June 9, 1942. L. F. HAGEMAN 2,286,084

STRIP FEED FOR MANIFOLDING MACHINES

Filed Aug. 4, 1937 3 Sheets-Sheet 1

Fig. 1.

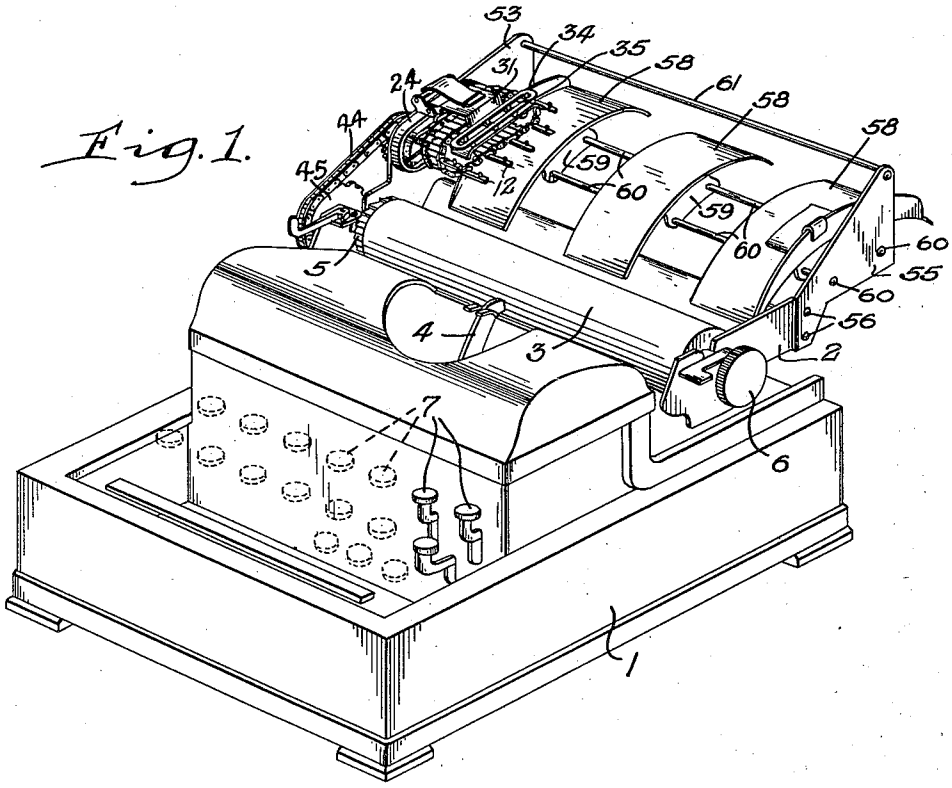

Fig. 4.

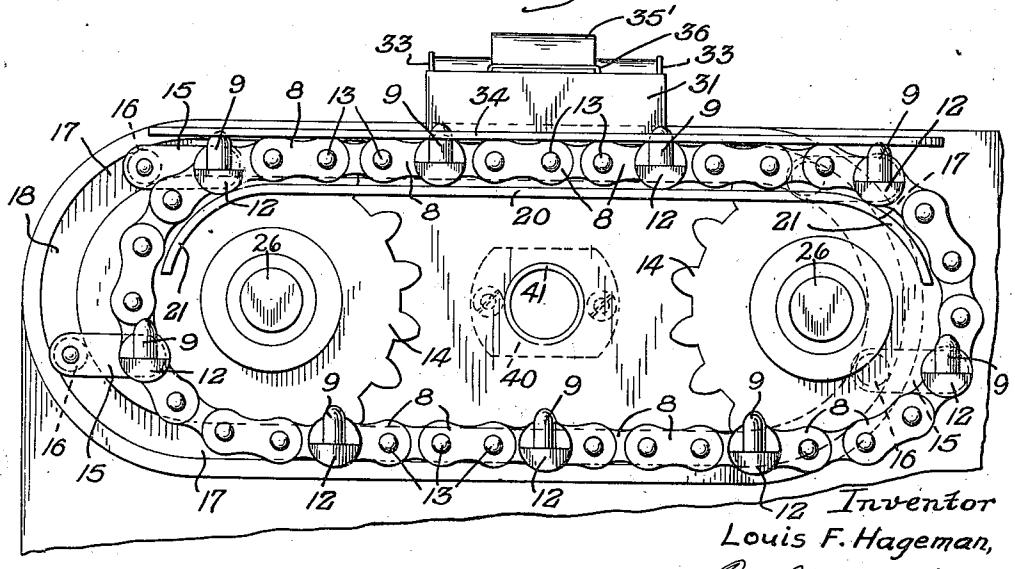

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Fig. 2.

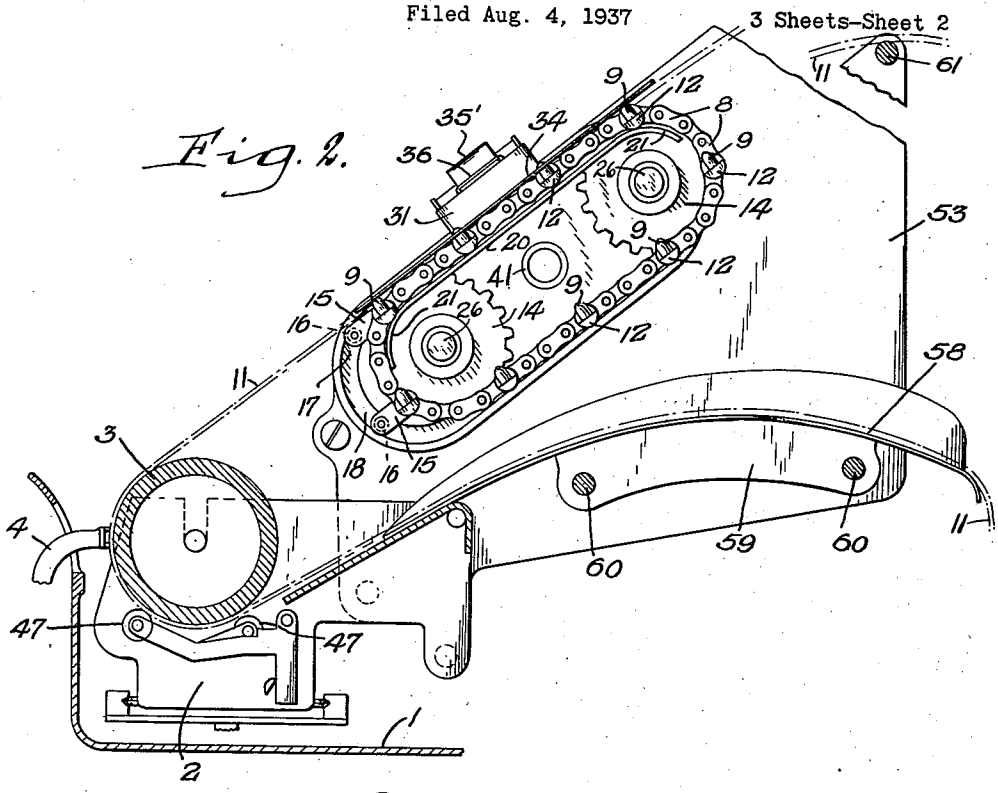
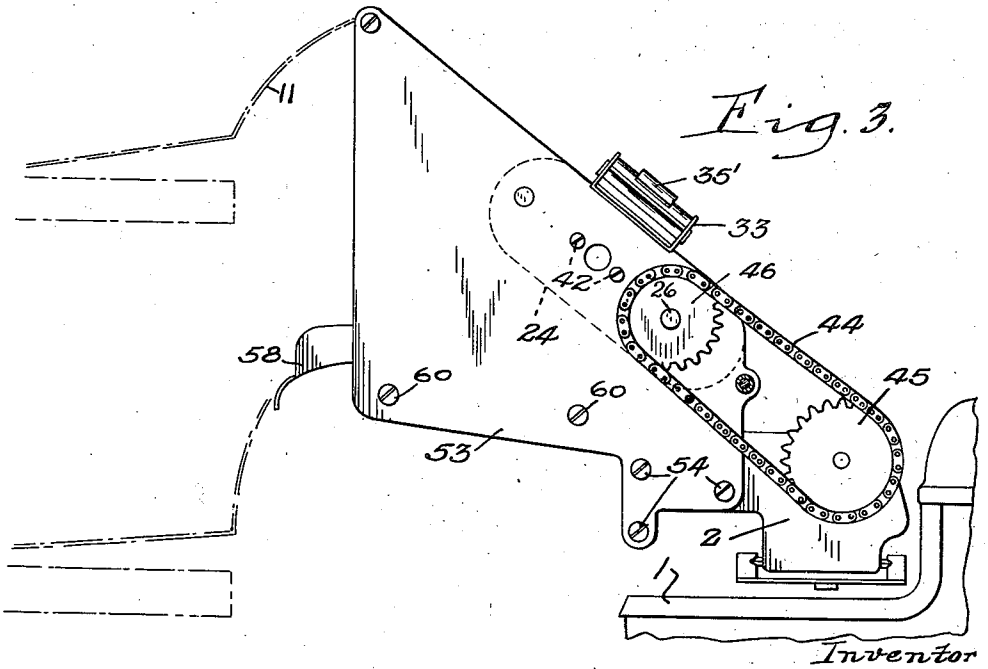


Fig. 3.



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STRIP FEED FOR MANIFOLDING MACHINES

Filed Aug. 4, 1937 3 Sheets-Sheet 3

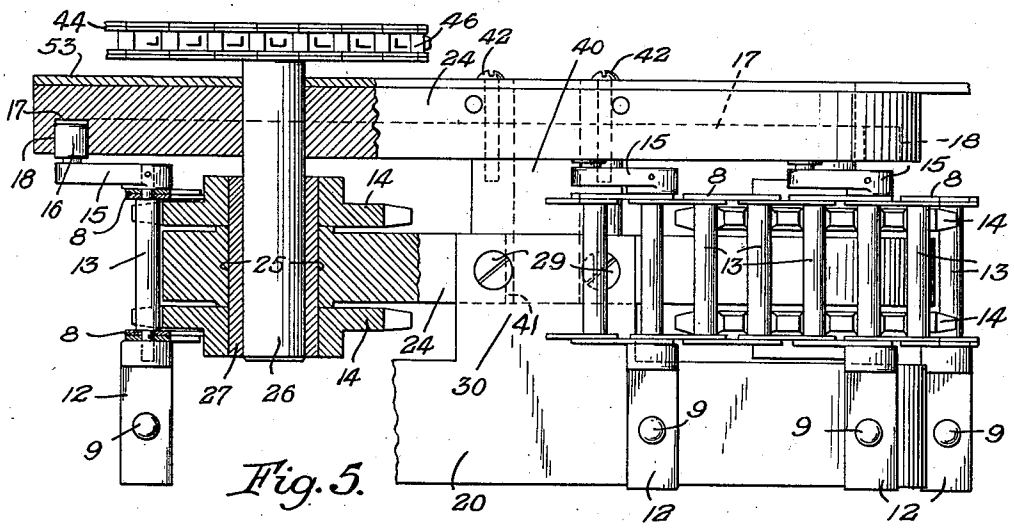

Fig. 5.

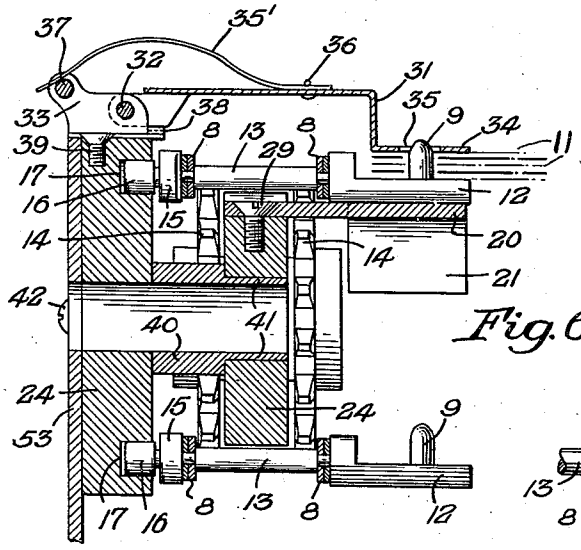

Fig. 6.

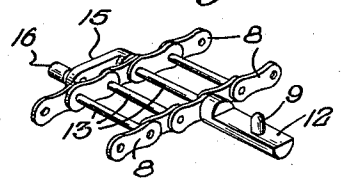

Fig. 8.

Fig. 10.

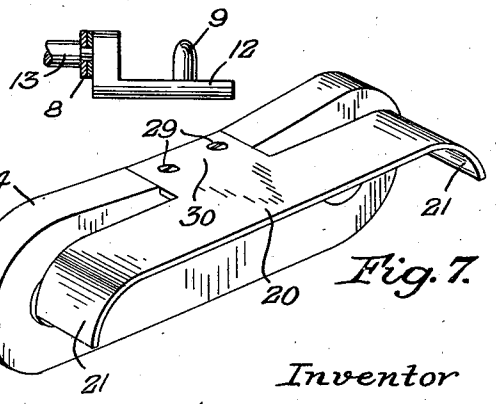

Fig. 7.

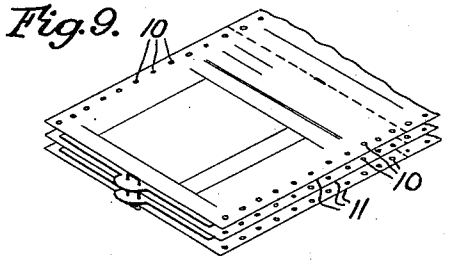

Fig. 9.

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UNITED STATES PATENT OFFICE

2,286,084

STRIP FEED FOR MANIFOLDING MACHINES

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Application August 4, 1937, Serial No. 157,369

12 Claims. (Cl. 271—2.1)

This invention relates to improvements for recording and similar machines, such as typewriting machines, billing machines, tabulating machines, teletype machines, autographic registers, and has special relation to feeding and aligning one or a plurality of relatively superposed record strips during passage through the machine.

It is a general object of the invention to provide a strip feeding mechanism which is especially adapted for feeding strips in machines of the class mentioned and similar machines, and having an improved construction and arrangement whereby the strip engaging feed pins are enabled to enter and leave the strip apertures without undue friction therewith and without damage to the strips, thus effecting very accurate feeding and aligning of the strips and maintaining the lines or record receiving spaces thereof in accurate alignment with the type bars or other writing mechanism.

It is a further and more particular object of the invention to provide an improved mounting and operating means for the strip engaging feed pins so that said pins are automatically adjusted into positions most effective for entering and leaving the feed apertures provided in the strips.

Still another object of the invention is to provide an improved mechanism for tilting the feed pins carried by a flexible feed transmitting element so that said pins will enter and leave the strip apertures freely and without binding while at the same time said pins are maintained in their correct feed transmitting positions during feeding engagement with the strips.

Other objects of the invention will be in part pointed out in the following detailed description of certain illustrative but preferred embodiments of the invention and will be in part obvious in connection therewith.

For a more comprehensive disclosure of the nature and objects of the invention reference is had to the subjoined detail description of the illustrative embodiments and to the accompanying drawings in which:

Fig. 1 is a perspective view of the invention as applied to a typewriting machine;

Fig. 2 is a fragmentary enlarged side elevation of Fig. 1 with parts in section and parts broken away, the record strips or paper being shown in dot and dash lines;

Fig. 3 is a side view similar to that of Fig. 2 but taken from the opposite side, parts being broken away, and the record strips being shown in dot and dash lines;

Fig. 4 is a detail side view of the invention similar to that of Fig. 2 but on a larger scale, the support therefor being shown as broken away;

Fig. 5 is a plan view of the same with parts in section and parts broken away;

Fig. 6 is a transverse section taken substantially at the center of length of the feed unit shown in Figs. 5 and 6;

Fig. 7 is a detail perspective view of one of the brackets supporting the feed chain and whereon the chain travels;

Fig. 8 is a detail perspective view of several links of the chain, showing the mounting and operative connections of one of the feed pins;

Fig. 9 is a detail perspective view of a manifolding assembly or stationery that may be used, and

Fig. 10 is a detail side view of a modified form of one of the feed pins, and the support therefor.

In the embodiment of the invention shown in the drawings, a typewriting machine frame 1 has a paper carriage 2, shiftable as customary, a cylindrical rotary platen 3 being mounted on said carriage to shift therewith. The type bars are shown in part at 4, the line spacing ratchet wheel with suitable line spacing pawl and a detent at 5, a finger wheel for manual control of the platen at 6, and the operating keys at 7.

Located to one side of the platen and independent of contact therewith is the paper strip feeding mechanism in which, in the present embodiment pivotally connected links 8 of an endless sprocket chain are provided with an endless succession of cylindrical feed pins 9, a plurality of which have simultaneous engagement with a plurality of feed apertures 10 of the record strips 11, to pull said strips around the platen and feed them along a straight path. The pins 9 of said chain are axially tiltable and means are provided to axially tilt and thrust them into strip engagement, and to axially tilt and withdraw them from such engagement during feeding movement of said chain. In the embodiment shown, a plurality of the pins have simultaneous feeding engagement with the strip apertures along a straight path. Also the pins have a thrusting movement normal to the plane of the strip, and also a simultaneous movement longitudinally of the strip path in the direction of feed. Retraction of the pins from strip engagement is also normal to the plane of the

strip at a time when the pins move longitudinally of the strip path in the direction of the feed. A plurality of said pins have simultaneous feeding engagement with the strip with their axes parallel to each other.

In order to accomplish this the pins are mounted on rotary stub shafts carried by the chain. As shown, it is convenient to provide the rotary pivots 13 of certain links of said chain with pin supporting parts 12, laterally projecting from one end thereof. Sprocket wheels 14 support and drive the feed chain. At its other end each of said pivots 13 is provided with a crank arm 15, the free end of which has a cam roller 16 traveling in a cam groove or endless track 17, the end portions 18 of which are so related to the sprockets 14 that as said chain passes around the sprockets, the pins 9 are caused to be axially tilted as stated.

The pin supporting parts 12 of said pivots as shown are preferably cylindrical with the upper parts cut away to provide flat top surfaces, from which project the pins 9. A bracket or rail 20 whereon the chain travels in part forms a support for those links of the chain which are engaged with the feed apertures of the paper record strips in feeding the same along a straight path, said supporting rail being provided at the ends thereof with downturned curved portions 21, concentric with said sprocket wheels and engaged by the pin supports 12.

As shown, this paper feeding mechanism is embodied in a self contained unit, readily attachable to the paper carriage of the machine or other support. For this purpose parallel spaced supporting brackets 24 are provided with bearings 25 for the supporting shafts 26 of the sprockets 14 which have duplicate wheel parts secured to a sleeve 27. The supporting rail 20 is secured to the inner of said brackets 24 by screws 29 engaging an extension 30 and the outer bracket 24 is formed with the cam groove 17.

Guide and retaining means for the paper forms a part of said feeding unit, comprising a plate 31 pivoted at its outer end at 32 to a support 33, and at its inner end having a slotted strip engaging foot 34, the slot 35 of which is long enough to receive the pins 9 of said chain engaged with the feed apertures of the paper strips in feeding the same along a straight path, a spring 35' being secured to said plate at 36 and curved upwardly over and slidably engaging a roller 37 of said support, thereby to hold the spring tensioned to press the slotted guiding foot 34 of the plate towards the paper strips. An integral stop 38 of the support 33 engages said plate 31 or a hinge lug attached thereto to limit the movement, said plate being adapted to be raised to inoperative position against the tension of said spring. The support 33 is secured to the outer of said brackets 24 by screws 39.

A spacer 40 is provided between the two brackets 24, and has an extension 41 engaging a recess of the inner of said brackets, and securing screws 42 attach the feeding unit in operative position. The shafts 26 of the sprocket wheels 14 engage perforations of the supporting bracket or standard 53, as seen in Fig. 5. In applying the feeding unit to the machine, the stub shafts 26 are first removed, the sprocket wheels 14 and other parts are lined up with the brackets 24 and the supporting standard 53 as shown in Figs. 5 and 6, and the stub shafts reinserted in position, after which the securing screws 42 are engaged with said supporting standard 53.

The endless chain of the paper feeding means is shown as driven by a sprocket chain 44, engaging a sprocket wheel 45 on the platen shaft and a sprocket wheel 46 on one of the sprocket shafts 26. The usual paper feed rollers 47 contacting the platen are shown as moved to inoperative position in Fig. 2 as the feeding mechanism for the paper record strips disclosed herein may dispense with the use of such feed rollers. However, they may be used if desired.

It is preferred to utilize the paper strip feeding mechanism disclosed herein for the feeding of a record strip having a series of preformed feed apertures 10. Although pin feed mechanism for coaction with both margins of the record strips may be used if desired, it is preferred to arrange the feed mechanism for coaction with but one margin of the record strips. By so doing, practically the full width of the machine is available for consideration and manipulation of the record strips, and also record strips of different widths may be employed without altering the position of the pin feeding mechanism.

In order to support the paper feeding mechanism, the supporting standard 53 is secured to one end of the paper carriage of the machine by screws 54, the securing screws 42 engaging said standard as explained.

Paper guide supporting standards 55 are provided at each end of the paper carriage 2, one such standard being secured directly to the end of said carriage at 56, and another standard being made an integral part of the feed unit supporting standard 53. The paper guides 58, of which three are shown, one at each end of the paper carriage and one in the middle spaced from one another, have lateral depending flanges 59, provided with perforations engaged by lower cross rods 60 connecting the standards, and the paper guides being slidably adjustable along said cross rods. An upper cross rod 61 connecting said standards is spaced rearwardly of the paper feeding means and may serve as a support for the paper record strips as they are fed rearwardly out of the machine. The standards being connected by the cross rods, a rigid frame is formed, so that the paper feeding mechanism and the paper guides are all mounted on a framing readily attachable as a unit to the paper carriage of the machine.

Each of the feed pins 9 as shown in Fig. 10 has a strip engaging, strip feeding section, being that part which contacts the edge of the feed aperture 10 for feeding the strip, which is located at or inside the pitch line of the chain, the terminal portions of said pins being located outside said pitch line. This enables a single record strip 11 or the lowermost of superposed record strips to take a path of movement close to or inside the said pitch line. The pitch line of the chain or similar pin supporting flexible element may for present purposes be defined as the line of centers of the pivotal connections between the chain links. In the embodiments of the invention herein shown in Figs. 6 and 10, it will be noticed that the feed pins 9 are mounted to one side of the feed chain. In the embodiment of Fig. 6 the bases or attaching parts of the feed pins are substantially at the level of the pitch line, while in Fig. 10 the strip engaging feed transmitting parts or shafts of the pins lie inside of such pitch line while the rounded tips of the pins extend outwardly beyond the pitch line. Inasmuch as the feed pins lie at one side of the pin supporting sprocket chain it is perhaps more nearly accu-

rate to say that the bases of the pins 9 of Fig. 6 are positioned substantially at the pitch surface, while the strip engaging feed transmitting shafts of the pins 9 of Fig. 10 lie at points inside of said pitch surface. For the purpose of this description, the pitch surface of the chain may be defined as an imaginary surface lying substantially perpendicular to the longitudinal axes of the feed pins or approximately parallel to the axes of rotation of the sprocket wheels 14, and passing through and being defined by the pitch line.

Referring more particularly to Figs. 2 and 4, it will be noticed that the feed pins 9 as they enter the strip apertures are caused to have strip engaging movements with the longitudinal axes of the pins always in substantially parallel relation with each other. Also the longitudinal axis of each pin moves in substantially parallelism, that is the axis of the pin in one position is always substantially parallel to its axis in any other position. This functioning of the feed pins is effected by the cam track or element 17 through cooperation of the crank arms 15 which are attached to the rotary pivots 13 carrying the pins 9 through the supporting arms or brackets 12. Due to this action the pins are caused to enter the strip apertures in positions substantially normal to the strips, thus avoiding undue pressure or friction of the pins against the aperture walls and facilitating the free and unobstructed movement of the pins into feeding engagement with the apertures. Fraying, crushing or other damage to the paper at the aperture margins is entirely avoided and accuracy of strip feed and strip alignment is promoted. Also due to the improved arrangement for operating the feed pins, the withdrawal of the pins from strip engagement is facilitated in like manner. It will be noted that the path of the feed pins 9 during strip engagement lies substantially along and parallel to the path of movement of the strips or record paper, while the pin path deviates from the strip path at points both forward and rearward where the sprocket chain passes over the sprocket wheels 14.

Attention is called to the fact that the rotary adjusting movements of the feed pins 9 relative to carrier chain, both at the time that the pins are entering into feeding relation with apertures of the strips and when said pins are being retracted from strip feeding engagement, are substantially in the plane of their strip feeding advancement. In other words, this rotary adjustment of the pins takes place in the longitudinal plane passing through the longitudinal axes of the pins. As clearly seen in Fig. 4 the pins maintain a constant relation substantially parallel with one another in all positions of the carrier chain, and pin rotation is relative to the chain and to the links on which the pins are respectively mounted. During these movements the pins rotate rearwardly on their axes with reference to the chain at the time of entering into feeding engagement with the strip, and similarly they rotate rearwardly at the time of retraction from said feeding engagement. In this manner each pin is moved in substantial parallelism, that is, parallel to itself in its different points of advancement, when entering and leaving the strips. Also, at all such times the strip engaging pin parts are adjusted into aperture engaging positions and the rate of pin travel is substantially the same as that of the moving strip.

It will be noticed that the cam or endless track 17 has a substantially straight part lying along and parallel to the strip path, and also has curved parts 18. The feed pins are maintained in their normal feed transmitting positions by engagement of the cam rollers 16 in the straight parts of this cam groove or track 17, while tilting of the pins is effected when the cam roller engages the curved parts 18. It will be seen that the tilting movements of the pins may be adjusted by varying the longitudinal position of the cam groove 17, 18 with reference to the sprocket chain. Such adjustment of the cam groove may be made in any desired manner such, for example, as by attaching the bracket 24 having this groove in different longitudinal positions with reference to the axes of the sprocket wheels, or the cam groove 17 may be formed in a separate plate or element attached to the supporting bracket 24 for longitudinal adjustment thereon.

It will be obvious from the above disclosure and particularly from Figs. 4 and 5 of the drawings that when the cam supporting bracket 24 is longitudinally adjusted from the position shown in Figs. 4 and 5 as just described, the feed pins 9 will not stand upwardly in the lower course or stretch of the feed chain but they will extend downwardly along this reach. This is for the reason that the cam roller supporting arms or cranks 15 will have to run in trailing positions with reference to the respective rotary pivots 13 throughout their entire endless path. It will be noted that for the feed pins 9 to operate as shown in Fig. 4 the crank arms 15 must be of a definite critical length in order that the cam rollers 16 can pass at the curved parts 18 of the cam groove 17 from the trailing position at the top reach of the feed chain in Fig. 4 to the positions in which the rollers run ahead of their pivots 13 at the lower reach. Therefore, if the cam supporting bracket 24 is adjusted longitudinally from the position of Fig. 4, the cam arms 15 must then run in trailing positions throughout their travel. In any event, it may be desirable that the crank arms 15 run in trailing positions at all times since the tilting actions of the pins upon entering or leaving the feed apertures of the strips will remain the same as above described.

As above mentioned it is desirable in some cases to mount the feed pins 9 below the pitch line of the sprocket chain as shown in Fig. 10. This arrangement further facilitates and promotes free entry of the pins into the strip apertures at the part of the path of pin travel which deviates from the straight part thereof. Also, withdrawal of the pins from the apertures is similarly promoted. It will be seen that the parts of the pins positioned at the pitch line or pitch surface will be traveling at substantially the same rate as that of the advancing strips at the moment that each individual pin is entering its strip aperture and consequently the pins will not bind against the forward or rearward margins of the apertures nor will they crush or otherwise injure the aperture margins. There is a similar effect also as the pins are withdrawn from the strip apertures. However, the end portions of the pins lying outside of the pitch surface will move slightly faster than the strips in cases where there is no tilting of the pins, but such increased pin movement is compensated by the tilting action above described. Therefore, with this improved arrange-

ment the pins are enabled to enter and leave the strip apertures freely and without any appreciable friction or binding effect, even in cases where the strip feed apertures are substantially the size of the pins, very little tolerance in aperture size being required. Thus very accurate feeding of the strips can be effected by this improved structure and the alignment of given parts of the strips with a definite point along the strip path can be effected with micrometric accuracy.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a machine of the character described, in combination, strip feeding mechanism including an endless sprocket chain, a succession of feed pins respectively pivotally mounted on the links of said chain and adapted to enter and feed the strip, means for adjusting the angular positions of said pins for movement into strip engagement and withdrawal therefrom, said adjusting means embodying connections for pivotally adjusting said pins and having an endless track including cam portions, and a crank for each of said pins having continuous controlling connection with said endless track for controlling the pivotal positions of the pins.

2. In a machine of the character described, in combination, strip feeding mechanism including an endless sprocket chain, axially tiltable feed pins mounted on the pivots of certain links of said chain in endless series and adapted to enter and feed the strip, and means for axially tilting and thrusting said pins into strip engagement and for axially tilting and withdrawing said pins from such engagement during movement of said chain, a plurality of said pins having simultaneous feeding engagement with said strip along an elongated part of the strip path, said means including a support having an endless track provided with cam portions, the pivots of the chain links carrying said pins having each a crank extension operatively connected to said track, and an elongated support for supporting said chain at said elongated part of the strip path.

3. In a machine of the character described, in combination, strip feeding mechanism including an endless sprocket chain, axially tiltable feed pins mounted on the pivots of certain links of said chain in endless series and adapted to enter and feed the strip, and means operative during feeding movement of said chain for tilting said pins on the chain in the plane of their advancement to cause them to travel substantially at the speed of the advancing strip during entry to or retraction from strip feeding engagement, each feed pin having a strip engaging, strip feeding section located at or inside the plane of the pitch line of said chain and a terminal portion located outside said plane.

4. In a machine of the character described, in combination, strip feeding mechanism including an endless flexible carrier, spaced rotary supporting members for said flexible carrier, certain links of said carrier having axially tiltable feed pins in endless series adapted to enter and feed the strip, means for axially tilting and thrusting said pins into strip engagement and for axially tilting and withdrawing said pins from such engagement during movement of said carrier, said tilting means including a continuous cam groove having longitudinally spaced curved parts respectively adjacent to said rotary supporting members and having a part substantially parallel to the strip feeding path of said feed pins, and operative connections between said feed pins and said cam including a follower running continuously in said cam groove and engaging the said parallel cam part to maintain the feed pins in strip feeding positions.

5. In a machine of the character described, in combination, strip feeding mechanism including a flexible carrier movably mounted to effect strip feed and having a part lying along the strip path and an adjacent part deviating therefrom, a feed pin rotatably mounted on said carrier for feeding engagement with the strip at the part of the carrier lying along the strip path, and means operative during feeding movement of said carrier for rotatably adjusting said pin in the plane of its advancement at said deviating path part so as to position it for entry at said deviating path part to or retraction from strip feeding engagement, said last mentioned means including a cam operatively connected to the pin for exerting continuous control thereof and being adjustable to vary the rotary adjustments of said pin.

6. In a machine of the character described, in combination, strip feeding mechanism including a flexible carrier movably mounted to effect strip feed and having a part lying along the strip path and an adjacent part deviating therefrom, a plurality of feed pins longitudinally spaced along the carrier for rotation thereon and positioned for feeding engagement with the strip at the part of the carrier lying along the strip path, and means for serially rotatably adjusting said pins in the planes of their advancement at said deviating path part so as to cause the pins to enter or leave the strip at said deviating path part while travelling at substantially the same speed as the feeding strip, said last mentioned means including a cam operatively connected to the pins for exerting continuous control thereof and being adjustable to vary the rotary adjusting movements of said pins.

7. In a machine of the character described, in combination, strip feeding mechanism including a flexible carrier movably mounted to effect strip feed and having a part lying along the strip path, a plurality of brackets rotatably mounted on said carrier in longitudinally spaced relation and terminating in free ends at one side of the carrier, feed pins respectively mounted on said brackets for unitary rotation therewith and spaced thereon at one side of the carrier, means including a cam and crank arms respectively connected to said brackets for sequentially rotatably adjusting said brackets and feed pins, and a supporting rail positioned beneath said brackets and engaging the same for supporting said brackets and feed pins at points along the strip path.

8. In a strip feeding mechanism, in combination, a flexible carrier having a strip feed part disposed to lie along a path of strip feed and a part deviating therefrom, a succession of feed pins mounted on said carrier and adapted to engage and feed the strip, and means operated by strip feeding action of the feeding mechanism for rotatably adjusting each of said pins in parallel relation with itself in the plane of its advancement along said deviating carrier part and therefrom to said strip feed part thereof, each said pin having a strip engaging strip feeding section located substantially at the plane of the pitch line of the said carrier and having a terminal portion located outside of said plane.

9. In strip feeding mechanism, in combination, a flexible carrier mounted for strip feeding movement and having a strip feeding part positioned along the path of strip feed and a part deviating from the strip path, a succession of feed pins each having adjustable mounting including a stub shaft carrying the respective pin and movably mounted on said carrier for pin adjustment relatively thereto in the plane of movement of the longitudinal axes of the pins, said pins being spaced along the flexible carrier so as to engage the strip in feeding relation at said strip feeding carrier part, means for rotating said stub shafts to move said pins in said plane of pin movement to position them for entry into strip engagement while the strip is being fed by said pins positioned at said strip feeding part of the flexible carrier, said stub shaft moving means including a crank arm for each pin to maintain the same always in position substantially normal to the strip path as it passes along said deviating part of the flexible carrier to or from said strip feeding part of the carrier.

10. In strip feeding mechanism, in combination, a flexible carrier mounted for strip feeding movement and having a strip feeding part positioned along the path of strip feed and a part deviating from the strip path, a succession of feed pins, a succession of rotary stub shafts each rotatably mounted on said carrier, said feed pins being respectively mounted upon said stub shafts for unitary rotation therewith relatively to the carrier in the plane of movement of the longitudinal axes of the pins, said pins being spaced along the flexible carrier so as to engage the strip in feeding relation at said strip feeding carrier part, and crank arms respectively connected to said rotary shafts to rotate the same and to rotate said pins at said deviating part of the flexible carrier in said plane of pin movement to position them for entry into strip feeding engagement while the strip is being fed by said pins positioned at said strip feeding part of the flexible carrier, said crank arm for each shaft being connected to maintain each feed pin always in position substantially normal to the strip path as it passes along said deviating part of the flexible carrier to or from said strip feeding part of the carrier.

11. In strip feeding mechanism, in combination, a carrier chain of flexibly connected links mounted for strip feeding movement and having a strip feeding part positioned along the path of strip feed and a part deviating from the strip path, a succession of feed pins, a succession of rotary stub shafts each rotatably mounted on said chain and respectively carrying said feed pins for unitary rotation therewith relatively to the chain in the plane of movement of the longitudinal axes of the pins, said pins having their strip engaging feed transmitting parts positioned below the pitch line of the chain and being spaced along the chain so as to engage in strip feeding relation in feed apertures longitudinally spaced along the strip at said strip feeding part of the chain, operating means respectively connected to said rotary shafts to rotate the same and to rotate said pins at said deviating part of the flexible carrier in said plane of pin movement to position them in alignment with respective strip apertures and to cause them to enter the apertures while the strip is being fed by said pins positioned at said strip feeding part of the chain, said shaft operating means for each shaft being connected to maintain each feed pin always in position substantially normal to the strip path as it passes along said deviating part of the flexible carrier to or from said strip feeding part of the carrier.

12. In a machine of the character described, in combination, strip feeding mechanism including a series of feed pins for feeding engagement in a series of longitudinally spaced strip apertures, a movable carrier carrying said feed pins in an endless path having a part adjacent to the strip path at which the pins have feeding engagement with said strip apertures and having a part deviating from the strip path, said pins being rotatably mounted on said carrier on axes transverse to the plane of feeding movement thereof, and an adjusting device including a cam having continuous controlling connections with the respective feed pins for rotatably adjusting said pins on their said axes into alignment with the respective strip feed apertures and to cause the entering pin parts to travel substantially at the speed of the advancing strip as they travel along said deviating path part into aperture engagement at said adjacent path part.

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