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STEP BY STEP FEEDING DEVICE FOR A PUNCHED SUPPORT OF
A PUNCHING OR READING APPARATUS

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2 Sheets-Sheet 1

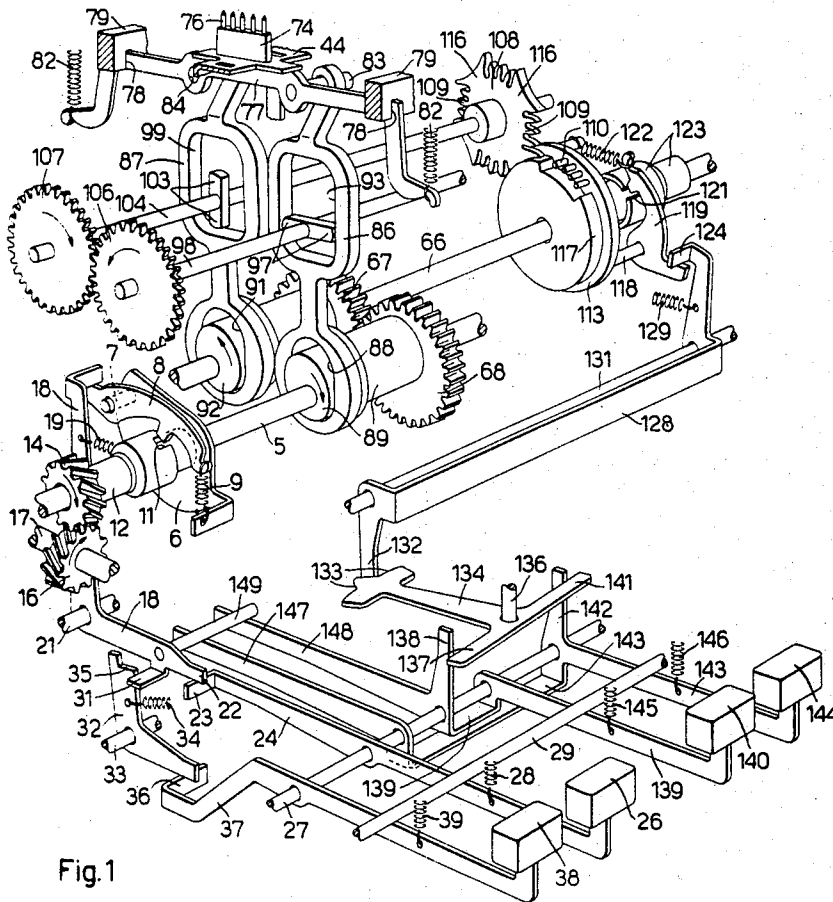


Fig. 1

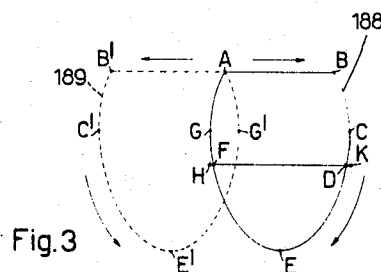


Fig. 3

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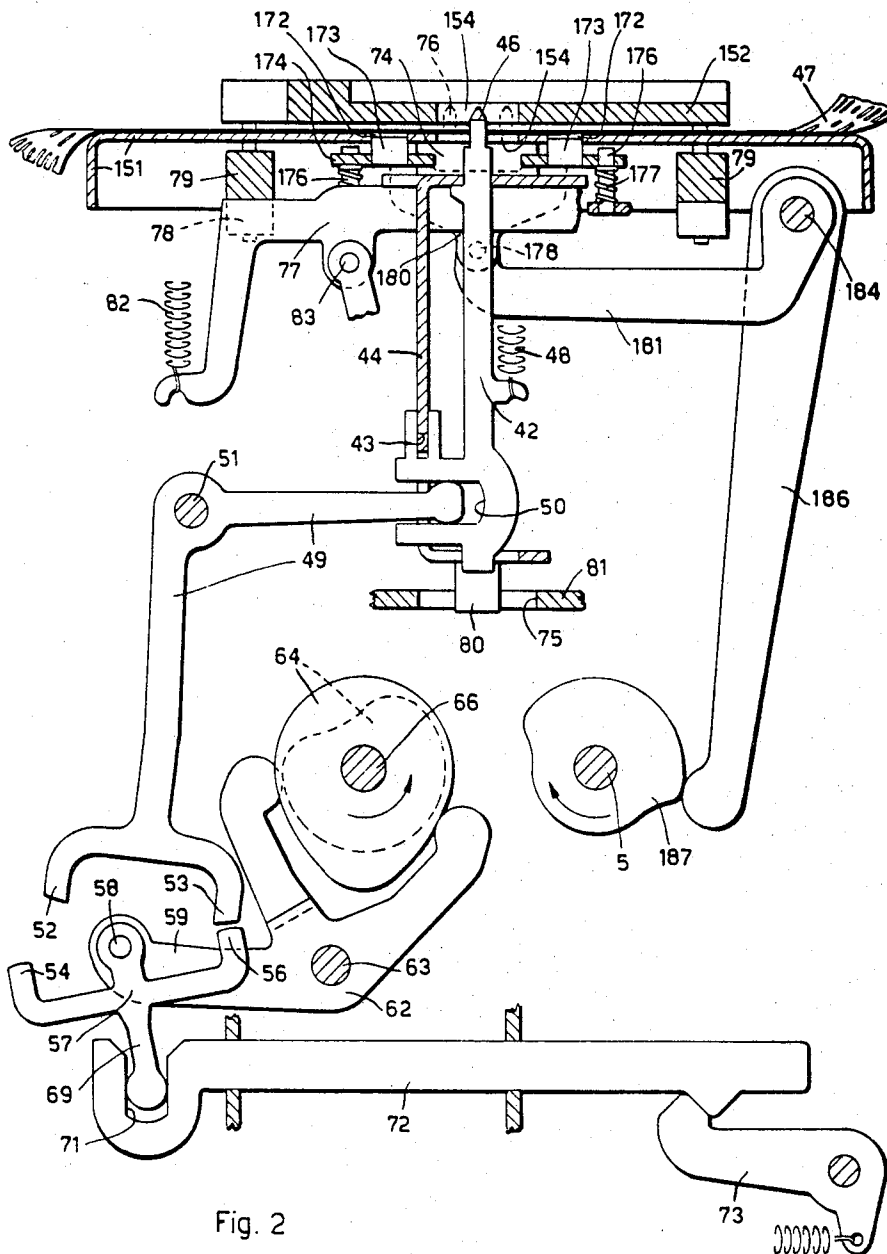


Fig. 2

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STEP BY STEP FEEDING DEVICE FOR A PUNCHED SUPPORT OF A PUNCHING OR READING APPARATUS

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6 Claims

ABSTRACT OF THE DISCLOSURE

A step by step feeding device for a punched record support of a punching or reading apparatus having a set of code elements mounted on a frame cyclically movable according to a closed path and for punching or reading said support during the feeding movement thereof, comprising a feeding member secured to said frame and adapted to intermittently engage said support for feeding same. The feeding member is operated by a pair of cyclically rotatable eccentrics, one of said eccentrics being adapted to positively reciprocate said feeding member in the feeding direction, both said eccentrics being adapted to jointly control said feeding member to be reciprocated in a direction perpendicular to said feeding direction.

BACKGROUND OF THE INVENTION

This invention relates to a step by step feeding device for a punched record support of a punching or reading apparatus having a set of code elements cyclically conditionable for punching or reading said support during the feeding movement thereof, said elements being mounted on a frame cyclically movable according to a closed path, said device comprising a feeding member adapted to intermittently engage said support for feeding same.

There are already known step by step feeding devices of the above type. In a known device embodied in a tape reader, the sensing elements and the feeding member are simultaneously operable by a first electromagnet in a direction perpendicular to the tape and by a second electromagnet in a direction parallel to the tape. Therefore, this device requires the synchronization of the two electromagnets and is also unadapted to backspace the tape.

In another known reader, the tape is fed by the same sensing elements, which are moved according to a closed path by a single eccentric. To backspace the tape, the rotation of the eccentric might be reversed, but in this case the sensing elements may tear the tape.

SUMMARY OF THE INVENTION

These disadvantages are obviated by a step by step feeding device according to the invention, which is characterized in that said feeding member is secured to said frame and is operated by a pair of cyclically rotatable eccentrics, one of said eccentrics being adapted to positively reciprocate said feeding member in the feeding direction, both said eccentrics being adapted to jointly control said feeding member to be reciprocated in a direction perpendicular to said feeding direction.

This and other characteristics of the invention will become apparent from the following description of a preferred embodiment thereof and from the accompanying drawings, wherein:

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BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a left hand rear perspective view of a punched tape reader incorporating a step by step feeding device according to the invention;

FIG. 2 is a partial left hand longitudinal sectional view of the reader of FIG. 1;

FIG. 3 is a diagram of the operation of the feeding device.

DESCRIPTION OF THE PREFERRED EMBODIMENTS OF THE INVENTION

With reference to the FIG. 1, the numeral 5 indicates a main shaft adapted to be cyclically rotated clockwise for operating a punched tape reader for example for a teleprinter system. More particularly the shaft 5 is rotated clockwise 360 degrees cycle upon engaging a clutch comprising a driven disk 6 secured to the shaft 5 and a driving sleeve 12 rotatable on the shaft 5. Fulcrumed on a pivot 7 of the disk 6 is a tooth 8 connected to the disk 6 by a spring 9. The tooth 8 is adapted to engage a notch 11 of the sleeve 12, which is integral with a worm gear 14 intermeshing with another worm gear 16. This latter is secured to a shaft 17, which represents a conventional transmitting shaft cyclically rotatable for transmitting each code combination read on the tape.

The tooth 8 is normally latched by a trip lever 18 so as to disengage the sleeve 12. The lever 18 is held in the position of FIG. 1 by a spring 19 which prevails over the spring 9. The lever 18 is pivoted on a stationary shaft 21 and is provided with a projection 22 adapted to cooperate with a lug 23 of a lever 24 fulcrumed on a stationary shaft 27 and normally urged by a spring 28 to contact a stationary shaft 29. The lever 18 when rocked counterclockwise is adapted to engage in a manner known per se a clutch not shown in the drawings, to cyclically rotate the transmitting shaft 17 one revolution clockwise. Secured to the lever 24 is a key 26 depressible to start the tape reader.

Furthermore the lever 18 is provided with a bent lug 31 adapted to cooperate with a latch 32 fulcrumed on a pivot 33. The latch 32 is provided with a shoulder 35 and is normally urged by a spring 34 to contact the lug 31 of the lever 18. The latch 32 is also adapted to cooperate with a bent lug 36 of a lever 37 fulcrumed on the shaft 27 and normally urged by a spring 39 to contact the shaft 29. Secured to the lever 37 is a key 38 depressible to stop the tape reader.

The reader comprises a set of five code elements or slides 42 (FIG. 2), each one sliding in a notch of a frame 44. Each slide 42 is also connected to the frame 44 by a spring 48 and is provided with a sensing pin 46 adapted to sense a unit of the code combination punched on a tape 47. Each slide 42 is provided with a notch 50 engaged by an arm of a corresponding transfer lever 49 fulcrumed on a stationary shaft 51.

The other arm of each lever 49 is provided with two projections 52 and 53 adapted to selectively cooperate with two arms 54 or 56 of a T-shaped lever 57. The five levers 57 are fulcrumed on a pivot 58 secured to an arm 59 of a lever 62 pivoted on a stationary shaft 63. The lever 62 cooperates with a pair of complementary cams 64 secured to a shaft 66. A toothed wheel 67 (FIG. 1) secured to the shaft 66 meshes with a similar toothed wheel 68 secured to the shaft 5. Each lever 57 (FIG. 2) is also provided with an arm 69 engaging a slot 71 of a conventional transmission code bar 72 adapted to assume selectively one of a pair of positions determined by a spring urged locking member 73. The frame 44 is secured to a bar 77 entering two vertical notches 78 of a pair of stationary bars 79 and is provided with a projection 80 (FIG. 2) slidable within a notch 75 of a portion

81 of the stationary machine frame. The bar 77 is normally urged by two springs 82 to contact the top end of the notches 78.

Secured to the frame 44 (FIG. 1) is a tape feeding member 74 provided with five pins 76 adapted to simultaneously engage the conventional feed holes of the tape 47.

Secured to the bar 77 and symmetrically arranged with respect to the slides 42 is a pair of pivots 83 and 84 pivotally mounting a pair of links 86 and 87. The link 86 is provided with a slot 88 embracing an eccentric 89 secured to the shaft 5, whereas the link 87 is provided with a slot 91 embracing a second eccentric 92 secured to the shaft 66. The slots 88 and 91 have a width equal to the diameter of the eccentrics 89 and 92, but they have a length greater than said diameter. When the reader is at rest the eccentrics 89 and 92 have their eccentricity inclined 45 degrees with respect to the vertical in opposite and convergent directions. A gap is then formed between the eccentrics 89 and 92 and the lower part of the corresponding slots 88 and 91.

Furthermore the link 86 is provided with a window 93, the vertical edges of which cooperate with a normally effective guiding member formed of a pair of opposite projections 97 secured to a shaft 98. Likewise, the connecting rod 87 is provided with a window 99, the edges of which are adapted to cooperate with a normally ineffective second guiding member formed of a pair of opposite projections 103 secured to a second shaft 104. The projections 103 are offset 90 degrees with respect to the projections 97. Secured to the shafts 98 and 104 are a pair of intermeshing similar toothed wheels 106 and 107.

Secured to the shaft 104 is also a geneva wheel 108 provided with four toothed portions 109 distanced apart 90 degrees and adapted to cooperate with a group of pins 110 secured to a disk 113 rotatably mounted on the shaft 68. The geneva wheel 108 is also provided with four projections 116 adapted to cooperate with a cylindrical surface 117 of the disk 113 to be held standing in each of the four read positions. Secured to the disk 113 is a pivot 118 pivotally mounting a tooth 119 also connected to the disk 113 by a spring 122 and adapted to cooperate with a notch 121 of a sleeve 123 secured to the shaft 66.

Normally the tooth 119 is held disengaged from the sleeve 123 by a lug 124 of a bail 128 fulcrumed on a stationary shaft 131. An arm 132 of the bail 128 is urged by a spring 129 to contact a cam surface 133 of a lever 134 fulcrumed on a stationary vertical pivot 136. The lever 134 is provided with a first arm 131 adapted to cooperate with a projection 138 of a bail 139 fulcrumed on the shaft 27 and urged by a spring 145 to contact the shaft 29. Secured to the bail 138 is a key 140 depressible for causing the feeding device to feed the tape in an advancing direction (leftwards in the drawings). Another arm 141 of the lever 134 is adapted to cooperate with a projection 142 of a second bail 143 fulcrumed on the shaft 27 urged by a spring 146 to contact the shaft 29. Secured to the bail 143 is a key depressible for causing the feeding device to feed the tape in a return direction. Each bail 139, 143 is provided with an arm 147, respectively 148, adapted to cooperate with a pin 149 secured to the trip lever 18.

The tape 47 (FIG. 2) to be read is guided between a pair of plates 151 and 152 provided with slots 154 allowing the passage of the pins 46 and the pins 76. The plate 151 is also provided with four holes 172, only two being shown in FIG. 2, each one slidably mounting a pin 173 having the upper surface knurled. The pins 173 are secured to a plate 174 vertically slidable on four pins 176 secured to the stationary frame of the reader and pushed upwards by four compression springs 177. The plate 174 is provided with two vertical bent portions 180 rotatably mounted on a pair of pins 178 secured to a pair of arms 181 secured to a shaft 184 rotatable on the stationary

machine frame. Secured to the shaft 184 is also a third arm 186 normally urged by the springs 177 to contact a cam 187 of the main shaft 5.

The feeding device operates as follows.

In FIG. 1 the feeding device is predisposed for advancing the punched tape rightwards. The pins 76 of the feeding member 74 (FIG. 2) engage the feed holes of the tape 47, while the pins 46 enter the possible code combination holes punched on the tape 47. The pins 46 not entering a hole are displaced downwards by the tape 47 against the urge of the springs 48. The levers 49 are thus selectively positioned to face the projections 52 to the arm 54, or the projection 53 to the arm 56, of the corresponding levers 57.

At the depression of the key 26 (FIG. 1), the trip lever 18 is rocked counterclockwise and is latched in rocked position by the latch 32. Then the lever 18 on the one hand causes the transmitting shaft 17 to be rotated clockwise on revolution, on the other hand it releases the tooth 8 which immediately engages the notch 11. Therefore as the shaft 17 starts rotating counterclockwise, through the wheels 16 and 14 and the clutch 12, 8 it also rotates the shaft 5 clockwise. Moreover, through the wheels 67 and 68, the shaft 66 is rotated counterclockwise whereby the eccentrics 89 and 92 are rotated in opposite directions.

Since the link 86 is guided by the projections 97, it compels the pivot 83 to be displaced parallelly to the tape bodily with the bar 77 and the pivot 84, while the link 87 being not engaged by the projections 103 follows the path of the pivot 84. Therefore each point of the bar 77, the frame 44 and of the feeding member 74 covers a closed path in an enlarged scale shown by a solid line 188 in FIG. 3.

More particularly, since the bar 77 (FIG. 1) is held by the springs 82 to contact the top end of the notches 78, the pins 76 during the first 90 degrees of rotation of the shaft 66 are displaced from point A to point B through a rectilinear portion of the path 188. Then the pins 76 engaging the feed holes feed the tape in the advancing direction. Thereafter the pins 76 begin to move downwards and cover an elliptic portion of the path 188 passing through point C where the step of the tape is completed. At the point D the pins 76 leave the tape holes and continue their downward movement till point E. Then the pins 76 begin to move upwards and return to the initial position A, passing through point F where each pin 76 engages the next feed hole of the tape, and through G where the pins 76 begin to draw the tape for the next step. The horizontal projection of the portions CD and FG of the path 188 giving segments $\overline{KD}$ and $\overline{FH}$ does not affect the tape because this corresponds to the engagement of the conical end of the pins 76 (FIG. 2) with the holes of the tape 47.

Since the frame 44 is integral with the pins 76, the pins 46 of the sensing members 42 which encounter a code hole on the tape 47 are moved along a path similar to the one of the pins 76. The pins 46 which do not encounter a hole are arrested by the tape 47 and during the causing operation instead of covering the path FABD (FIG. 3) successively cover the straight segments FH, HK, KD.

The code combination set up on the levers 49 (FIG. 2) is transferred to the code bars 72 while the pins 46 and 76 are moved along the segment AB (FIG. 3). Then the cams 64 rock the lever 62 counterclockwise till the arms 54, 56 of the levers 57 engage the projections 52, 53 of the levers 49. Thus the levers 57 are selectively rocked in accordance with the code combination set up on the levers 49, whereby the code bars 7 are accordingly positioned to transmit the relevant code combination over the telegraph line in a manner known per se.

When the pins 46 and 76 are moved along the arc CEG, the cam 187 causes the springs 177 to displace the plate 174 upwards, whereby the tape 47 is pinched between the knurled surfaces of the pins 173 and the

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plate 192, thus preventing the tape 47 from returning or being unduly displaced.

The shafts 17 and 5 are cyclically rotated as long as the lever 18 (FIG. 1) is held rocked by the latch 32. Upon depressing the key 38, the lever 37 through the lug 36 rocks the latch 32 counterclockwise. Then the latch 32 releases the lever 18 which at the end of the reading cycle on the one hand causes the shaft 17 to be arrested, on the other hand disengages the tooth 8 from the notch 11 thus stopping the eccentrics 89 and 92, whereby the reader is stopped.

Upon depressing the key 144, the bail 143 on the one hand through the arm 147 rocks the lever 18 at the depression of the key 86, on the other hand through the projection 142 rocks the lever 134 clockwise. Now the cam surface 133 rocks the bail 128 clockwise, whereby the tooth 119 is rocked counterclockwise and engages the notch 121 of the sleeve 123. During the first cycle of the shaft 66 the disk 113 is rotated one revolution counterclockwise. At the beginning of the rotation of the shaft 66, the pins 110 of the disk 113 engage one of the toothed portions 109 of the geneva wheel 108, which is thus rotated 90 degrees clockwise together with the shaft 104, whereby the projections 103 are positioned horizontally. Furthermore the shaft 104 through the wheels 106 and 107 rotates the shaft 98 90 degrees counterclockwise, thus positioning the projections 97 vertically. At the end of the cycle of the disk 113 the lever 119 is latched again by the lug 128. Now the link 87 is guided by the projections 103 and is thus caused to displace the bar 77, while the link 86 follows the path of the pivot 83 and merely contributes to vertically displace the bar 74. Now the bar 77, the frame 44, the feeding member 74 and the slides 42 follow the path shown in FIG. 3 by a broken line 189. More particularly, at the beginning of the first cycle of the shaft 66 the pins 76 should be displaced from the point A to the point B. Due to the simultaneous rotation of the shafts 98 and 104, the projections 103 immediately engage the link 87, whereby the pins 76 are moved in effect from the point A to the point B', whereby the tape 47 is returned one step. Subsequently the pins 76 are moved along the arc B', C', E', G'A in a manner similar to that previously described.

It is thus clear that the feeding member 74 is secured to the frame 44 of the sensing members 42 and is operated by a pair of eccentrics 89, 92, the eccentric 89 being adapted to positively reciprocate the feeding member 74 in the feeding direction, both eccentrics 89, 92 being adapted to jointly control the feeding member 74 to be reciprocated in a direction perpendicular to said feeding direction.

It is intended that many changes, improvements and additions of parts may be made to the described displacing device.

What is claimed is:

1. A step by step feeding device for a punched record support of a punching or reading apparatus having a set of code elements cyclically conditionable for punching or reading said support during the feeding movement thereof, and a frame for mounting said elements, said feeding device comprising in combination:

- (a) a feeding member secured to said frame,
- (b) a pair of parallel shafts cyclically rotatable in opposite directions at the same speed,
- (c) a pair of circular eccentrics each one secured to one of said shafts,
- (d) a pair of links associated with said pair of eccentrics and connected to said feeding member,
- (e) an aperture on each one of said links to embrace the associated eccentric so as to contact same substantially through 180 degrees for moving said feeding member and said frame according to a closed path to cause said feeding member to intermittently engage said support when moved on a portion of said path,

(f) and means for conditioning one of said eccentrics to cause the associated link to positively reciprocate said feeding member in the feeding direction of said support, said means further conditioning both said eccentrics to cause said links to reciprocate said feeding member in a direction perpendicular to said feeding direction.

2. A step by step feeding device for a punched record support of a punching or reading apparatus having a set of code elements cyclically conditionable for punching or reading said support during the feeding movement thereof, and a frame for mounting said elements, said feeding device comprising in combination:

- (a) a feeding member secured to said frame,
- (b) a pair of cyclically rotatable eccentrics,
- (c) connecting means connected to said feeding member and operable by said eccentrics for moving said feeding member and said frame according to a closed path to cause said feeding member to intermittently engage said support when moved on a portion of said path, said means being conditioned by one of said eccentrics to positively reciprocate said feeding member in the feeding direction of said support, said means being further conditioned by both said eccentrics to reciprocate said feeding member in a direction perpendicular to said feeding direction,
- (d) yieldable means for urging said feeding member perpendicular to said support,
- (e) a pair of pivots associated with said eccentrics and secured to said member,
- (f) a pair of links comprised in said connecting means and associated with said eccentrics, said links being individually pivoted on said pivots and being engaged by said eccentrics,
- (g) and a normally effective guiding member located between said eccentrics and said pivots for guiding the link associated with said one eccentric to cause same to positively reciprocate said feeding member and said frame.

3. A device according to claim 2, comprising in combination:

- (h) stop means for limiting the reciprocation of said feeding member toward said support in said perpendicular direction, whereby said portion of path is rectilinear whereas the remaining portion of said path is substantially elliptic.

4. A step by step feeding device for a punched record support of a punching or reading apparatus having a set of code elements cyclically conditionable for punching or reading said support during the feeding movement thereof, and a frame for mounting said elements, said feeding device comprising in combination:

- (a) a feeding member secured to said frame,
- (b) a pair of cyclically rotatable eccentrics,
- (c) connecting means connected to said feeding member and operable by said eccentrics for moving said feeding member and said frame according to a closed path to cause said feeding member to intermittently engage said support when moved on a portion of said path, said means being conditioned by one of said eccentrics to positively reciprocate said feeding member in the feeding direction of said support, said means being further conditioned by both said eccentrics to reciprocate said feeding member in a direction perpendicular to said feeding direction,
- (d) yieldable means for urging said feeding member perpendicular to said support,
- (e) a pair of pivots associated with said eccentrics and secured to said member,
- (f) a pair of links comprised in said connecting means and associated with said eccentrics, said links being individually pivoted on said pivots and being engaged by said eccentrics,
- (g) means for causing said eccentrics to be rotated in mutually opposite directions,

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(h) a pair of shafts associated with said eccentrics and located in a position intermediate between said eccentrics and said pivots,

(i) and a pair of guiding members secured to said shafts and alternately effective for guiding the associated links, the guiding member presently effective causing the associated link to positively reciprocate said feeding member in said feeding direction.

5. A device according to claim 4, comprising in combination:

(j) a couple of opposite projections comprised in each one of said guiding members, the projections of one of said guiding members normally engaging the associated link, the projections of the other guiding member angularly offset 90 degrees with respect to the projection of said one guiding member and being therefore ineffective,

(k) and means for simultaneously rotating said shafts 90 degrees for rendering the projections of said one guiding member ineffective and the projections of said other guiding member effective, whereby said feeding member returns said support step by step.

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6. A device according to claim 5, comprising in combination:

(l) a pair of intermeshing pinions secured to said pair of shafts,

(m) a geneva wheel secured to one of said shafts,

(n) a one-cycle clutch engageable for rotating said geneva-wheel 90 degrees.

(o) and manually operable means for engaging said clutch to reverse the feeding movement of said support.

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