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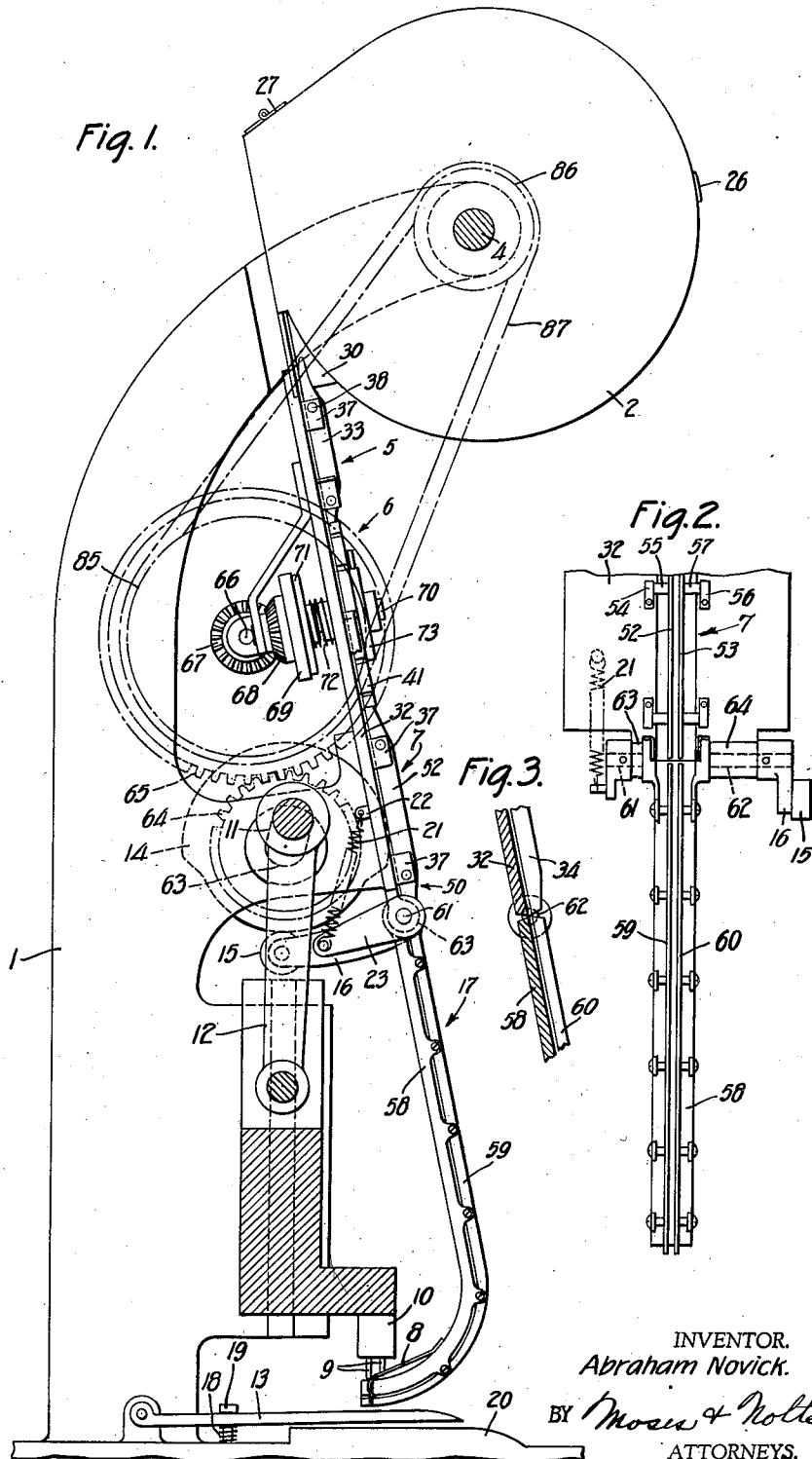
A. NOVICK

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ARTICLE FEEDING MECHANISM

Filed Nov. 4, 1937

7 Sheets-Sheet 1



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ARTICLE FEEDING MECHANISM

Filed Nov. 4, 1937

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Jan. 14, 1941.

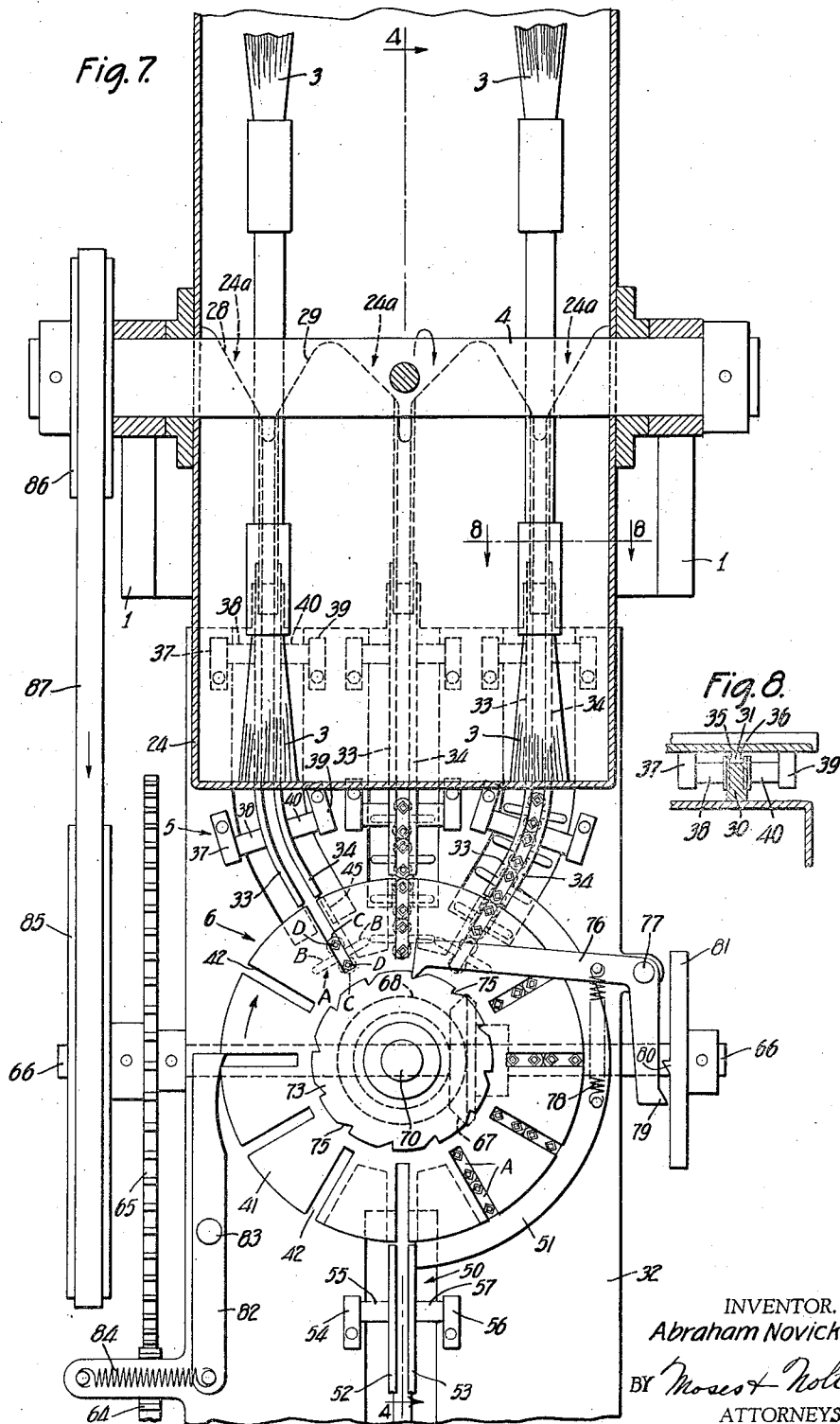
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ARTICLE FEEDING MECHANISM

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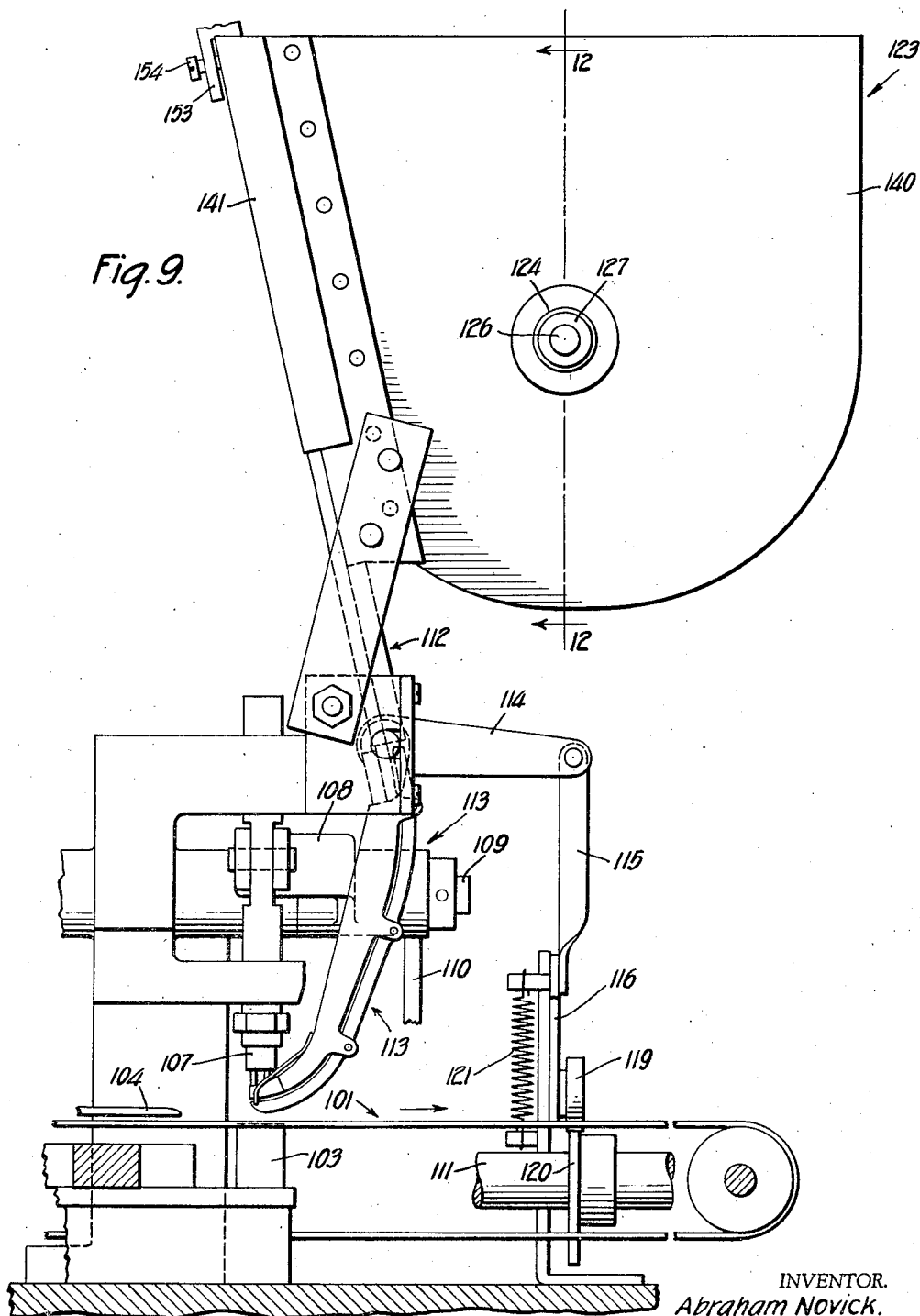
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ARTICLE FEEDING MECHANISM

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7 Sheets-Sheet 4



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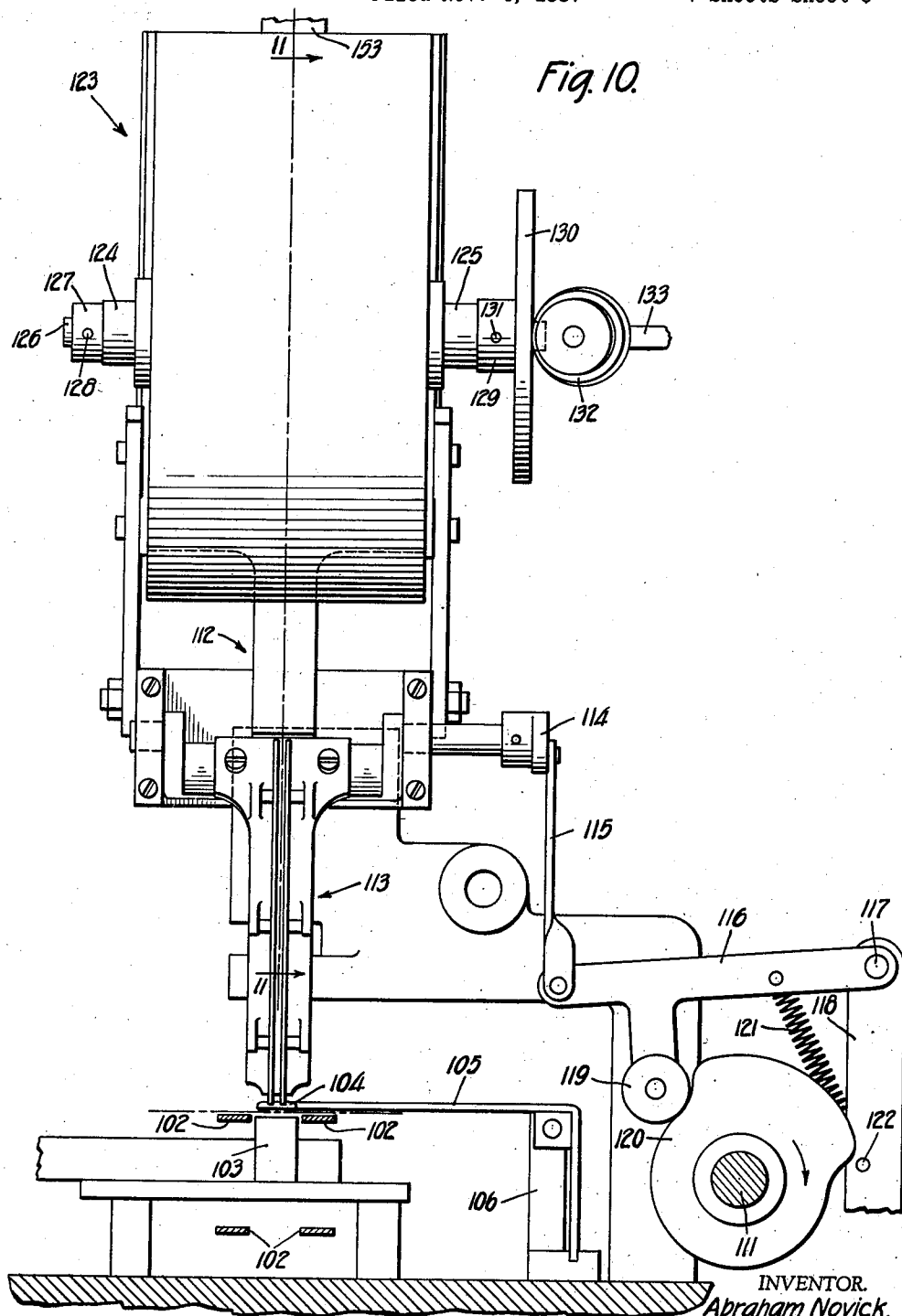
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ARTICLE FEEDING MECHANISM

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7 Sheets-Sheet 5



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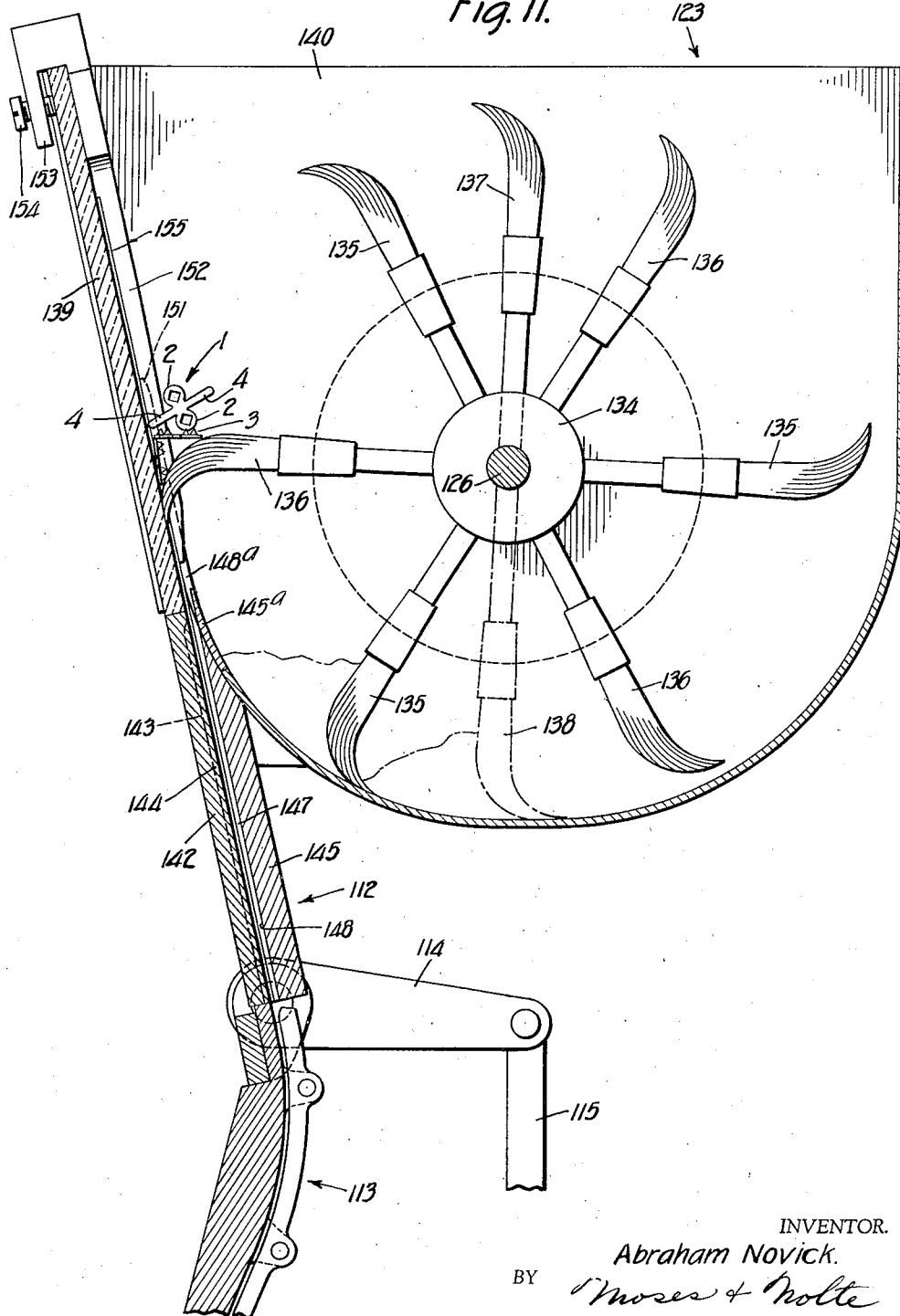
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ARTICLE FEEDING MECHANISM

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Fig. 11.



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ARTICLE FEEDING MECHANISM

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Fig. 12.

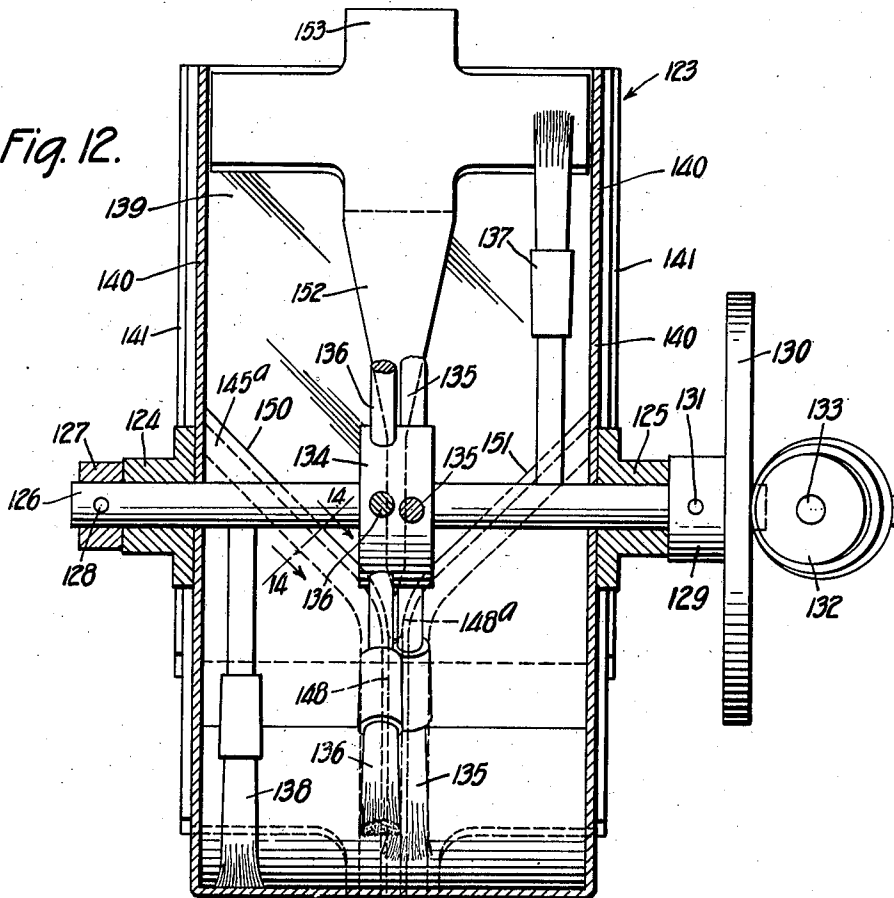


Fig. 13.

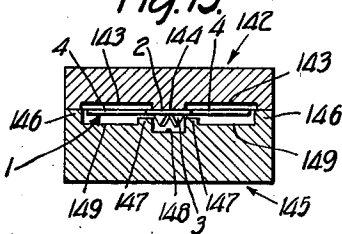
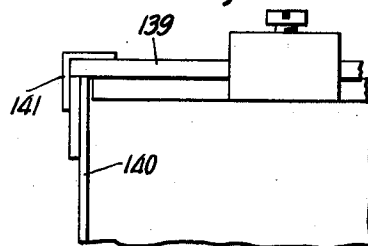


Fig. 14.



Fig. 15.



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UNITED STATES PATENT OFFICE

2,228,478

ARTICLE FEEDING MECHANISM

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Application November 4, 1937, Serial No. 172,708

21 Claims. (Cl. 1—3.1)

This invention relates to article feeding mechanism and more particularly to mechanism for feeding envelope fasteners of the clasp type from a heterogeneously arranged collection of fasteners into proper cooperative relation with fastener setting mechanism.

While the invention is of broader utility than that indicated above, being applicable to articles other than fasteners and to mechanisms or machines in which no setting operation occurs, the specific application of the invention which involves the feeding and setting of clasp fasteners will be referred to and described herein because that application is well adapted to illustrate the principle and important features of the invention.

The fastener feeding mechanisms of the present application are desirably incorporated in, and form parts of, an organized envelope making machine of the type disclosed in my pending application, Serial No. 142,393, filed May 13, 1937, now U. S. Letters Patent No. 2,197,826, granted Apr. 23, 1940, for Envelope fastener machines. Certain features of the present invention have to do with the combination of the present improved blank feeding means with the envelope feeding and fastener setting means of said application.

Clasp fasteners of a popular and widely used type comprise a central body portion having bendable legs extending in opposite directions therefrom and having attaching arms or ears extending at right angles to the legs.

Such fasteners are customarily supplied to a fastener setting machine in stack form, are fed by means of a magazine or chute to a perforating and prong forming station, and are thence delivered to a setting position with the prongs pointed toward the back of an envelope. At the perforating and prong forming station the arms or ears are perforated and are provided with prongs at the borders of the perforations. The fasteners as delivered to the setting station are clinched to the envelope by driving the prongs through the back of the envelope and against an anvil to upset the prongs. In the resulting envelope the legs lie flat against the outer face of the back of the envelope but may be bent away from the back into parallel relation, passed through a perforation formed in the envelope flap, and then flattened down again to retain the flap in envelope closing position.

The prongs are formed in the setting machine for the reason that the pronged fasteners cannot be practically handled and presented in stack form.

In accordance with the present invention, the fasteners, with the prongs already formed upon them, are dumped into a hopper.

It is an important object of the invention to provide mechanism which can successfully unscramble the fasteners, rearrange them in orderly fashion, and deliver them dependably to feeding and setting instrumentalities of the setting machine.

In order to unscramble and rearrange the heterogeneously disposed fasteners, it is necessary that a fastener, regardless of its original position or attitude shall be faced properly with respect to the projection of the prongs, and that the two prong bearing arms shall be aligned in a definite direction. Since the legs, however, are thinner and narrower than the pronged arms, a fastener leg can enter any passage or guide that an arm could enter. The passage or guide must, of course, be constructed to refuse any fastener so started into it, the result being that the mouth of the passage or guide is frequently obstructed by an improperly started fastener. Since the starting of a fastener in the proper attitude into a passage or guide is largely a matter of chance, and since the passage or guide entrance must be so extremely critical, the starting of a fastener into the passage or guide is a matter of uncertainty and it may frequently happen that a number of abortive attempts will occur between the arrival of successive fasteners in position to enter the guide.

In accordance with a practical and desirable embodiment of the present invention a hopper is provided having a plurality of guides extending therefrom and rotary brush members are provided for causing fasteners to be carried up over the mouths or entrances of the several guides. By thus providing a plurality of guides, the frequency with which fasteners reach guide entering positions is substantially increased.

Provision is further made of a transfer device for delivering the fasteners from the several guides to a single magazine, thus consolidating and controlling the outputs of the guides so as to assure that the magazine will be adequately supplied from one or more of the guides at all times.

An important feature of the invention relates to the construction and arrangement of parts for facilitating the delivery of the fasteners in proper attitudes from the hopper into the mouth of a guide and for causing improperly disposed fasteners to be rejected by the guide mouth and to be removed from it. To this end, the guide is made to comprise opposed members spaced apart

just far enough to pass the flat portions of the fastener, but not far enough to accommodate the fastener body with the projecting prongs. One of the members is provided with a channel of sufficient depth to accommodate the prongs, the purpose being to cause the prongs of a fastener to enter this channel in aligned condition, that is with the prongs of both arms received in the channel. The channel member is provided with a wide flaring mouth which presents downwardly inclined convergent edges or walls in prong intercepting positions. With the arrangement described, the inclined edges or walls tend to turn a fastener as it descends in the mouth of the guide and to align the prongs with the channel. If any part of the fastener becomes inserted between the opposed guide members without alignment being effected, or with the prongs faced in the wrong direction, it will simply be arrested in the guide mouth and will be brushed away by one of the rotary agitating brushes which operate in the hopper.

In accordance with a further and still more desirable embodiment, the necessity for a plurality of guides is obviated.

In the plural guide embodiment referred to above, the fasteners are lifted into position to fall into the notch by a series of rotary brushes which bisect the notch, and these brushes alone are depended upon both to lift the fasteners and to knock away fasteners which tangle with one another, or which are not properly faced and oriented to pass through the guide. Since the fasteners are apt to descend toward the base of the notch from both sides of the notch simultaneously, a great many fasteners are refused passage, not because they could not, unhindered, enter the notch, but because two of them arriving from opposite directions obstruct one another.

In accordance with an important feature of the most desirable form of the invention, two sets of brushes are provided, neither of which is centered with respect to the notch, one set being disposed at one side of the notch base, and the other set at the opposite side. The brushes of both sets overlap the base of the notch so that any brush of either set is capable of clearing the notch. The brushes of the two sets arrive at the notch alternately, however, with the result that each brush, after clearing the notch, restrains the descent of a fastener from its own side long enough to permit any fastener seeking to enter the guide from the opposite side to do so. Thus the way is clear for fasteners descending from one side and then from the other, in regular alternation.

In accordance with a further feature of the invention, additional brushes are provided near the opposite extremities of the notch, and remote from the base of the notch, these brushes being designed to serve a purely lifting function and to start the fasteners far enough out along the notch walls to enable the fasteners to accumulate in proper attitudes for entering the notch and to remain restrained without disturbance while awaiting access to the base of the notch.

The opposite walls of the notch are desirably made long enough so that either can hold a plurality of fasteners in readiness to slide down into the notch. Thus the notch walls constitute reservoirs for arranged fasteners.

In accordance with still another important feature of the invention the end face of the notched plate is provided with channels at short

distances back from the notch walls for the purpose of avoiding frictional binding, particularly with fasteners whose legs are slightly bent.

In accordance with still another feature of the invention, the inclined guide plate which is unnotched is slidably mounted to afford ready access to the mouth of the guide, so that the operator is able to clear the guide mouth quickly when any condition arises which cannot be corrected by the machine itself.

A further feature of the invention, which is not necessary to the successful practicing of the invention, but which facilitates the proper and orderly operation, consists in the provision of a separating finger which extends toward the base of the notch and substantially bisects the angle of the notch. This finger is spaced from the inclined guide plate sufficiently to accommodate a fastener leg, but not the full thickness of a fastener with the prongs included. It affords further assurance, therefore, against conflict between fasteners descending toward the guide from opposite sides of the notch.

As a result of these features of improvement, a single guide leading from the hopper may be depended upon to deliver an adequate supply of fasteners to the fastener setting station at all times, it being unnecessary to provide a plurality of guides and then consolidate the output of the several guides for delivery to a magazine.

Other objects and advantages will hereinafter appear.

In the drawings forming part of this specification and illustrating a practical and desirable embodiment of the invention:

Fig. 1 is a view in sectional, side elevation of a machine embodying features of the invention;

Fig. 2 is a fragmentary view in front elevation, illustrating features of the magazine;

Fig. 3 is a fragmentary detail view in section illustrating the pivotal mounting of the lower end of the magazine;

Fig. 4 is a fragmentary, sectional view illustrating particularly the hopper and the transfer device, together with means for transferring the fasteners from the hopper to the transfer device, the section being taken on the line 4—4 of Fig. 7 looking in the direction of the arrows;

Fig. 5 is a fragmentary, detail view, illustrating the upper side of the transfer device together with associated parts;

Fig. 6 is a fragmentary, sectional view taken on the line 6—6 of Fig. 4, looking in the direction of the arrows;

Fig. 7 is a fragmentary, sectional view taken on the line 7—7 of Fig. 4, looking in the direction of the arrows;

Fig. 8 is a sectional detail view taken on the line 8—8 of Fig. 7, looking in the direction of the arrows;

Fig. 9 is a fragmentary view, in side elevation, partly in section, illustrating a machine embodying another form of the invention;

Fig. 10 is a fragmentary, transverse, vertical, sectional view, illustrating substantially the mechanism of Fig. 9;

Fig. 11 is a vertical, sectional view, on a larger scale than Figs. 9 and 10, the section being taken on the line 11—11 of Fig. 10 looking in the direction of the arrows;

Fig. 12 is a sectional view, taken substantially on the line 12—12 of Fig. 9, looking in the direction of the arrows;

Fig. 13 is a detailed, sectional view, taken on

the line 13—13 of Fig. 12, looking in the direction of the arrows;

Fig. 14 is a detail, fragmentary, sectional view, taken on the line 14—14 of Fig. 12, looking in the direction of the arrows; and

Fig. 15 is a fragmentary, detail plan view illustrating a feature of a hopper and guide construction as seen in Fig. 11.

The illustrative machine of Figures 1 to 8, as has been indicated above, is designed to receive heterogeneously arranged clasp fasteners, to unscramble them, and to deliver the fasteners in orderly arrangement to a setting point and there clinch them to envelopes.

Briefly, the machine comprises a frame 1, which carries a hopper 2. Agitator brushes 3, mounted on a shaft 4, cause the fasteners to be lifted and to be deposited in guide and delivery devices indicated generally at 5. These devices include a plurality of guides, all of which deliver fasteners to a rotary transfer device 6 which in turn delivers the fasteners to a magazine 7. The magazine normally stands full of fasteners, the lowermost one being disposed in the lower end of the magazine and detained by a spring 8 in position to have its perforations entered by retractible pins 9 which are carried by a reciprocating driver 10. The driver 10 is reciprocated by means of a rotating crank 11 and a connecting rod 12, being suitably guided by the frame to travel toward and from an anvil 13. The envelopes are slipped successively over the anvil 13 into fastener receiving position. When the pins 9, in descending, have passed through the perforations of the endmost fastener, the lower end of the magazine 8 is rocked in a counter-clockwise direction (as viewed in Fig. 1) by means of a cam 14 which, through a cam follower 15, actuates a rocker arm 16 rigid with the lower magazine section 17. The endmost fastener is thus held by the pins 9 as the magazine moves clear of the driver, and the continued descent of the driver causes the fastener prongs to be driven through the back of the envelope and to be clinched against the anvil 13.

The anvil is yieldably supported by a spring 18 which surrounds a headed stem 19, so that the anvil normally stands away from a base portion 20 of the frame to provide clearance space for the introduction of envelopes and the removal thereof, but is afforded solid support when depressed against the base portion 20 at the clinching operation. A spring 21 is connected at one end to a stationary ear 22 and at the other end to an arm 23 fast with the lower magazine section 17. This spring urges the lower magazine 17 in a clockwise direction, causing the follower roller 15 always to stand in engagement with the cam 14, so that the magazine section 17 returns to its initial position as soon as it is permitted to do so by the cam.

The foregoing brief outline sufficiently indicates the purpose and general principle of operation of the machine.

Fasteners of the type upon which the machine is designed to operate are shown in Figures 4, 6 and 7. A fastener A comprises a central body portion having bendable legs B extending in opposite directions from it. Arms C also extend in opposite directions from the body portion, the arms being disposed at right angles to the legs. The arms are wider than the legs, and have prongs D struck from them, the two sets of prongs being symmetrically disposed with relation to the central body portion of the fastener.

The hopper 2 comprises a substantially semi-

cylindrical bottom plate 24, an angle plate 25 and a cover plate 26 which is connected through a hinge 27 to the angle plate 25. The angle plate 25 extends substantially tangentially to the plate 24, but is spaced therefrom a sufficient distance to accommodate the thickness of a fastener exclusive of the prongs. The plate 25 extends downward at a sharp inclination so that fasteners thrown flat against it tend to slide down toward the space between the plate 25 and the adjacent face of plate 24.

The plate 24 is extended parallel to the plate 25 for a substantial distance, and this parallel portion is provided with a series of notches 24a (Figs. 4 and 7), each bounded by convergent edges 28 and 29. The notches terminate in parallel-edged portions which are extended into the curved portions of the plate 24 far enough to afford clearance for the prongs of a fastener whose back lies flat against the plate 25.

Blocks 30 are disposed between divergent surfaces of the plates 24 and 25, each block being of wedge shape, and having one face formed to fit the plate 24 and the opposite face formed to extend parallel to the plate 25 at a distance from the plate 25 sufficient to clear the flat portions of the fastener. A channel or groove 31 is formed in the straight face of the block 30 in line with the base of the notch 24a. This channel is of sufficient depth to clear the prongs of a fastener whose back lies flat against the plate 25. The channel is of the same width as the base or parallel-edged portion of the notch 24a, this width being just sufficient to comfortably receive and pass the prongs formed at one end of the fastener.

A pair of diametrically opposite brushes 3 is provided in connection with each of the notches 24a, each brush as it revolves, serving to carry fasteners up against the surface of the plate 25 immediately above the notch. The brushes of adjacent pairs are quadrangularly related to one another.

It will be seen that the plates 24 and 25, together with the block 30, form a guide adapted to pass any fasteners whose arm prongs are vertically aligned and faced away from the plate 25, but to refuse to pass a fastener positioned in any other attitude. For example, if a fastener should slide down the plate 25 properly oriented but with its prongs faced toward the plate 25, the narrow base portion of the notch would be too narrow to receive the entire width of a fastener arm so that the fastener could not pass. If a fastener, having its prongs disposed against the plate 25 should slide down in an attitude tending to introduce a leg into the passage formed between the plate 25 and the block 30, the arms would again prevent the passage of the fastener. If faced in the opposite direction, the fastener would be arrested by the prongs. Any arrested fastener is simply carried upward clear of the notch by the next brush of the series.

A fastener having its back disposed flat against the plate 25, whether properly oriented or not, will slide down the plate 25 until one set of prongs engages either the edge 28 or the edge 29. This edge will guide the lower set of prongs into the base of the notch, and will, ordinarily, cause the upper set of prongs to swing around into line with the lower set of prongs when the lower set of prongs has entered the base of the notch. Should any such fastener not swing around into proper position, however,

it will simply be brushed away by the next following brush.

It will be seen that the mouth of the guide formed jointly by the plates 24 and 25, and the block 30 tends to orient properly any fastener which slides down the plate 25 with its back against the plate 25, but that any fastener which does not attain the precise attitude necessary for continuing its passage between the plate 25 and the block 30 will be arrested in position to be knocked clear of the guide mouth by a following brush.

Each guide entered by one of the notches is continued downward to deliver to the rotary transfer device 6. A plate 32 forms a continuation of the plate 25. The guide continuation of each block 30 is formed by a pair of bars 33 and 34 which constitute in effect extensions of the walls 35 and 36 of the block 30 which border the passage 31. In the case of the central guide, seen in Fig. 7, the bars 33 and 34 are straight, but in the case of the two side guides the bars are curved toward the lower ends and terminate in portions which extend radially toward the center or axis of the transfer device 6. The bars 33 are supported from the plate 32 by means of brackets 37 affixed to the plate and arms 38 carried by the brackets. The bars 34 are, in each instance, similarly supported by brackets 39 affixed to the plate 32 and arms 40 carried by the brackets 39.

The bars 33 and 34 terminate at the lower ends in close proximity to a transfer disc 41, forming part of the transfer device 6. The disc 41 is provided in its margin with a series of equally spaced radial slots 42, each slot being of a length to accommodate two fasteners, and to cause the upper or outer arm of the outer fastener to stand substantially flush with the periphery of the disc when the lower prongs of the lower or inner fastener are arrested by the base or inner end of the slot. In order to minimize the possibility of jamming as the fasteners travel toward and into the transfer slots, the plate 32 is recessed at opposite sides of the path traversed by the fastener arms, thus providing side recesses 43 and 44 (Fig. 6) with an intervening fastener engaging rib or flange 45. The transfer disc 41 is also provided with recesses 46 at opposite sides of the slot 42 so that flanges 47 and 48 are provided at opposite sides of the slot for engaging the fastener in opposed relation to the rib or flange 45. Any tendency toward jamming which might result from the legs of the fasteners being slightly bent is thus minimized.

The delivery ends of the guides formed by the bars 33 and 34 are spaced angularly from one another the same as the notches 42 of the disc 41. The disc is rotated step by step and is arrested at the end of each step in position to align three of the slots of the disc with the three guides. The rotation of the disc as seen in Fig. 7 is in a clockwise direction so that any empty slot is first arrested in line with the left hand guide seen in that figure. If, at that instant, there are two or more fasteners standing in the left hand guide, they will descend into the slot and preclude the reception of other fasteners in that slot. If, however, the left hand guide happens to be empty, or to contain only one fastener, the slot will receive no fasteners or one fastener as the case may be. At the next step it will be filled from the central guide unless again the available stock is insufficient to fill it. It will have a third

chance to be filled by the right hand guide, and with the machine organized and constructed as described, there is very little probability that it will fail to contain two fasteners when leaving alignment with the right hand guide.

The step by step rotation of the disc 41 carries the fasteners in their slots into alignment with a magazine section or guide 50, which constitutes a common outlet for all of the fasteners delivered to the transfer disc 41. A stationary arcuate guard 51 is provided to fit against the periphery of the disc and close the open ends of the slots 42 as they travel from the right hand guide into position to deliver to the magazine section 50. The magazine section 50 is formed by the continuation of the plate 32 on the one hand, and by a pair of guide bars 52 and 53 on the other. The guide bar 52 is supported from the plate 32 by brackets 54 and arms 55, and the guide bar 53 is supported from the plate 32 by brackets 56 and arms 57. This magazine section is substantially the same in construction and principle of operation as the central guide section which delivers fasteners to the disc 41.

The lower or rockable magazine section 17 stands normally in line with the magazine section 50. The magazine section 17 is composed of a solid guide member 58 which carries guide bars 59 and 60. The upper end of the member 58 is affixed to aligned shafts 61 and 62 which are journaled respectively in bearings 63 and 64, formed on the lower end of the plate 32. The fastener engaging parts of the plate 32 and of the member 58 extend into meeting relation in line with the common axis of the shafts 61 and 62, as illustrated in Fig. 3. The rocker arm 16 which rocks the magazine section 17 is made fast to the shaft 62, while the arm 23 connected to the spring 21 is made fast to the shaft 61.

With the arrangement described, two fasteners are delivered to the magazine composed of the stationary section 50 and the rockable section 17, each time that a slot 42 is arrested in line with the section 50. The machine is organized to cause the transfer disc 41 to move a step so as to register a fresh slot 42 with the magazine section 50 for each two strokes of the driver 10. The shaft 63, which carries the crank 11 for operating the driver, also has fast upon it a gear 64 which, through a meshing gear 65, drives a shaft 66 at one-half its own speed. The shaft 66 through bevel gears 67 and 68 drives at its own rotational speed a clutch member 69 journaled on a shaft 70. A cooperating friction clutch member 71, fast on the shaft 70, is yieldingly urged by a spring 72 into frictional driving engagement with the clutch member 69. The shaft 70 has fast upon it a detent disc 73, and the detent disc 73 is in turn made fast to the transfer disc 41 by means of a pin 74. It will be seen, therefore, that the shaft 66 is driven at one-half the rotational speed of the shaft 63, and that the tendency of the clutch is to drive the disc 41 at the same rotational speed as the shaft 66.

The detent disc 73, however, forms a part of a detent mechanism for compelling the clutch to slip. The detent disc 73 is provided with equally spaced peripheral notches 75, equal in number to the slots 42 of the disc 41. A detent pawl 76 in the form of a bell crank, pivoted at 77, is urged toward the disc for cooperation with the notches, by a spring 78. Whenever the nose of the pawl is engaged in one of the notches it holds the detent disc 73 and the connected transfer disc 41 positively against rotation, in a pre-

determined position like that illustrated in Fig. 7.

The tail of the pawl is provided with a cam projection or tooth 79 for cooperation with a single camming tooth 80 formed on a cam wheel 81. The cam wheel 81 is fast upon the shaft 66. At each complete revolution of the shaft 66, the tooth 80 engages the tooth 79 to rock the pawl 76 clear of the detent disc 73. The clutch thereupon becomes effective to drive the detent disc and the transfer disc. The tooth 80 clears the tooth 79 immediately after the release of the pawl, leaving the pawl free to bear against the disc 73 and to enter the next notch of the disc. Thus there is a single step advance of the discs 73 and 41 at each complete revolution of the shaft 66, or in other words, at each two complete revolutions of the shaft 63.

In order to avoid possible rebound of the disc 41 when it is arrested by the action of the pawl 76 a detent pawl 82 is provided for engaging in the outer ends of the slots 42. The pawl 82 is pivoted at 83 and is urged toward engagement with the disc 41 by means of a spring 84.

The shaft 66 is connected to drive the brush shaft 4 by means of pulleys 85 and 86 fast on the respective shafts, and a driving belt 87 trained on the pulleys. The driving ratio of these shafts is susceptible of variation, but as shown the shaft 4 is driven at twice the speed of the shaft 66, or in other words at the same speed as the shaft 63. Since there are two brushes associated with each of the three guides illustrated, there are two opportunities for each guide to receive a blank at each setting operation and hence, six opportunities for a properly oriented fastener to be started on its way toward setting position for each setting operation actually performed. Thus, adequate assurance is provided for an ample supply of fasteners to the setting point at all times, so long as the hopper is adequately supplied with fasteners.

When starting the machine into operation it is desirable that the magazine be fully stocked with fasteners throughout its length so that a reserve will be available in the event that the fastener delivering mechanism occasionally misses the delivery of a fastener as intended. This may be very readily accomplished by the operator, simply by his holding the magazine section 17 completely out of line with the driver through a succession of operations of the driver. This may be done by manually moving the magazine section 17 counter-clockwise against the force of the spring 21.

In the form of the invention illustrated in Figs. 9 to 15 inclusive, many features of the embodiments already described as included.

A salient point of difference, however, lies in the fact that only a single fastener guide is employed, the mouth of the guide being wider than that of any one of the several guides of the previously described embodiment. The brushes for clearing the base of the guide mouth or notch, are arranged in staggered relation (Fig. 12), so that while each brush sweeps across the base of the mouth or notch, it travels in a path displaced to one side or the other with reference to the center of the notch, the result being that each brush clears the base of the notch and then restrains descent of fasteners from one side of the notch while leaving the path open for descent of fasteners from the opposite side. The next brush to cross the notch base is displaced in the opposite direction so that the fasteners are allowed to descend in alternation, first from one

side of the guide mouth and then from the other. In addition, fastener lifting brushes 137 and 138 are provided at opposite extremities of the guide mouth for lifting fasteners and depositing them over the extremities of the guide mouth. With this arrangement, the delivery of fasteners is so thoroughly assured that the provision of a plurality of guides and of means for consolidating the product of several guides is made unnecessary.

The mechanism of Figs. 9 to 15 includes a conveyor 101 for delivering envelopes one by one into position to be acted upon by fastener setting instrumentalities and for thereafter discharging the envelopes. The conveyor comprises a pair of spaced, endless bands 102 (see Fig. 10), which are disposed at opposite sides of the fastener setting station. A block 103 is mounted between the bands 102 for limiting downward movement of an anvil 104 at the setting operation. The anvil is integral with a bendable arm 105 which extends laterally beyond the envelope path and which is carried by a bracket 106. The bracket 106 is reciprocated lengthwise of the conveyor 101 in timed relation with the arrival of envelope blanks at the fastener setting station. The mechanism for feeding the envelope blanks and for operating the bracket 106 is illustrated and described in my U. S. Letters Patent No. 2,197,826, for Envelope fastener machines, and reference may be had to the disclosure of that application for further details of this mechanism.

A driver 107 is carried by a reciprocating lever 108. The lever 108 is rockable upon a shaft 109 and is operated by a cam follower 110 from a cam (not shown) mounted on a cam shaft 111.

The fastener delivering mechanism comprises an upper guide section 112 and a lower rockable guide section 113, the lower section being cooperative with the driver 107 in the same manner that the lower magazine section 17 cooperates with the driver 10 of Fig. 1, and the two magazine sections being joined together with capacity for rocking movement of the lower section for the same purpose as, and in the same manner that, the magazine sections 17 and 50 of Fig. 1 are joined together.

A crank arm 114 is provided for rocking the lower magazine section 113 in proper timed relation with the operation of the driver. The crank arm 114 is connected to the upper end of a link 115, the latter being in turn connected at its lower end to a lever 116. The lever 116 is mounted on a fulcrum pin 117 carried by a stationary bracket 118. The lever 116 carries a cam follower 119 which cooperates with a cam 120 fast on the cam shaft 111. A tension spring 121, connected to the rocking lever and to a pin 122 mounted on the bracket 118, maintains the cam follower 119 always in engagement with the periphery of the cam 120.

The fastener supplying mechanism in this form of the invention comprises a hopper 123 which is mounted stationary in any suitable manner and which has bearings 124 and 125 fixed upon its side walls. A shaft 126 extends through the bearings and is fixed against endwise play by means of a collar 127 secured to the shaft by pin 128 and by means of the hub 129 of a driving disc 130 which is secured to the shaft by a pin 131. The driving disc 130 is frictionally driven at any suitable speed, for example about 2 R. P. M., by a cone frustum 132 fast on a drive shaft 133.

The shaft 126 has fixed upon the middle thereof a hub 134 which carries three right hand brushes 135 and three left hand brushes 136, (see Fig. 12). It will be observed (see Fig. 11) that the brushes 135 and 136 occur in alternation about the periphery of the hub 134. The brushes are desirably arranged at uniform angular intervals as illustrated.

In addition to the brushes 135 and 136, the shaft 126 carries within the hopper and near the right hand wall thereof a brush 137 and also within the hopper and near the left hand wall thereof a brush 138. The brushes 137 and 138 desirably extend in opposite directions from the shaft 126.

The bottom of the hopper is generally circular in form, but the upper left hand wall of the hopper, Fig. 11, is straight and is sharply inclined. The upper wall portion consists of a removable section 139 of glass to present an extremely smooth sliding surface to the fasteners, said plate being slidably received at its opposite ends between the extremities of the sides 140 of the hopper, Fig. 15, and overlying angle bars 141 carried by the sides. The angle bars cooperate with the edges of the sides to form guideways for the removable plate 139. The removable mounting of the plate 139 facilitates access to the interior of the hopper and particularly to the point at which fasteners might become jammed in attempting to leave the hopper.

Outside the hopper, and in line with the plate 139, is a guide plate 142, (Figs. 11, 12 and 13), which is formed with two channels 143 in the fastener engaging face thereof, the channels being separated from one another by a rib 144. The rib 144 is disposed to engage the central body portion of a fastener, while the channels 143 afford clearance space for preventing binding of any fastener whose arms may be slightly bent. Opposed to the guide plate 142 is a guide block or plate 145. This guide block 145 is formed as illustrated in Fig. 13. It includes marginal flanges 146 which stand in abutting relation to the plate 142. Guide ribs 147 are provided with an intervening guide channel 148, the guide channel being opposed to, and substantially co-extensive in width with, the guide rib 144 of the block 142. The faces of the ribs 144 and 147 which lie in opposed relation to one another are separated by a sufficient distance to comfortably pass the flat portions but not the prongs of the fasteners the channel 148 alone being capable of passing the prongs. Outside the bounds of the ribs 147, the block 145 is provided with clearance grooves 149 for avoiding binding of fasteners which may have their arms slightly bent.

The block 145 has secured to its upper end a plate 145a which is formed at its upper extremity with a wide flaring mouth, the edges 150 and 151 of said plate extending upward symmetricaly toward the opposite sides of the hopper from the guideway formed by the groove 148. The clearance channels 149 are extended upwardly to the left and right, parallel to the edges 150 and 151 respectively.

The brushes 135 and 136 have been referred to as right hand brushes and left hand brushes, respectively. What is meant by this will be clearly perceived from an examination of Fig. 12. A right hand brush 135, in crossing the base of the notch formed by the convergence of the edges 150 and 151, sweeps across the base 148a of the notch but it also sweeps across a considerable

portion of the edge 151, without substantially overlapping any portion of the edge 150. Thus, the brush clears the base of the notch and restrains the descent of any fastener along the edge 151 into the notch while leaving the way clear for a fastener to slide down along the edge 150 into the notch. When the next brush 136 sweeps across the notch, the action is just the reverse, the fasteners being restrained from entering the notch along the edge 150, and the way being held clear to permit a fastener to enter the notch from along the edge 151.

The brushes 137 and 138 are provided for causing fasteners to be delivered over the upper outer extremities of the notch or mouth so that each side of the notch or mouth may serve as a reservoir for fasteners awaiting an opportunity to enter the notch. Of the fasteners carried up by the brush 137, some will be deposited in suitable attitudes against the plate 139 to permit a fastener arm to become lodged between the plate 139 and the opposed base of the block 145 along the edge 151. Such a fastener must have its prongs faced away from the plate 139, and both sets of prongs of the fastener will naturally settle against the edge 151 and be guided by it. The same thing occurs at the left hand side of the hopper when fasteners are carried up by the brush 138.

As a further feature which has utility, but which is not generally necessary to the successful practicing of the invention, a separator finger 152 is provided on the plate 139. This separator finger is formed with an end portion 153 which extends over the upper edge of the plate 139 and downward at a short distance from the outer face of the plate 139. A set screw 154 is threaded through the downwardly extending portion of the finger and serves to clamp the finger to the plate 139. The finger is desirably set in notch bisecting position. Since it is mounted solely on the plate 139, it is removable with the plate as a unitary part thereof. The finger 152 bears directly against the plate at its upper end, but throughout the major portion of this length, including the entire lower end portion, it is formed with a set back 155 so that its face opposed to the plate 139 is spaced from the plate 139 sufficiently to permit a fastener arm, but not the fastener prongs, to enter between the plate 139 and the finger. The finger assists in preventing a fastener, descending from the left, from being dislodged or disarranged by a right hand brush, and it also assists in preventing a fastener descending from the right, from being dislodged or disarranged by a left hand brush.

The edges 150 and 151 are desirably made long enough so that several fasteners properly oriented and arranged in sequency can stand at either side of the notch simultaneously while awaiting an opportunity to enter the notch and to be delivered to the upper magazine section formed jointly by the guide plate 142 and the guide block 145.

While both illustrative embodiments have been described as comprising an upper stationary magazine section and a lower swinging magazine section, this construction is not essential to the broad invention. The magazine may be made rigid with the fastener container or hopper, in which case the combined hopper and magazine structure may be swung as a unit, or alternatively, the combined hopper and magazine structure may be mounted stationary, with suitable separator and

transfer means provided for placing the fasteners singly in setting position.

I have described what I believe to be the best embodiments of my invention. I do not wish, however, to be confined to the embodiments shown, but what I desire to cover by Letters Patent is set forth in the appended claims.

I claim:

1. In a machine for setting fasteners of the type equipped with two widely spaced sets of prongs, the combination with fastener setting means for operating upon the fasteners at a setting station, of a magazine for feeding the fasteners singly at said station, a hopper, a plurality of fastener guides leading from the hopper and defining separate paths for the conducting of fasteners from the hopper, means for causing the fasteners to be discharged from the hopper into the fastener guides in orderly arrangement and in predetermined attitudes each with one of the prong sets directly following the other, and a rotary transfer device controlling and effecting the delivery of fasteners from the several guides to the magazine, said transfer device comprising a disc having evenly spaced notches in its marginal area each of sufficient depth to accommodate at least two prong sets of a fastener to maintain control of the orientation thereof, and means for imparting uni-directional, step-by-step movement to the transfer device.

2. A fastener feeding mechanism comprising a hopper, rotary fastener agitating means therein, and a guide for conducting fasteners from the hopper and formed in part at least of wall members of the hopper, said guide comprising a flat downwardly inclined plate, and an arcuate plate having an upper marginal portion thereof extending flat and in parallel relation to the flat plate at a fixed distance therefrom, said arcuate plate having a broad notch formed in its flat area whose edges converge downwardly toward the arcuate area of the plate, said notch terminating in a narrow, parallel-edged portion disposed in the arcuate area of the plate which retreats from the flat plate.

3. A fastener feeding mechanism as set forth in claim 2 in which a guide continuation is formed by the flat plate in cooperation with a channel block opposed thereto, said block having its channel disposed in alignment with the parallel-edged portion of the notch, and having the face portion bordering the channel disposed in co-planar relation with the flat marginal portion of the arcuate plate.

4. A feeding mechanism for feeding fasteners of the type equipped with two widely spaced sets of prongs comprising a rotary fastener transfer device, a plurality of radially disposed guides leading to the transfer device for gravity feeding fasteners thereto each with one of the prong sets directly following the other, and a single magazine extending radially downward away from the lower side of the transfer device, said transfer device comprising a disc having a series of radially extending channels in its margin for transferring fasteners from the guides around to the magazine, each channel being deep enough, at least, to receive the two prong sets of a fastener to maintain control of the orientation thereof.

5. A fastener feeding mechanism as set forth in claim 4 in which an inclined supporting plate forms a common element of all the guides, the transfer device, and the magazine.

6. A feeding mechanism for feeding fasteners

of the type equipped with two widely spaced sets of prongs comprising, in combination, a rotary transfer device which includes a rotary disc having a plurality of outwardly extending channels formed in the margin thereof, each channel being deep enough at least to receive the two prong sets of a fastener to maintain control of the orientation thereof, a downwardly extending fastener guide arranged to be placed in communicating alignment with the several disc channels by rotation of the disc, means for intermittently rotating the disc, and an inclined fastener supporting plate extending under the fastener guide and the disc, said supporting plate being recessed at opposite marginal portions of the path traversed by the fasteners in traveling along the guide, the recess extending into overlapping relation with the disc by an amount at least as great as the distance between the prongs of a fastener.

7. A fastener feeding mechanism comprising a rotary transfer device which includes a rotary disc having radial channels formed in the margin thereof, a radially extending fastener guide arranged to be placed in communicating alignment with the several disc channels by rotation of the disc, and an inclined fastener supporting plate forming a common element of the guide and the transfer device, said disc having the marginal portion of its fastener engaging face recessed except at the areas lying immediately alongside the disc channels.

8. In a fastener feeding mechanism for feeding fasteners of the type equipped with two widely spaced sets of prongs, in combination, a guide member formed with a flat, downwardly inclined fastener engaging surface, and a cooperating guide means opposing a guiding surface to the fastener engaging surface of said guide member at a fixed distance therefrom, said cooperating guide means having a notch in its upper margin whose edges converge downwardly so that either edge may engage the prong sets of a fastener to orient it and guide it to the lower portion of the notch, and a channel communicating with the lower portion of the notch and extending downwardly therefrom, means for depositing fasteners against the downwardly inclined face of the guide member in position to fall into the notch, and means periodically sweeping over the lower portion of the notch to prevent obstruction of the notch and channel.

9. In a fastener feeding mechanism, the combination with a hopper for holding a mass of heterogeneously arranged fasteners, of a guide, comprising parallel spaced members for conducting fasteners away from the hopper, one of said members being formed at the upper end with a notch and having a guide channel communicating with the base of the notch, and a plurality of revolving fastener lifting brushes both disposed to sweep across the base of the notch but arranged to extend to different sides of the base of the notch, and means for revolving the brushes to cause them to pass alternately over the base of the notch.

10. In a fastener feeding mechanism, the combination with a hopper for holding a mass of heterogeneously arranged fasteners, of a guide for conducting fasteners from the hopper, comprising parallel spaced members, one of said members being formed at its upper end with a notch and having a guide channel in its guide forming face communicating with the base of the notch, said members also having clearance

channels in its guide forming face extending closely adjacent to and in parallelism with the edges of the notch.

11. In a fastener feeding mechanism, the combination with a hopper for holding a mass of heterogeneously arranged fasteners, of a guide for conducting fasteners from the hopper comprising parallel spaced members, one of said guide members being formed at its upper end with a notch and having a guide channel communicating with the base of the notch, means for clearing the notch base and an adjoining portion of the notch at one side of the base, means for clearing the notch base and an adjoining portion of the notch at the opposite side of the base, and means for causing said clearing means to be alternately effective.

12. In a fastener feeding mechanism, the combination with a hopper for holding a mass of heterogeneously arranged fasteners, of a guide for conducting fasteners from the hopper comprising parallel spaced members, one of said guide members being formed at its upper end with a notch and having a guide channel communicating with the base of the notch, and means for lifting fasteners from the container to the notch and for clearing the notch first at one side of the notch base and then at the other.

13. In a fastener feeding mechanism, the combination with a hopper for holding a mass of heterogeneously arranged fasteners, of a guide for conducting fasteners from the hopper comprising parallel spaced members, one of said guide members being formed at its upper end with a notch and having a guide channel communicating with the base of the notch, and the second guide member being formed with a plane fastener engaging surface and constituting also a wall section of the hopper, and means for mounting said second guide member in operative position with capacity for ready removal.

14. In a fastener feeding mechanism, the combination with a hopper for holding a mass of heterogeneously arranged fasteners, of a guide for conducting fasteners from the hopper comprising parallel spaced members, one of said guide members being formed at its upper end with a notch and having a guide channel communicating with the base of the notch, and the second guide member being formed with a plane fastener engaging surface and constituting also a wall section of the hopper, and means for slidably mounting the second guide section in operative position with capacity for ready removal.

15. In a fastener feeding mechanism, the combination with a hopper for holding a mass of heterogeneously arranged fasteners, of a guide for conducting fasteners from the hopper comprising parallel spaced members, one of said guide members being formed at its upper end with a notch and having a guide channel communicating with the base of the notch, and a partition finger mounted on the second guide member in substantially notch bisecting position and extending toward the base of the notch in spaced parallel relation to the second guide member.

16. In a fastener feeding mechanism, the combination with a hopper for holding a mass of heterogeneously arranged fasteners, of a guide for conducting fasteners from the hopper comprising parallel spaced members, one of said guide members being formed at its upper end with a notch and having a guide channel communicating with the base of the notch, and the

second guide member being formed with a plane fastener engaging surface and constituting also a wall section of the hopper, a partition finger mounted on the second guide member in substantially notch bisecting position, and extending toward the base of the notch in spaced parallel relation to the second guide member, and means for mounting said second guide member in operative position with capacity for ready removal.

17. In a fastener feeding mechanism, the combination with a hopper for holding a mass of heterogeneously arranged fasteners, of a guide, comprising parallel spaced members for conducting fasteners away from the hopper, one of said members being formed at the upper end with a notch and having a guide channel communicating with the base of the notch, and a plurality of revolving fastener lifting brushes both disposed to sweep across the base of the notch but arranged to extend to different sides of the base of the notch, and means for revolving the brushes to cause them to pass alternately over the base of the notch, and additional fastener lifting brushes operable respectively across the opposite extremities of the notch.

18. Means for conducting fasteners from a hopper having a mouth portion, the fasteners being of a type wherein each comprises a flat central body portion, oppositely disposed, aligned arm portions formed integral with the body portion and each arm portion having an attaching member formed integral therewith and extending substantially perpendicularly therefrom and said body portion having a pair of oppositely disposed bendable legs arranged in a direction normal to the axis of the arm portions, said conducting means comprising in combination, a substantially flat downwardly inclined plate, a second plate having an upper marginal portion thereof extending in substantially parallel relation to said inclined plate at a distance therefrom slightly greater than the thickness of a fastener body portion, and said second plate having at least one edge portion inclined downwardly toward the mouth portion of the hopper, and means within the hopper for elevating fasteners therein to a portion of the flat, downwardly inclined plate which is above the level of the downwardly inclined edge portion of the second plate.

19. The structure comprising the elements combined and cooperating as set forth in claim 18 and further characterized by said second plate having two edge portions which converge downwardly and terminate in parallel edges spaced apart a distance slightly less than the width of the arm portions of a fastener.

20. A feeding mechanism for feeding fasteners of the type having a substantially flat body portion and two widely spaced sets of prongs projecting substantially normally therefrom, comprising in combination, a receptacle adapted to hold a supply of the fasteners and having a mouth portion, a downwardly inclined plate secured to the receptacle, a guide member having an upper marginal portion thereof extending substantially parallel to said inclined plate, said marginal portion having an edge inclined downwardly toward the mouth portion of the receptacle and said edge being spaced from the inclined plate by a distance such that the two sets of prongs of a fastener engage said edge to thereby orient a fastener having its flat body portion in sliding engagement with the inclined plate, and means within the hopper for elevating fasteners therein

to a level above that of the upper marginal portion of the guide member.

21. Means for conducting fasteners from a hopper, the fasteners being of a type comprising
5 a main body portion having an attaching member extending perpendicularly therefrom, and a bendable leg portion extending from the body portion in the plane thereof, said conducting means comprising, in combination, a substantially flat downwardly inclined plate, a second
10 plate having an upper marginal portion thereof

extending in substantially parallel relation to the said inclined plate at a distance therefrom slightly greater than the thickness of a fastener leg portion, said second plate having at least one edge portion inclined downwardly toward the
5 mouth portion of the hopper, and means within the hopper for elevating fasteners therein to a portion of the flat downwardly inclined plate which is above the level of the downwardly inclined edge portion of the second plate.
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