DEVICE FOR INTERMITTENTLY FEEDING STRIP MATERIAL

INVENTORS.
JOHN H. GRUVER
HAL K. MOE

BY
WILMER N. KIRK
AGENT
DEVICE FOR INTERMITTENTLY FEEDING STRIP MATERIAL

John H. Gruver, Cleveland, and Hal K. Moe, Willowick, Ohio, assignors to Addressograph Multigraph Corporation, Cleveland, Ohio, a corporation of Delaware

Filed June 30, 1967; Ser. No. 658,321

Int. Cl. G03B 1/24; B65H 17/40

U.S. Cl. 226—76

9 Claims

ABSTRACT OF THE DISCLOSURE

A strip feeding device for use with an imprinting machine forwards a strip containing marginally spaced holes and advances it intermittently in equal steps by pin wheels which engage the holes. The strip may contain an image to be transferred to a record form or it may itself receive an imprint, depending on the imprinting process employed.

The device may be actuated directly by the imprinting machine and includes a drive mechanism in the form of a crank arrangement which actuates a rack. An end of the rack is selectively positionable on the crank means, as determined by the desired increment of advance of the strip, and in its movement the rack and its associated parts intermittently rotate a driven shaft. The cranking arrangement also provides for gradual acceleration and gradual deceleration of the driven shaft in each cycle of operation. A brake mechanism affords accurate stopping of the driven shaft at the completion of each cycle.

A strip advancing shaft carries the pinwheels which engage the holes in the strip, and the strip advancing shaft is normally coupled to the driven shaft to permit simultaneous intermittent rotation of both shafts. Provision is made to disengage the strip advancing shaft from the driven shaft so that it may be rotated independently of rotation of the driven shaft to position the strip for precise register.

A pawl cooperating with a readily replaceable ratchet wheel is incorporated in the drive for the driven shaft so that the size of the minimum strip advance can be changed to accommodate particular requirements.

The present invention relates to feeding devices, and more particularly to feeding devices for strip material for use in association with addressing and printing machines and like equipment wherein the strip is advanced in step-by-step movement past an imprinting station in the machine.

Such strip feeding devices are particularly useful in instances where the strip to be fed is in an addressing or printing machine is a master strip bearing a readable legend on its surface and a mirror-image of the legend on the reverse side of the strip. The mirror image is transferable by heat and pressure contact between the strip and a business instrument, which may be in the form of a card, envelope, magazine, ledger sheet, or the like, in an addressing or printing machine such as is shown in U.S. Patent No. 5,018,723. Strip feeding devices of the nature with which the invention is concerned are also of great utility when used in conjunction with addressing or printing machines of the type shown in U.S. Patent No. 2,359,850. In such instances, the strip is usually a series of detachable, pre-printed record forms which receive imprints in pre-determined areas from embossed plates through an inked ribbon.

Strip feeding devices as heretofore known have certain disadvantages in that they are costly, due usually to requiring a separate power source, and are incapable of providing for accurate registration of matter either to be imprinted on the strip or to be transferred from the strip to a record form, and are frequently noisy and unreliable in operation.

It is a primary object of the invention to overcome these difficulties and to provide a strip feeding device which can be quickly and readily attached to an addressing or printing machine.

Another object of the invention is to provide a positive, and easily adjustable, arrangement for intermittently feeding the strip in predetermined increments within a range from a single line to several inches, depending on the amount of data which is to be imprinted or transferred.

Another object of the invention is to provide a variable speed arrangement for slowly starting advancement of the strip, reaching peak speed of advancement of the strip at approximately the mid-point of advance of the strip, and gradually decelerating movement of the strip to a stop.

A further object of the invention is to afford a strip feeding device which is operated as an ancillary function of the addressing or printing machine operation, rather than through a separate source of power.

In accordance with these and other objects which will become apparent hereinafter, the best mode contemplated for the present invention is disclosed in the accompanying drawings wherein:

FIG. 1 is a plan of the strip feeding device of the invention;

FIG. 2 is a section taken on the line 2—2 of FIG. 1;

FIG. 3 is a section on line 3—3 of FIG. 1 showing the driving mechanism for the device in elevation with the parts in neutral position;

FIG. 4 is a view similar to FIG. 3, but with the housing in phantom and showing the driving mechanism in operative position;

FIG. 5 is a section taken on the line 5—5 of FIG. 3; and

FIG. 6 is a section taken on the line 6—6 of FIG. 4.

Referring to FIGS. 1 and 2, there is shown a strip feeding device indicated generally at 10, including a side plate 12 and a housing 14. Mounted between side plate 12 and housing 14 are tie rods 16 and 18 which are effective to maintain proper spaced relation between the side plate and the housing. Also mounted between side plate 12 and a foot 14 of housing 14, and fastened thereto in any suitable manner, is a tubular bar 20.

The strip feeding device 10 may be attached to a printing machine in the following manner. A mounting rail 22 (FIGS. 1 and 2) is affixed to a panel P of the printing machine (a fragmentary portion of which is shown in phantom) in any suitable manner, and the bar 20 is fastened to the rail 22 by means of thumb screws 24. To assist in maintaining the feeding device 10 in proper position in relationship to the printing machine, brackets 25 are affixed to the bar 20 in any suitable manner, e.g., by the screws 25 and the bottom faces of the brackets rest on the rail 22 as shown in FIGS. 1 and 2. To further assure rigid mounting of the feeding device 10, there is provided a support member 26 which is fastened to the upper surface of the bar 20 as, for example, by a screw 21, in the manner shown in FIG. 2. An opening is provided near the upper end of the member 26 to accommodate a headed stud 28. A lock nut 30 is provided to retain the proper axial position of the stud 28 on member 26. In the mounting of the feeding device 10 on the printing machine, the head of the stud 28 is inserted into a suitable keyhole slot formed in the panel P of the printing machine and is shifted laterally in the keyhole slot so as to engage the narrow portion thereof and thereby prevent endwise withdrawal of the stud 28. A clamp nut 31 threaded on the stud can be run up into clamping cooper-
atation with the head of stud 28, and a friction spring 32 prevents inadvertent loosening. Journaling at one end in the side plate 12 and connected at its other end to a drive mechanism, to be described hereinbelow, in the housing 14, is an intermittently rotatable shaft 34 on which are mounted a pair of spaced, axially adjustable sprocket wheels or pinwheels 36, the sprockets or pins of which are progressively engageable in marginally spaced holes in a strip S in a conventional manner. Strip guides, indicated at 38, may be employed intermediate the pinwheels 36, the number of such guides and their spacing in relation to the pinwheels depending on the width of the strip S to be fed. For convenience, the guides 38 are slidably mounted on rod 18 and fastened in desired positions by thumb screws 40 which are threaded into hubs 42 affixed to the guides.

In order to maintain the strip S in engagement with the pinwheels 36, there are provided hold-down plates 44. Hold-down plates 44 preferably should be movable away from the pinwheels 36 when desired, e.g., when a fresh strip is to be threaded for feeding, and for this purpose slides 46 affixed to the hold-down plates are fastened to a rod 48 by means of thumb screws 50. Rod 48 is mounted for free rocking motion between side plate 12 and housing 14. Counterclockwise movement of rod 48 as seen in FIG. 2 is effective to open a gap between the hold-down plates 44 and the pinwheels 36 to admit and position the strip S, whereas clockwise movement of rod 48 brings the plates 44 into a position holding the strip in mesh with the sprockets, as shown in FIG. 2. A manually operated lever 51 may be utilized to manipulate rod 48, and any suitable means may be employed to hold the lever in either position.

Similar hold-down plates 44a may be used with any or all of the guides 38, as desired. As stated hereinabove, the strip feeding device is preferably operated as an auxiliary function of the printing machine, rather than having a separate source of power. For the purposes of the invention, it is deemed sufficient to direct attention to FIG. 1 wherein there is shown in broken lines a printing machine drive shaft PMDS the end of which is exposed through a suitable opening in the machine housing. The printing machine drive shaft PMDS is connected by a coupling 52 to a main drive shaft 53 of the stripping device 10. In this manner, both shafts may operate in unison, while still permitting ready connection and disconnection of the strip feeding device 10 with respect to the printing machine. The main drive shaft 53 extends through a boss 14b in the housing 14, as shown in FIGS. 1, 2, and 5, and is held against endwise movement by a collar 54 and a collar 56, both of which are pinned to the shaft in a conventional manner.

Referring to FIGS. 1, 3, 4, and 5, there is shown a drive mechanism which embodies a crank means. Thus, it will be noted that one end of a crank arm 58 is secured to the collar 56, and hence to the shaft 53, so that the crank arm 58 will swing as the shaft 53 rotates. A clamp 60, C-shaped in cross section, is mounted on crank arm 58 and is slideable thereon so as to be selectively positionable on the arm 58. Projecting from the clamp 60 is a stud 62 which serves to pivotally mount one end of a rack 66. A locking screw 64 is provided for locking clamp 60 to the crank arm 58 in any desired position, thus enabling the crank arm 58 to drive rack 66. The purpose for such arrangement will be described more fully hereinbelow.

In FIG. 1, and in detail in FIG. 6, there is shown an outboard bearing, indicated generally at 66. Referring to FIG. 6, it will be seen that the housing 14 is secured to a wall of the housing 14 in a conventional manner and comprises a series of spacer posts 70 and an end plate 72. Mounted for rotation within the outboard bearing 68 and extending through an opening in the wall of the housing 14, there is provided a driven shaft 74. Freely mounted on the shaft 74 is a spacer block 76 having a foot portion 78 which serves as a rocking guide for the rack 66 to hold the same in mesh with a rotary gear 80 which is freely mounted on the shaft 74 whereby movement of the rack imparts rotation to the rotary gear 80.

With reference to FIGS. 1, 3, 4, and 6, there is fixed to the gear 80 and movable therewith an arm 82, having at its free end a fixed pin 84 on which a pawl 86 is pivotally mounted. Adjacent to the arm 82 is a retaining disc 88 which is utilized to prevent endwise movement of spacer block 76, gear 80 and arm 82 along shaft 74. Retaining disc 88 includes a hub 90 and a locating pin 92. Pin 92 engages an opening in a toothed disc 94, see FIGS. 3, 4, and 6, thereby insuring simultaneous rotation of shaft 74 with disc 94. A spring 97 extends between pawl 86 and arm 82, urging pawl 86 into engagement with the toothed periphery of disc 94. The toothed disc is held fast against disc 88 on shaft 74 by a cap nut 96 threaded on the end of the shaft. As can be seen clearly in FIGS. 3 and 4, the teeth in disc 94 are formed in a conventional manner so as to permit pawl 86 to ride over the teeth when moved in one direction while providing positive engagement between the teeth in disc 94 when the pawl moves in the opposite direction, the purpose of which will be explained hereinafter.

It should be understood that the disc 94 may contain any number of equally spaced-apart teeth, as determined by the increment of strip advance desired. For example, it may be desirable in one instance to advance the strip S in 1/4-inch increments, which may represent a single line of typewriter spacing, and in another instance in 1/8-inch increments, which may represent single line spacing of data-processing equipment. All that is necessary to make such a change is to substitute another merely by removing cap nut 96, making the substitution, and replacing the cap nut.

From the foregoing description, it will be seen that rotation of shaft 74 is controlled by the following sequence of movements. Shaft PMDS is rotated with each cycle of the printing machine and, through coupling 52, causes rotation of main drive shaft 53 and consequent swinging of the crank arm 58. By referring to FIGS. 1 and 3, it will be noted that clamp 60 is positioned on crank arm 58 so that its right edge abuts against a stop post 63a. In this position, which may be termed a neutral position, the locking screw 64 is threaded into the clamp 60, with the result that the arm 58 is held in position with respect to the axis of shaft 53, and consequently, although the shaft 53 and crank arm 58 may rotate, no movement is imparted to the rack 66. Such a condition, of course, might prevail in instances where the printing machine is being operated for purposes other than the feeding of the strip S and would make it unnecessary to disengage the strip feeding device 10 from the printing machine and also would prevent undue wearing of parts. However, of importance so far as the invention is concerned is the fact that the neutral position referred to hereinabove is regarded as the starting point from which to position the clamp 60 on the crank arm 58.

Referring now to the example shown in FIG. 4, it will be noted that the clamp 60 has been moved along crank arm 58 so as to be positioned thereon in a location somewhat remote from the neutral position shown in FIGS. 1, 3, and 6. FIG. 5. Since the end of rack 66 is mounted on the stud 62 of clamp 60, it moves a corresponding distance, and, in so doing, causes rotation of gear 80 which, in turn, moves the arm 82 and pawl 86 to the desired initial operating position in relation to the toothed disc 94. Subsequent rotation of shaft 53 and of crank arm 58 brings about a positive bearing on rack 66, wherein the toothed disc 94 is forced in a counterclockwise rotation, as viewed in FIG. 4, by engagement with pawl 86. Movement of the toothed disc 94, as controlled by movement of rack 66, thus imparts predetermined intermittent rota-
tion to retaining disc 88 and shaft 74 to which disc 88 is pinned, as explained hereinabove.

An important feature of the drive imparted to shaft 74 resides in the variable speed of travel of the rack 66 in its to-and-fro movement which is provided by the combination of the action of crank arm 58, and the location of clamp 60 thereon, and the consequent set point provided for the rack 66 in relation to the drive shaft 53. In each complete cycle of the printing machine, the crank arm 58 rotates approximately 180° and then returns to its starting position. Thus, while the shaft 53 may maintain a substantially uniform rate of speed of rotation during this cycle, the rack 66 starts slowly, gradually accelerates to its maximum speed when the crank arm 58 has reached approximately 90° of its swing, and then decelerates gradually until the crank arm has completed its 180° of travel. Bearing in mind that the rack 66, the toothed disc 94 and the shaft 74 move simultaneously, it follows that shaft 74 will rotate at a rate which corresponds to the speed of movement of the rack 66. Since rotation of shaft 74 controls rotation of the strip advancing shaft 34, in a manner which will be described hereinbelow, it will be appreciated that the strip S starts its advance slowly, accelerates to peak speed approximately at the midpoint of its advance, and then decelerates gradually to a stop. Such controlled intermittent movement of the strip S thus provides for a highly advantageous smooth, non-jerky advance of the strip which greatly reduces the chance for tearing the sprocket holes, even at high speeds.

Although, as pointed out hereinabove, shaft 74 is rotating at gradually decreasing speed as the printing machine completes each cycle, a braking means is provided to insure that there will be no over-running, or over-throw, of the shaft on completion of the cycle. A simple, but highly effective, brake mechanism is illustrated in FIG. 6, and comprises a rotary brake disc 100 which is affixed to shaft 74 so as to rotate therewith. A stationary brake disc 102 frictionally engages brake 100, and a compression spring 104, mounted in a pair of spring seats 106, serves to maintain constant pressure of the brake disc 102 on brake disc 100. Both the brake disc 102 and the spring seat 106 are held against rotational movement by any suitable keyed engagement with the spacer posts 70. A threaded and adjusting stop collar 110, with its associated setscrew 110 and deformable plug 110a, engages a threaded portion of shaft 74 to maintain compression of the spring 104 and also permits adjustment of the drag of brake disc 102 against brake 100. With the braking arrangement shown, it will be readily seen that the shaft 74 may be brought to a complete stop continuing stationary.

Intermittent rotation of driven shaft 74 controls intermittent rotation of the strip advancing shaft 34 with which it is in end-to-end alignment, as seen in FIG. 6. The manner in which this is accomplished will now be described. By referring to FIG. 6, it will be seen that one end of shaft 74 extends somewhat beyond end plate 72 of the outboard bearing 68 and has fixedly mounted thereon, and rotate therewith, a pin retaining member 112. The member 112 is formed so as to include a pair of spaced-apart, substantially parallel annular sections 114, each of which contains, slightly inwardly of its periphery, a lampire of therein aligned openings 116. Each of the openings 116 is of sufficient dimension to permit a drive pin 118 to be slidably positionable therein. As will be seen, each of the drive pins 118 is retained in the openings 116, and in the space between the sections 114, by a compression spring 120 and a retainer 122, e.g., a C-washer. Such an arrangement permits pins 118 to be moved in either of alternate positions A or B, as indicated, the importance of which will become apparent as the description proceeds.

In FIGS. 1 and 6 there is shown a coupling 124 which is mounted for sliding movement on shaft 34 while having a driving relationship thereto. This connection is effected by the cooperation of a slot 126 in coupling 124 which engages a pin 128 fixed to shaft 34. Coupling 124 is urged into abutment with the pin retaining member 112 by the spring 130. Spring 130 is held against movement on shaft 34 by retainer 132 (FIG. 1).

Coupling 124 includes a knob portion 134 and a disc portion 136. The disc 136 contains a series of uniformly spaced notches, as indicated. The pin 118 engages the top notch of each of the drive pins 118 with one of the notches 138 in coupling 136, as shown at A in FIG. 6, locks the pin retaining member 112 to the coupling 124, whereby rotation of shaft 74 and pin retaining member 112 causes rotation of coupling 124, and, consequently, of shaft 34. The parts have been designed in such a manner that the condition shown at A in FIG. 6 will exist with respect to one pin only, all other pins being forced to the position shown at B. This can be accomplished by having the notches 138 differ in number from the number of pins 118 as, for example, by providing one less notch 138 in disc 136 than there are pins 118 in pin retainer 112.

From the foregoing description, it will be seen that pin retaining member 112, with its associated parts such as pins 118 and springs 120, and coupling 124 with its notched disc portion 136, together comprise a transmission as indicated generally by the reference numeral 140 in FIG. 6.

The novel arrangement just described thus provides a positive drive for the strip advancing shaft 34 by engagement of any one of the pins 118 with any one of the notches 138, and also provides a fine increment adjustment of shaft 34 with respect to the position of shaft 74. The fine increment adjustment permits the operator to rotate the strip advancing shaft 34 in either direction independently of shaft 74 and without disturbing the position of shaft 74. Such adjustment may be desirable, for example, at the start of a printing operation. After the device has been set up to advance the strip S a predetermined distance, it may be found that the imprint made by the printing machine is slightly out of longitudinal register with the desired areas of the strip. Such an out-of-register condition, of course, might also exist in instances where an image is being heat-transferred from the strip S to a record form. In any event, with the fine increment adjustment shown, it is only necessary for the operator to grasp the knob 134 and slide the coupling 124 and its associated disc 136 to the left, as viewed in FIGS. 1 and 6, until the coupling disc is free of all pins on the pin retaining member 112. In such retracted position, the coupling 124 can be rotated in either a clockwise or counter-clockwise direction and, through the cooperation of the slot 126 in coupling 124 with the pin 128 of shaft 34, shaft 34 and the pin wheels 36 mounted thereon are rotated the desired amount. However, since there is no pin 118 in engagement with a notch 138, shaft 74 remains stationary. Such independent positioning of shaft 34 and the resulting movement of pin wheels 36 thus afford longitudinal adjustment of the positioning of the strip S in relation to the imprint to be effected by the printing machine. When such adjustment has been completed, knob 134 is released and spring 130 urges the coupling 124 to return to the position shown in FIG. 6, i.e., in abutment with pin retainer member 112. One of the pins 118 will again engage a notch 138, thus locking shaft 34 in position to be driven with shaft 74. Because, as stated previously, there are a number of pins 118 positioned adjacent the periphery of the pin retainer 112, and there is one more pin 118 than there are notches 138 in disc 136, only slight rotation of the coupling 124, e.g., a few thousandths of an inch, results in one of the pins engaging one of the notches.

Summarizing the operation of the strip feeding device, the strip S is threaded over the pin wheels 36 and hold-down plates 44 are rocked to hold-down position, thereby preventing inadvertent displacement of the strip. The driving mechanism should be in the neutral position shown in FIG. 3, i.e., with the clamp 60 snug against stop pin.
SP, crank arm 58 parallel to rack 66, and pawl 86 in engagement with a notch in the 0 or zero position indicated on toothed disc 94. Clamp 60 is then slid along crank arm 58 to the desired position. The sliding movement of the clamp also moves rack 66 to which the clamp 60 is connected, thereby imparting rotation to rotary gear 50 and arm 82 and causing pawl 86 to ride over the teeth of toothed disc 94 which is stationary at this point. Assuming, for example, that the strip S is to be advanced in the direction indicated by the arrow in Fig. 2 in 2-inch increments, movement of the clamp 60 along crank arm 58 is continued until the pawl enters a notch designated by the numeral 2 on disc 94, or in the position shown in Fig. 4. At this point, clamp 60 is locked in position on crank arm 58 by tightening screw 64.

With the set-up thus completed, the device is actuated and, as stated hereinafter, rotation of the main drive shaft 53 provides a cranking action which pulls rack 66 toward the right, as viewed in Fig. 4, causing gear 50, arm 82, and toothed disc 94, through the intervention of pawl 86, to rotate in a counterclockwise direction. Rotation of the toothed disc 94 forces rotation of shaft 74 which, in turn, through transmission 140 causes shaft 34 to rotate by means of engagement of one of the pins 118 with a notch 138 in coupling disc 136, as described hereinafter, thus advancing the strip S by a predetermined increment. On the return stroke of rack 66, pawl 86 rides over the teeth on toothed disc 94 until the rack returns to its initial position.

In the example shown in Fig. 4, it will be recognized that if, in the positioning of the clamp 60 on crank arm 58, pawl 86 advances from the 0 to the 2 position on disc 94 and such advance represents 2 inches, a complete 180° swing of the crank arm will cause the disc 94 to be rotated approximately 4 inches, or twice the distance of the initial set-up of 2 inches. However, in the design of the parts, if the diameter of disc 94 is twice the diameter of pin wheels 36, peripheral movement of the disc 94 and pin wheels 36 will be in the same ratio, and thus, rotation of the pin wheels will be half that of the disc 94, i.e., the desired 2 inches in the example cited.

If, at this time, the imprint on the strip S or the transfer of the image from the strip to a record form requires that further movement of the strip is desired, pin wheels 36 are shifted along shaft 34 accordingly. However, in the event misregistration is indicated in the direction of travel of the strip, the fine increment adjustment previously described may be utilized. It will be recalled that such adjustment may be quickly and effectively made by backing the coupling 124 away from the pin retaining member 112 until pins 118 are out of engagement with any of the notches 138, and turning the coupling in either direction, and with it the shaft 34, the desired amount. Release of the coupling and re-engagement of a pin 118 in a notch 138 restores the drive to shaft 34.

The foregoing description has proceeded on the assumption that the drive shaft PMDS has a continuous rotary motion. It can be readily seen, however, that the strip feeding device will work equally well in a situation where the drive shaft PMDS is oscillated. Preferably the oscillation should be through a fairly large angle near 180° to secure the full benefit of the accelerating and decelerating motion imparted by the crank unless, of course, this type of simple harmonic variation is already exhibited in the motion of shaft PMDS. For convenience any of the foregoing PMDS are considered to be embraced in the term "rotation," and the word is thus employed in the subjoined claims.

While a preferred embodiment of the invention have been described and illustrated, it is to be understood that this is capable of variation and modification.

What is claimed is:

1. A feeding device for intermittently advancing strip material in predetermined increments comprising:

(a) a drive shaft, rotatable during each cycle of operation of the device;
(b) crank means mounted on the drive shaft and rotatable therewith;
(c) a rack having one end selectively positionable on the drive shaft and pivotally mounted thereon so as to be reciprocated thereby;
(d) a driven shaft;
(e) means controlled by the rack for imparting predetermined intermittent rotation to the driven shaft;
(f) a strip advancing shaft normally connected to the driven shaft and rotatable therewith;
(g) a positive drive transmission, forming the connection between the strip advancing shaft and the driven shaft, said transmission including means for providing fire increment rotary adjustment between said shafts; and
(h) a pin wheel mounted on the strip advancing shaft adapted to advance the strip material.

2. A feeding device according to claim 1, and further including a brake means acting on the driven shaft to insure accurate stopping of said driven shaft upon completion of each cycle of operation.

3. A feeding device according to claim 1 wherein the driven shaft rotation imparting means includes:

(a) a toothed disc mounted on the driven shaft and rotatable therewith;
(b) a pawl engageable with the toothed disc and adapted to simultaneously rotate the disc and the driven shaft in a direction corresponding to the direction of advancement of the strip material; and
(c) a rotary gear freely mounted on the driven shaft and rotatable therewith by movement of the rack, said rotary gear having an arm affixed thereto pivotally mounting said pawl for engagement with said toothed disc.

4. A feeding device according to claim 3, and further including a brake means acting on the driven shaft to insure accurate stopping of said driven shaft upon completion of each cycle of operation.

5. A feeding device according to claim 3 which includes readily disengagable means for drivingly connecting the toothed disc with the driven shaft while providing for ready removal and replacement of the disc, whereby toothed discs with different tooth spacings can be readily interchanged by the operator.

6. A feeding device for intermittently advancing strip material in predetermined increments comprising:

(a) a drive shaft, rotatable during each cycle of operation of the device;
(b) crank means mounted on the drive shaft and rotatable therewith;
(c) a rack having one end selectively positionable on the crank means and pivotally mounted thereon so as to be reciprocated thereby;
(d) a driven shaft;
(e) means controlled by the rack for imparting predetermined intermittent rotation to the driven shaft;
(f) a pin retaining member mounted on one end of said driven shaft for rotation therewith, said member carrying a series of pins therein;
(g) a strip advancing shaft positioned in end-to-end alignment with the driven shaft and normally rotatable therewith; and
(h) a positive drive transmission having finite increment rotary adjustment between said driven shaft and said strip advancing shaft.

7. A feeding device according to claim 6 wherein the driven shaft rotation imparting means includes:

(a) a toothed disc mounted on the driven shaft and rotatable therewith;
(b) a pawl engageable with the toothed disc and adapted to simultaneously rotate the disc and the driven shaft in a direction corresponding to the direction of advancement of the strip material; and
(c) a rotary gear freely mounted on the driven shaft and rotatable therewith by movement of the rack, said
rotary gear having an arm affixed thereto pivotally mounting said pawl for engagement with said toothed disc.

8. A feeding device according to claim 6, and including a brake means acting on the driven shaft to insure accurate stopping of said driven shaft upon completion of each cycle of operation.

9. A feeding device for intermittently advancing strip material in predetermined increments comprising:

(a) a drive shaft, rotatable during each cycle of operation of the device;
(b) crank means mounted on the drive shaft and rotatable therewith;
(c) a rack having one end selectively positionable on the crank means and pivotally mounted thereon so as to be reciprocated thereby;
(d) means controlled by the rack for imparting predetermined intermittent rotation to a driven shaft;
(e) a strip advancing shaft positioned in end-to-end alignment with the driven shaft and normally rotatable therewith; and

(f) a positive drive transmission having fine increment rotary adjustment between said driven shaft and said strip advancing shaft, comprising:

a pin retaining member mounted on one end of said driven shaft for rotation therewith, said member carrying a series of pins therein;
da coupling mounted on said strip advancing shaft and having two positions thereon, said coupling including a disc having notches therein, wherein in one of said positions of said coupling one of said notches is engageable with one of said pins in said pin retaining member to cause rotation of said strip advancing shaft according to rotation of said driven shaft, said coupling in the other position being retracted from said pin retaining member so as to disengage said pin from said notch to thereby permit fine increment rotary adjustment of said strip advancing shaft independent of rotation of said driven shaft.

References Cited

UNITED STATES PATENTS

1,030,183 6/1912 Inman .................. 226—157 X
1,421,489 7/1922 Joslin .................. 226—157 X
1,785,546 12/1930 Flett .................. 226—157 X
2,175,416 10/1939 Trump et al. ........ 226—157 X
2,758,837 8/1956 Littell et. al. ........ 226—157 X
5,281,037 10/1966 Young ................ 226—76 X

ALLEN N. KNOWLES, Primary Examiner

U.S. Cl. X.R.

74—121; 226—174, 157