE

Filed May 24, 1956

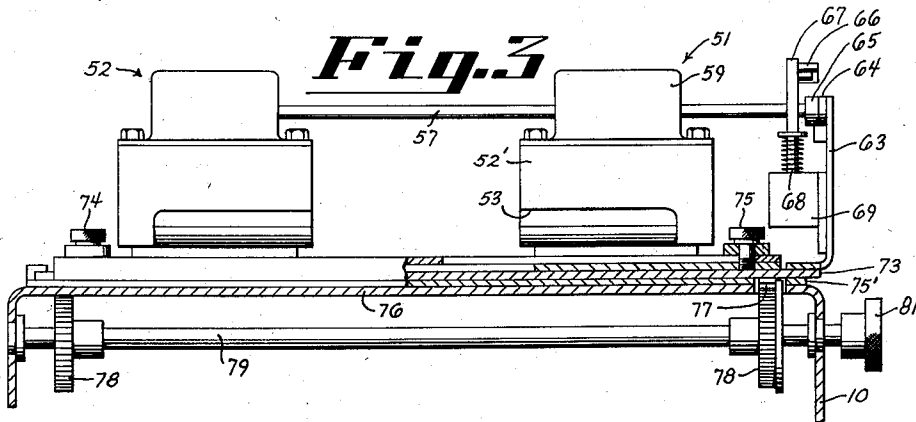
**Fig. 1**



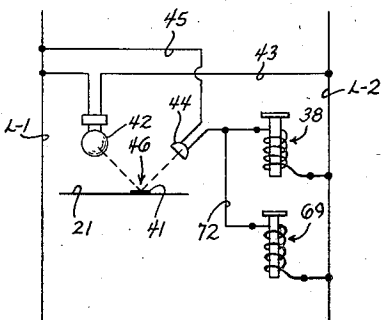
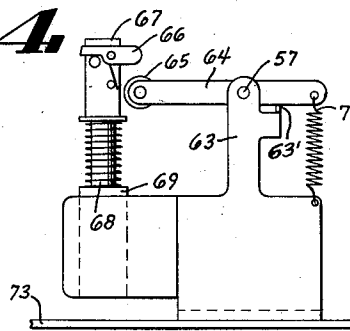
**Fig. 2**



**Fig. 3**



**Fig. 4**



**Fig. 6**

**Fig. 5**

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**STRIP FEEDING DEVICE**

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Application May 24, 1956, Serial No. 587,013

11 Claims. (Cl. 197-133)

This invention relates to strip feeding apparatus, and particularly to the feeding of multi-copy record material in strip form through a typewriting or like machine incorporating friction feed devices for advancing the strip material over the platen.

The object of the invention is to simplify the construction as well as the means and mode of operation of strip feeding devices, whereby such devices 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.

A further object of the invention is to provide for frequent, automatic realignment of the superposed record copies to obviate accumulated error of misalignment as the record strip material advances through the machine.

A further object of the invention is to introduce a principle of positive alignment in apparatus of the kind described through a reciprocating pin intermittently entering openings in the strip to readjust misaligned record copies as well as interleaved carbon material.

A further object of the invention is to provide for positive realignment of the strip elements in conjunction with a momentary release of the applied friction feeding pressure.

Still another object of the invention is to effect the described release of the friction feed devices and the strip realignment under strip control.

A still further object of the invention is to provide means sensitive to signal indicia on the strip, as for example photo electric devices scanning the strip for dots or apertures provided thereon, to initiate the described friction release and pin actuating means.

A further object of the invention is to provide a strip feeding device 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 fragmentary view in side elevation of a platen and strip feeding device associated therewith arranged in a typewriting machine, in accordance with the illustrated embodiment of the invention;

Fig. 2 is a detail view in cross section through a control unit mounted in the carriage frame for sensing of signalling positions on the strip and for realigning the strip elements;

Fig. 3 is a front end view of control apparatus in accordance with the illustrated form of the invention, being taken substantially along the line 3-3 of Fig. 2;

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Fig. 4 is a fragmentary view in side elevation of the operating mechanism for the pin aligning means;

Fig. 5 is a plan view of a fragment of a record form bearing pin aligning openings and a signalling position in accordance with the operation of the apparatus of the illustrated embodiment of the invention; and

Fig. 6 is a wiring diagram.

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

Referring to the drawings, a typewriting or like machine in accordance with the illustrated embodiment of the invention comprises a relatively stationary carriage frame 10 providing a support for one end of a shaft 11 on which is a platen 12. Also secured to the shaft 11 is a ratchet 13 and engaging the periphery of the ratchet is a pawl 14 pivotally connected at its one end to an arm 15 pivotally mounted on the shaft 11. The arm 15 is engaged by a plunger 16 extending from a solenoid 17, the illustrated typewriter being of the electric kind wherein line spacing operations are key controlled. At its end opposite that connected to the arm 15, the pawl 14 is formed with a finger engageable with the teeth on the periphery of the ratchet 13. Upon each actuation of the solenoid 17, the arm 15 and pawl 14 move in an oscillatory sense to impart an increment of rotary motion to the ratchet 13 and thereby to the platen 12. A detent member 18, acting on the periphery of the ratchet 13, holds the platen 12 in its positions of adjustment during the return or retracting movements of the arm 15 and pawl 14. The motion of the platen 12, under repeated energizing of the solenoid 17, is a step by step rotary movement, with the successive steps being increments of constant and fixed extent.

Beneath the platen 12 is a so-called paper pan 19, guiding a strip 21 from the rear of the machine under and around the platen in intimate relationship thereto, the strip passing through a writing line in the medial horizontal plane of the platen and extending upward and rearwardly out of the machine.

Also beneath the platen 12 are friction feed devices, including rollers 22 and 23 on the one ends of respective arms 24 and 25. The arms 24 and 25 are mounted on a common pivot 26 and extend in intersecting relation to one another in a manner to define a scissors like arrangement. Thus, a relative approaching motion of the opposite ends of the arms tends to effect a similar motion of the described one ends of the arms mounting rollers 22 and 23, the arms being so arranged that movement or pressure applied in this direction is resolved into a pressure of the rollers 22 and 23 at spaced points against the surface of the platen 12. A tensile spring 27 interconnects the arms 24 and 25 in a manner tending normally to press the rollers 22 and 23 against the platen. The strip 21, it will be understood, passes between the rollers 22 and 23 and the surface of the platen and so tends to be held relatively tightly to the platen by the rollers. The construction and arrangement of parts defines a friction feed mechanism whereby the strip 21 tends normally to advance in step by step increments in accompaniment with and corresponding to the increments of movement imparted to the platen.

In the use of pre-printed record forms the extent of an individual increment of feeding movement is predetermined to correspond to the spacing between lines of the form. Thus, in inserting a strip into the machine, the first writing line of the first form is placed at the writing line at the platen. The first line spacing operation will then bring the second line of the form to the writing line and so on throughout all of the forms of the strip. In the case of multi-copy strip material, wherein as in the presently illustrated instance, the strip

is made up of a plurality of superposed record copies and interposed carbon strips, friction feeding of the strip tends unavoidably to produce a condition of misalignment in the superposed strip elements. Errors or discrepancies of this kind normally are individually slight but may accumulate to an undesirable extent so that matter imprinted upon one writing line of the overlying strip may appear on a different line of an underlying copy. A compensating adjustment of the strip material can be made by releasing the friction feed devices and manually readjusting the strip material to a condition of realignment. It will be understood in this connection that provision is made for manually releasing the friction feed devices for this and other purposes as to permit the insertion of a new strip into the machine. The instant invention, however, has in view an automatic and intermittently repeated release of the friction feed devices under strip control to carry out a continuing correction in the alignment of the strip elements to avoid accumulated error.

On the described opposite ends of the arms 24 and 25 are levers 28 and 29 pivotally mounted on the respective arms at about their mid points. One end of the lever 28 is shaped as a finger and is engageable with a stud 31 set in the arm 24. The lever 29 is similarly shaped at its corresponding end and similarly engages a like stud 32 on the arm 25. The levers 28 and 29 are reversely disposed relatively to one another, the lever 28 engaging the stud 31 on the top thereof and the lever 29 engaging the stud 32 on the underside thereof. Between the arms 24 and 25, at their described opposite ends, is a bell crank lever 33. On oppositely extending arms of the lever 33 are rollers 34 and 35. In the illustrated instance the roller 34 engages the lower edge of lever 28 while the roller 35 engages the upper edge of lever 29. Another arm 36 on the bell crank lever 33 is pivotally connected to the outer end of a plunger 37 extending from an electromagnetic device 38 and urged normally outward by a compression spring 39.

The ends of the levers 28 and 29 adjacent to the respective rollers 34 and 35 are rounded and it will be apparent that in response to a rocking motion of the lever 33 in a counterclockwise direction, as will result from an energizing of the electromagnet 38, the rollers 34 and 35 will act as cams upon the levers 28 and 29 which are prevented from rocking movement by the pins 31 and 32. The result will be to effect a relative separating motion of the arms 28 and 29 and accordingly to retract the rollers 22 and 23 relatively to the surface of platen 12. The frictional pressure holding the strip 21 to the platen thus is relieved and the platen may advance relatively to the strip should release of the friction feed occur during a line spacing operation. The release of the friction feed devices is but a momentary operation. As the bell crank lever 33 completes its counterclockwise movement under the influence of electromagnet 38, a position of the parts obtains which is substantially the reversal of that shown in Fig. 1. Thus roller 34 assumes a position above the lever 28 and the roller 35 assumes a position below lever 29. The spring 27 then is free to return the arms 24 and 25 in a relative approaching direction and the rollers 22 and 23 return to frictional contact with the strip 21 and platen surface. Upon deenergizing of the electromagnet 38, the spring 39 extends the plunger 37, causing the bell crank lever 33 to move in a return or clockwise direction and to reassume the illustrated position. In the course of such movement the rollers 34 and 35 pass by the levers 28 and 29 which rock out of their paths, permitting motion of the lever 33 without a corresponding movement of the arms 24 and 25. The levers 28 and 29 may be placed under suitable spring control to maintain normally a position of contact with their respective studs 31 and 32.

The electromagnet 38 is arranged in an electrical cir-

cuit with sensing mechanism adapted to detect and to respond to signalling positions on the strip, as for example positions 41 on each or selected forms of the strip, as indicated in Fig. 5. In the illustrated instance, the signalling positions 41 are black spots and the sensing mechanism is a photo electric device which casts a beam of light upon the strip as it is advanced to the platen, the spots 41 passing through and interrupting such beam in a manner to effect an actuation of the electromagnet 38. As shown in Fig. 6, a lamp 42 is connected in a line 43 extending between the conductors L-1 and L-2 of an electrical supply system. An eye or light sensitive switch 44 along with the coil of electromagnet 38 are arranged in series in another line 45 extending between the conductors L-1 and L-2. The lamp 42 is arranged to cast a beam of light upon the passing strip 21 and the eye 44 is arranged to receive the reflection of such beam from the strip. Under the influence of such applied light, the eye 44 maintains the line 45 normally open and the coil of electromagnetic relay 38 is thus normally deenergized. The point at which the light beam from lamp 44 strikes the strip 21 may for convenience be indicated at 46. As the advancement of the strip brings a spot 41 thereon to the point 46, the reflection of the light beam to the eye 44 is interrupted and the switch of which the eye is essentially comprised closes to close a circuit through the coil of relay 38. As indicated, the latter when energized actuates the bell crank lever 33, resulting in a momentary release of the friction feed devices in the manner before described. Should the strip 21 stop with a spot 41 in the position 46 the electromagnet 38 will remain energized but there will be permitted but a single action movement of the feed devices since the bell crank lever 33 will remain in its counterclockwise extreme position wherein, as before described, the arms 24 and 25 are free to return in an approaching direction under the influence of spring 27. Continued movement of the strip causes the spot 41 to pass out of the point 46 and reflection of the light beam upon the eye 44 is reestablished. The electromagnet 38 accordingly is deenergized and the bell crank lever 33 returns to its illustrated position, camming the levers 28 and 29 out of its path as it does so.

The spot 41 on each record form is located in predetermined spaced relation to an opening in the strip formed by registering perforations in each of the superposed strip elements. There may be used as the selected opening an opening 47 which is one of a series of marginal perforations appearing in strips adapted for positive pin feeding operations. Also, a file opening 48 conventionally found in record forms may be used, or the spot 41 may be placed in predetermined relation to a specially formed opening in the strip.

There will normally be a pair of openings 47 or 48 laterally spaced apart in the strip and adapted to receive an aligning pin 49 (one shown) mounted in laterally spaced apart housings 51 and 52 on the carriage frame. The housing 51 comprises a body 52' having a through longitudinal slot 53 opening through one side thereof and adapted to receive and to guide the strip 21 prior to its reaching the under side of the platen 12. A bore 54 extends through the body 52' in transverse relation to the slot 53 and has a bushing 55 installed therein in which is reciprocally mounted the pin 49. One end of the pin 49 is tapered for better entrance into the strip opening. The other end of the pin projects above the body 52' and has a pin in slot connection with an arm 56 secured to a cross shaft 57 in part supported by a bracket 58 resting on the body 52'. A cover member 59 encloses the outer projecting end of pin 49, the arm 56 and bracket 58. On the underside of the body 52' is another cover member 61 enclosing an opening 62 in the body and mounting the lamp 42 and eye 44 of the photo electric device. The lamp is arranged, as before indicated, to cast a beam of light through the

opening 62 upon the strip 21 whence it is reflected upon the eye 44.

The housing 52 is identical in construction to the unit 51 except for omission of the photo electric sensing device. The shaft 57 is common to the units so that a rotary actuation of the shaft is effective simultaneously to operate the pins 49 of both units. At its one end, the shaft 57 extends through and beyond the unit 51 and has a mounting in a bracket 63 on the slideway 73. An arm 64 has one end thereof secured to the shaft 57 near the bracket 63. On the other end thereof is a roller 65 engageable with a lever 66 constructed like the aforementioned levers 28 and 29 and mounted in a like manner upon an extension 67 of the plunger 68 of an electromagnet 69. Thus, a retracting motion of the plunger 68 in response to energizing of the electromagnet 69 results in a pulling down of the extension 67, and since the lever 66 cannot rock in a counterclockwise direction results also in a downward rocking motion of the arm 64 imparting a counterclockwise arcuate movement to the shaft 57. In response thereto the pins 49 are moved axially inward within the bores 54. The lever 66 passes by the roller 65 as the plunger 68 completes its retracting motion and the arm 64 is at once restored to its upper position, as illustrated, by a spring 71. Motion of arm 64 under influence of spring 71 is, however, limited by stop 63'. The actuation of the pins 49 accordingly is a momentary action in which the pins are depressed to penetrate the strip and then immediately are withdrawn therefrom.

The electromagnet 69, as shown in Fig. 6, is in a line 72 extending from the line 45 to the conductor L-2. It is, accordingly, in parallel relation with the electromagnet 38 and is energized and deenergized in correspondence therewith. According to the construction and arrangement of parts, therefore, the arrival of a black spot 41 at the position 46 results in a concomitant interruption of the strip feeding action and depression of the pins 49. The interruption in feeding is but momentary and the strip may continue its advance about the platen, with the strip elements now realigned by virtue of the aligning action of the pins 49. In this regard it will be understood that the pins 49 tend to readjust in a forwardly or rearwardly direction any of the elements of the strip which may be out of registry with the upper or topmost copy. Since the holding pressure upon the strips applied by the rollers 22 and 23 is released at the time of entrance of the aligning pins, the strip elements are free to make such readjustment and upon reapplication of the friction pressure the strip elements are held in their realigned position.

The units 51 and 52 have a common mounting in a transversely extending slideway 73, the lower part of the body 52' having flanges slidably received in turned over portions of the slideway 73. Adjustment screws 74 and 75 extend through the overlapping positions of the body 52' and slideway 73 and hold the respective units 51 and 52 in a selected position of lateral adjustment. The units 51 and 52 are adjusted laterally properly to receive and guide the strip 21 and to locate the selected opening 47 or 48 with respect to the bore 54 in which the pin 49 reciprocates, and to locate the black spot 41 in a lateral sense with respect to the photo electric beam. The mechanism may be adapted for strips of greater or smaller width by loosening the screws 74 and 75, adjusting the units 51 and 52 laterally as may be desired and then retightening the screws 74 and 75. A longitudinal adjustment of the units 51 and 52 is provided in order that the photo electric devices may be adjusted in a longitudinal sense to sense the black spot 41 at the same moment the selected strip opening achieves registry with the bore 54.

Thus the slideway 73 is supported on a bearing plate 75' made fast to a bracket 76 rigidly mounted on the carriage frame 10. On the underside of the slideway 73

is a longitudinal rack 77 extending through registering openings in the plate 75 and bracket 76 and meshing with a pinion 78 on a cross shaft 79. The shaft 79 is rotatably mounted at its ends in side portions of the carriage frame 10 and has secured thereto a knob 81. The knob 81 is manually accessible for rotation and such rotary motion is effective through the shaft 79, pinion 78 and rack 77 to move both units 51 and 52 simultaneously in a longitudinal sense relatively to the strip.

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. Strip feeding apparatus, including a platen, friction feed devices normally effective to hold multi-copy strip material against said platen for feeding thereof with rotation of said platen, strip controlled means for momentarily releasing said friction feed devices at intervals in the feeding of said strip, and means for realigning the copies of said strip in said intervals.

2. Strip feeding apparatus, including a platen, friction feed devices, a strip assembly comprising multiple superposed strip elements being pressed by said devices against said platen for feeding of said strip assembly with rotation of said platen, and means reciprocable under strip control intermittently operable to realign the elements of said strip assembly.

3. Strip feeding apparatus, including means for feeding a strip assembly comprising superposed strip elements, each of said strip elements having a perforation normally registering with the corresponding perforations of the other elements of the strip assembly whereby to define an opening in said strip assembly, a relatively stationary pin arranged for entering and withdrawing movements relatively to said opening, and strip controlled means operating to effect such movements of said pin as said opening is brought to alignment therewith.

4. Strip feeding apparatus, including means for feeding a strip assembly comprising superposed strip elements, each of said elements having a perforation normally registering with the corresponding perforation of the other elements of the strip assembly to define an opening therein, said means including friction feed devices, a pin arranged selectively to enter said opening, and strip controlled means operable concomitantly to release said friction feed devices momentarily and in such moment to cause said pin to enter in and to withdraw from said opening.

5. Strip feeding apparatus, including a platen, means comprising releasable friction feed devices for advancing strip material over said platen, said strip being formed with an opening and a signalling position, a pin adapted to enter said opening, and means scanning the strip momentarily releasing said friction feed devices and effecting an entering and withdrawing movement of said pin relatively to said opening under the control of said signalling position.

6. Strip feeding apparatus according to claim 5, characterized in that said opening and said signalling position are in such predetermined spaced relation that upon arrival of said signalling position at a point to be scanned

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by said last named means said opening is in position to receive said pin.

7. In a typewriting or like machine, a rotatable platen, friction feed devices for advancing a strip of series connected superposed record forms over said platen in response to rotation thereof, the strip being formed with through openings in selected sets of said forms, a pin reciprocable to enter and withdraw from said openings when aligned therewith, means for interrupting the feeding of said strip upon arrival of each successive opening in line with said pin, and means for reciprocating said pin into and out of said openings concomitantly with interruption of feed of the strip.

8. In a typewriting or like machine, a rotatable platen, friction feed devices for advancing superposed record strip material over said platen, the strip being formed with longitudinally spaced apart openings and longitudinally spaced apart signalling positions in predetermined spaced relation to said opening, a reciprocable pin, said strip advancing relatively to said pin to bring said openings successively into position to receive said pin upon reciprocation thereof, means for sensing said signalling positions, and means for reciprocating said pin upon the sensing of a signalling position.

9. A typewriting or like machine according to claim 8,

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characterized by other means responsive to the sensing of a signalling position for momentarily interrupting the feed of the strip.

10. In a typewriting or like machine, a carriage frame, a rotatable platen in said frame, friction feed devices holding record strip material to said platen for advance thereof with rotation of the platen, said strip being formed with longitudinally spaced apart openings and with longitudinally spaced apart signalling positions, a pin mounted on said frame for reciprocable movement into and out of an aligned opening in the strip, and a sensing mechanism on said frame and operating in response to the sensing of a signalling position to reciprocate said pin and momentarily to release said friction feed devices.

11. A typewriting or like machine according to claim 10, wherein said pin and said sensing mechanism are comprised in a single unit mounted on said frame for adjustment relative thereto.

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