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MACHINE FOR AUTOMATICALLY PACKAGING CONVEYER SUPPORTED PRODUCTS

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Fig. 1.

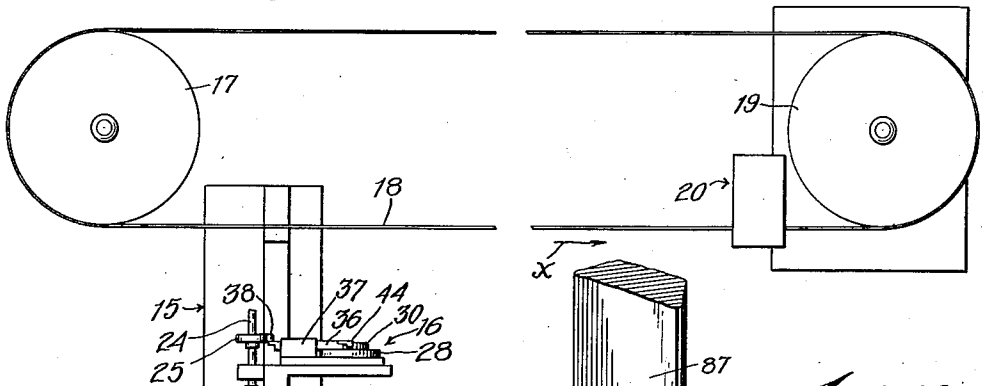


Fig. 11.

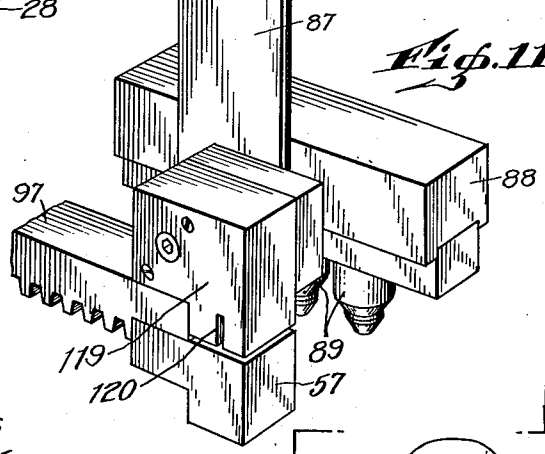
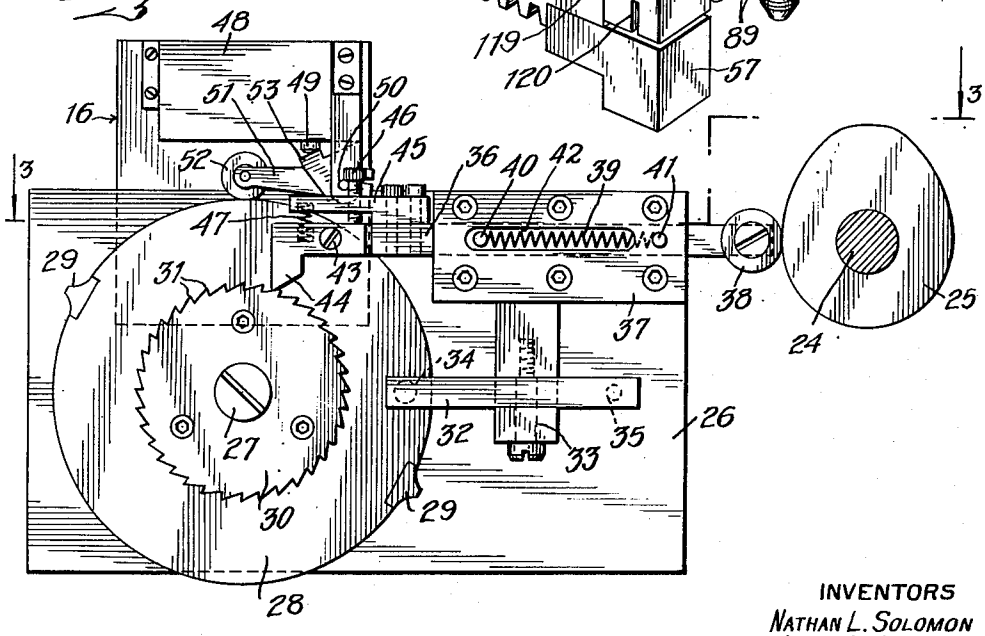


Fig. 2.



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Fig. 3.

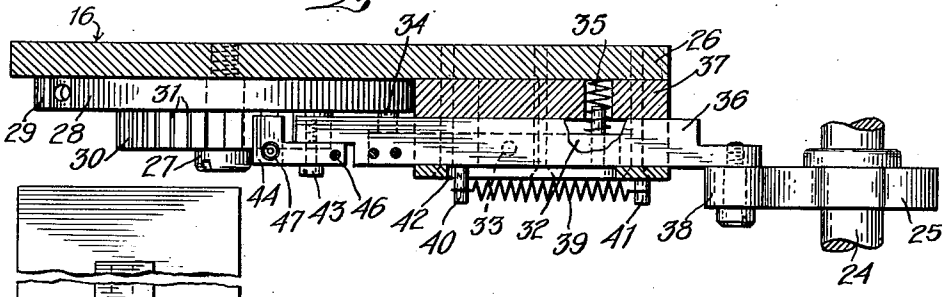


Fig. 5.

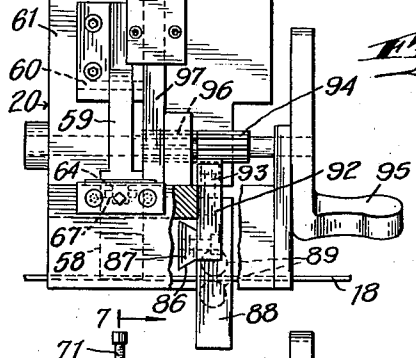


Fig. 4.

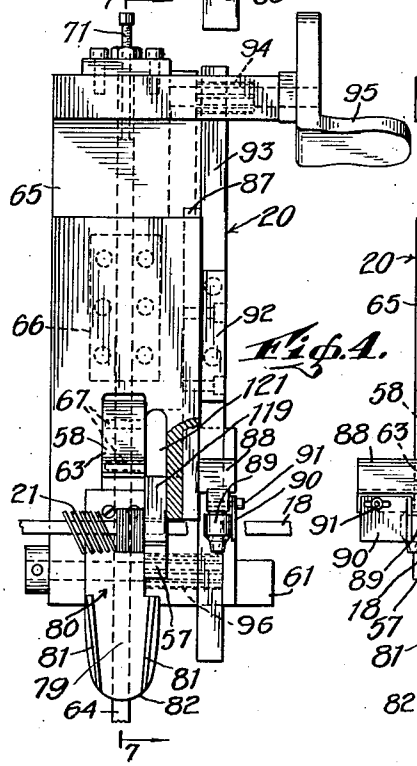
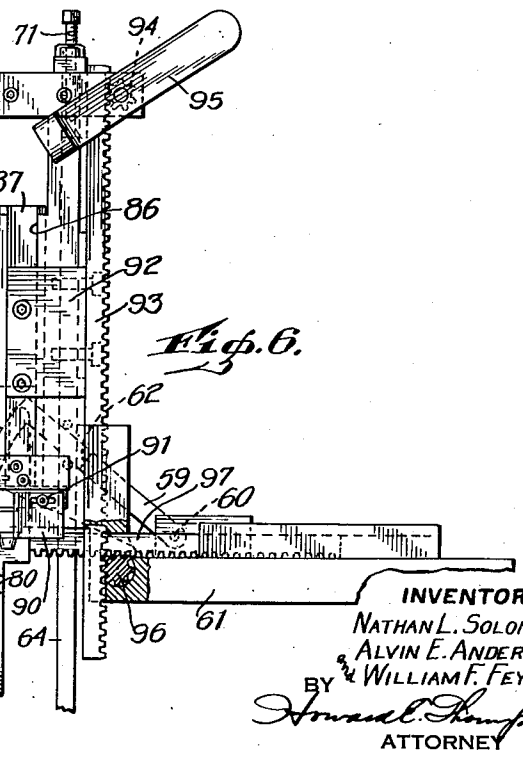


Fig. 6.



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Fig. 7.

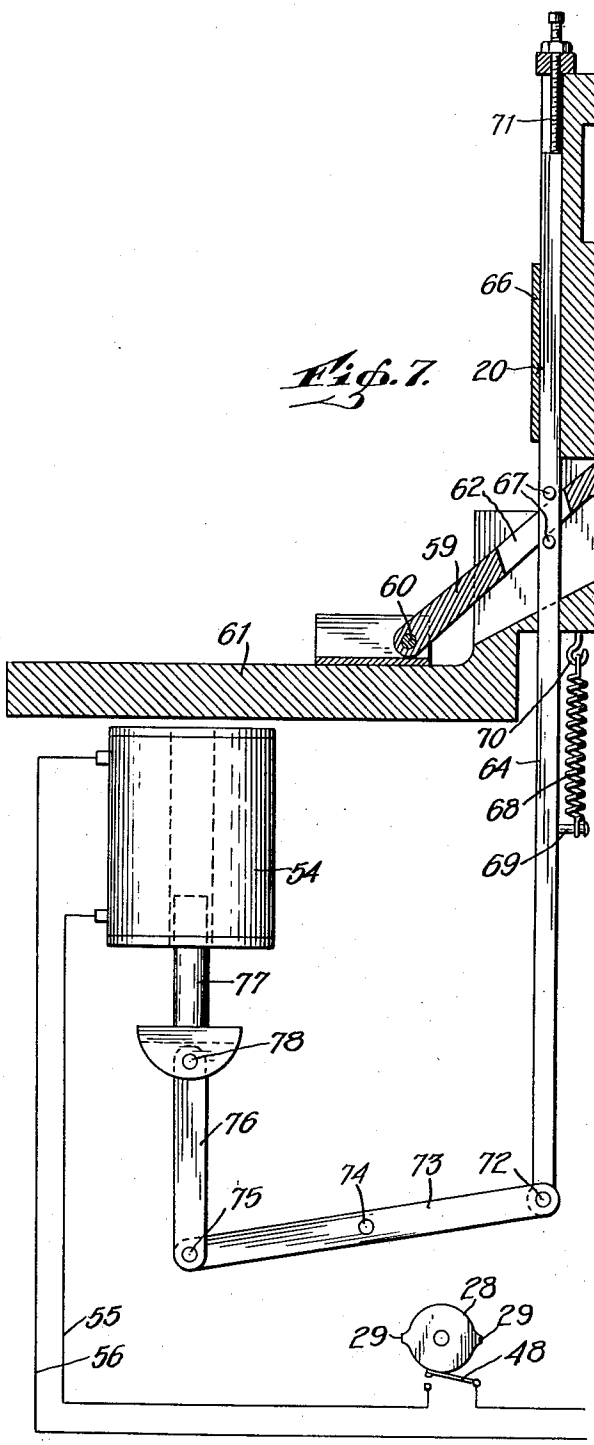
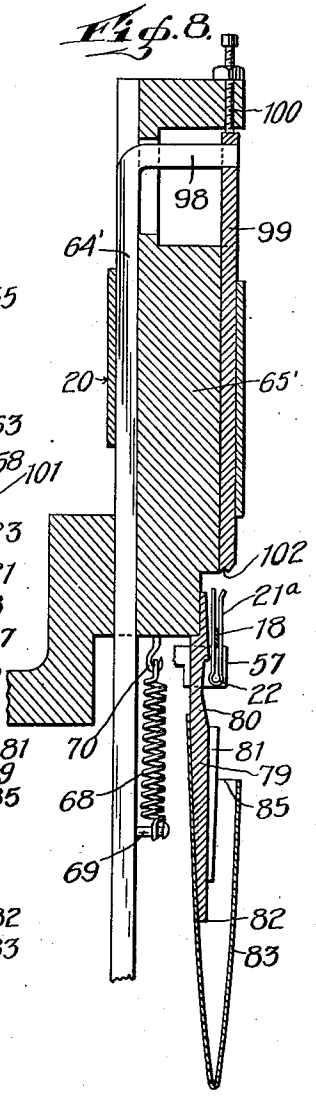


Fig. 8.



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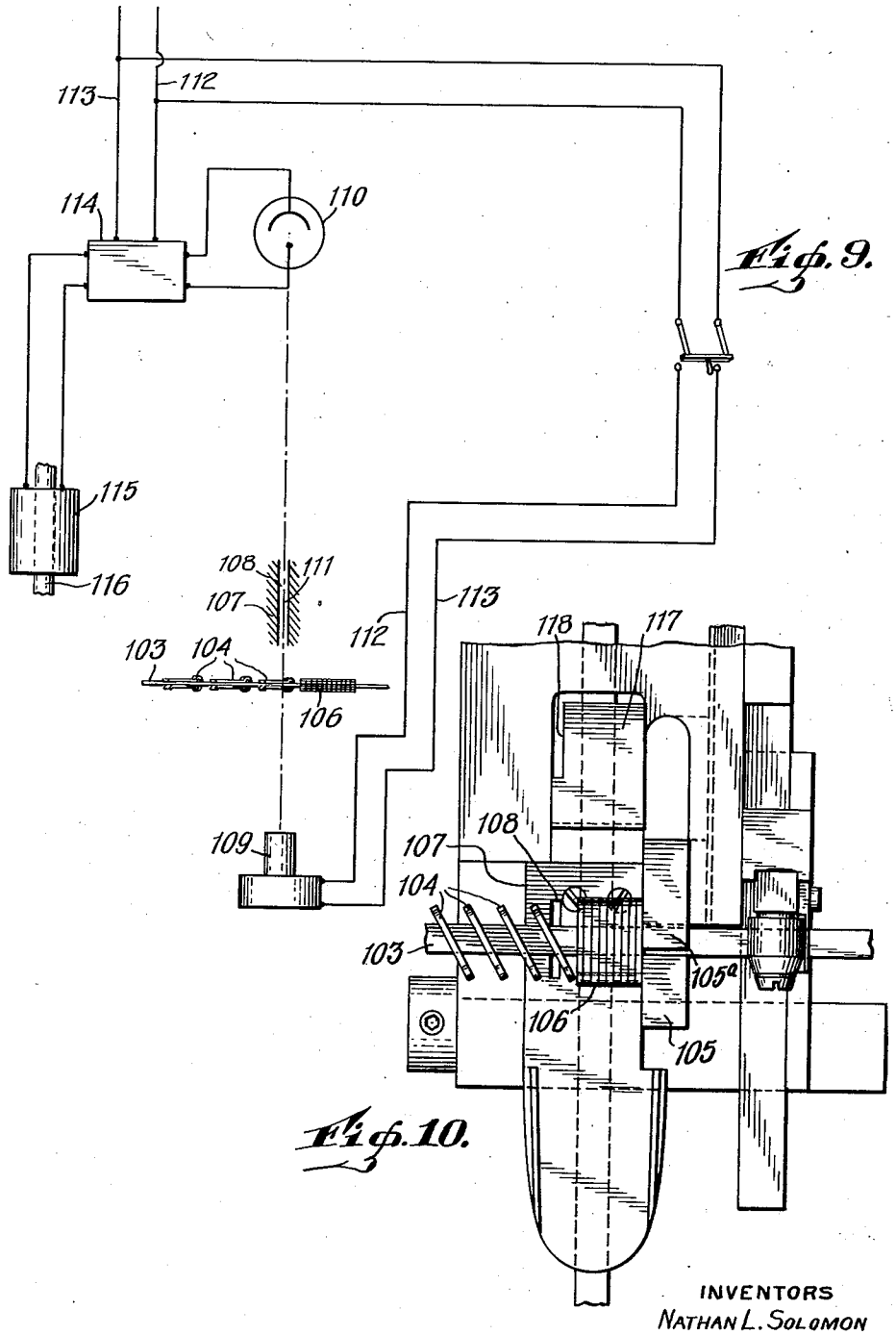


Fig. 9.

Fig. 10.

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UNITED STATES PATENT OFFICE

2,574,196

MACHINE FOR AUTOMATICALLY PACKAGING CONVEYER SUPPORTED PRODUCTS

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Application December 7, 1944, Serial No. 567,084

8 Claims. (Cl. 163—8)

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This invention relates to machines wherein formed products are mounted on conveyors or carriers, such for example, as machines of the type and kind disclosed in the application of Jean R. Taplinger, Serial Number 540,732, filed June 16, 1944, in which application, a wire product is so formed and mounted. More particularly, the present invention deals with means or apparatus, in machines of this type and kind, for automatically stacking or bunching a number of products made from flat, round, half-round and otherwise shaped wire, and for convenience therein, referred to as wire forms, on the conveyor or carrier, and then simultaneously displacing the stacked or bunched products from the conveyor or carrier and discharging the same into a package or receptacle. Still more particularly, the invention includes means for automatically controlling the number of articles or products stacked or bunched on the conveyor or carrier and to put in motion the means for displacing or removing the stacked and counted products or articles for transmission into the package or receptacle. The novel features of the invention will be best understood from the following descriptions when taken together with the accompanying drawings in which certain embodiments of the invention are disclosed and in which the separate parts are designated by suitable reference characters in each of the views; and in which:

Fig. 1 is a diagrammatic plan view illustrating in outline the general relationship of the conveyor or carrier with respect to the forming mechanism and the packaging mechanism.

Fig. 2 is a side and sectional view of that part of the forming mechanism diagrammatically illustrated in Fig. 1, which deals with the control of counting and automatically energizing the packaging mechanism.

Fig. 3 is a partial section on the line 3—3 of Fig. 2.

Fig. 4 is a face view of the packaging mechanism diagrammatically positioned in Fig. 1.

Fig. 5 is a plan view of the structure shown in Fig. 4 with part of the construction broken away and in section.

Fig. 6 is a side elevation of the structure shown in Fig. 4, with part of the construction broken away and in section.

Fig. 7 is a section on the line 7—7 of Fig. 4 on an enlarged scale and diagrammatically showing only the product or article displacing or removing mechanism.

Fig. 8 is a view similar to Fig. 7, showing only

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a part of the construction and showing a modification.

Fig. 9 is a diagrammatic plan view showing a modified form of control and illustrating the wiring diagram of said control.

Fig. 10 is a view similar to Fig. 4, showing only a part of the construction and illustrating the same as applied to the control of Fig. 9; and

Fig. 11 is a perspective detail view of the article stop mechanism employed.

In illustrating one adaptation and use of my invention, the same is shown applied to the packaging of articles of manufacture, such as wire forms, wherein the wire forms are formed and mounted upon an endless band and are fed by this band through various stations for treatment or processing in the manner taught in the application hereinbefore referred to. In machines of this type and kind, I employ a machine or mechanism for automatically counting and stacking a predetermined number of products as the carrier band or conveyor is moved through the machine and when the desired number of products have been counted and stacked, means is automatically actuated for simultaneously removing all of the counted and stacked products from the band and delivered into a package or receptacle, the latter in most cases, being utilized as the package or wrapper for the retail sale of the product. In the present illustration, an envelope will be utilized as the package, for the reception of the wire forms. In referring to wire forms, it will be apparent that reference is made to wire or strand forms of any type or kind, and in fact to any type of product which can be mounted, counted and collectively displaced from a carrier into a package or other receiver.

Considering the diagrammatic showing in Fig. 1 of the drawing, 15 represents in outline the approximate position of a machine employed to produce wire forms or bobby-pins and including a counting and automatic stripping mechanism, as diagrammatically indicated at 16. At 17 is shown one pulley or wheel, around which an endless band 18, which may be termed a carrier or conveyor, passes, the band also passing around another pulley or wheel 19, spaced with respect to the wheel 17. Adjacent the wheel 19 is a packaging mechanism 20, which may be referred to as a stripper or as a stacking and ejector mechanism. The band 18 is traveling in the direction of the arrow x of Fig. 1, and arranged on the band 18, at spaced intervals, are products or articles 21, note Fig. 4, arranged at

an inclination. These products or articles in the construction shown are in the form of bobby-pins, as more clearly illustrated in Fig. 7. The looped ends 22 thereof are directed downwardly. One end of the pins 21 are formed with offset flanged portions 23 which facilitate removal of the products from the band, as later described. As seen in Fig. 7, the products 21 are curved, whereas in Fig. 8, similar products 21–A have straight sides and would thus be removed from the band 18 by a slightly different mechanism from that shown in Fig. 7.

The counting and starter switch mechanism, diagrammatically indicated at 16 in Fig. 1, is shown more in detail in Figs. 2 and 3 of the drawing.

In Figs. 2 and 3, 24 represents the cam shaft of the forming and mounting mechanism 15, upon which is arranged a cam 25, and 26 represents a plate of the machine 15, on which is supported a stub shaft 27. Rotatable on the shaft 27 is a switch tripping disc or wheel 28, having two or more trip devices 29, two being illustrated in the present construction. Secured to the face of the wheel 28 is a tooth wheel or ratchet 30 having a predetermined number of teeth 31 on the periphery thereof and the number of these teeth, in the construction shown, will control the number of products in each of two stacks or groups for insertion into receiving packages or receptacles, as will later appear.

At 32 is shown an arm pivoted, as seen at 33 and carrying at its free end a friction member 34 to engage the face of the wheel 28 to retain the same against movement other than through the feed mechanism employed and later described. The arm 32 is urged into operative position by a spring 35, as clearly illustrated in Fig. 3 of the drawing. The wheel 28 is intermittently rotated by a feed mechanism comprising an elongated bar 36 slidably mounted in a guide block 37, the bar supporting at one end an anti-friction roller 38 which operates upon the cam 25 and is held in constant engagement with the cam by a spring 39, one end of which is coupled with the bar, as seen at 40 and the other end is coupled to the post 41 on the front plate of the guide block 37. The front plate has an elongated aperture 42 for the passage of the spring mounting 40 therethrough as the bar 36 reciprocates back and forth.

The other end of the bar 36 carries a pin or screw 43 upon which is pivoted a pawl 44 adapted to engage the teeth 31 of the ratchet 30 in intermittently feeding the wheel 28. Supported on top of the bar 36 is a bracket 45 carrying an adjacent stop screw 46 and forming a backing for a spring 47. The spring 47 cooperates with the pawl 44 to hold it against the screw 46. This screw also forms a backing to support the pawl in its forward or feed stroke, while permitting the pawl to ride freely over the teeth 31 in the backward or non-feed stroke of the bar. This will be clearly apparent from a consideration of Fig. 2 of the drawing.

Supported upon the plate 26 above the wheel 28 is a switch 48, the switch element or button of which is shown at 49. Pivoted adjacent the switch 48, as at 50, is an arm 51, carrying at its free end a roller 52 operating upon the surface of the wheel 28. The arm 51 also has a switch operating projection 53 arranged adjacent the element or button 49 so that as the roller 52 is raised by one of the trips 29, the switch 48 will be energized to automatically actuate the mechanism 20. In other words, it will energize the solenoid 54, note Fig. 7.

In Fig. 7, the switch 48 is diagrammatically illustrated, as is also the switch actuating wheel or disc 28 with its trips 29 thereon. The circuit wires to the solenoid 54 are indicated at 55 and 56 in said figure.

At this time, it will be understood that the shaft 24 completes one revolution each time a product, such as 21—21A is formed by the machine mechanism 15 and mounted upon the band 18. Thus as each product is formed, the wheel 28 is moved a distance equal to the spacing of one tooth 31 on the ratchet, thus as a corresponding number of such devices arranged on the band are reached and are stacked at the mechanism 20, one of the trips 29 will be then brought into position to actuate the switch 48 to then strip or remove the counted and stacked products from the band and discharge the same into the receiver. The trip devices 29 are so constructed as to quickly energize the switch and immediately return the roller 52 to operative position upon the wheel in order to provide successive stackings of counted products on the band.

As the band 18 is fed through the mechanism 20, the products or pins 21 are moved up against a stop bar or finger 57 and are stacked or piled one upon the other edge to edge, the band 18 passing through the products 21 in this operation. When the last and counted product 21 has been stacked, the stack of products are collectively and simultaneously stripped from the band 18 by a stripper or ejector 58. The stripper or ejector 58, as seen in Fig. 7 of the drawing, is in the form of an arm 59, pivoted as seen at 60 to the bed plates 61 of the mechanism 20. The arm 59 has an elongated aperture 62 inwardly of the curved or finger end 63 of the ejector. Passed through the aperture 62 is a vertical rod 64, suitably guided in an upstanding plate 65, as seen at 66. The rod has spaced pins 67 projecting from the sides thereof to operate upon the arm 59 in actuating the ejector 58. A spring 68 is coupled to the rod 64, as seen at 69 and to a part of the plate 61, as seen at 70. This spring serves to hold the ejector 58 and the rod in raised inoperative position against an adjustable stop screw 71. The screw 71 is adapted to control the stroke of the ejector or stripper 58 in order to insure complete removal of the products from the band 18.

Pivoted to the lower end of the rod 64 as at 72, is a rocker arm 73, pivoted to the other end of the arm as at 75, is a link 76 having a pivotal coupling with the core 77 of the solenoid 54, as indicated at 78.

From the above described construction, it will be readily apparent that when the solenoid 54 is energized, the core 77 will be raised and the rod 64 moved downwardly through the link and levers employed, and in this downward movement, the ejector or stripper 58 will remove all of the articles 21 from the band 18. The width of the finger end 63 of the ejector or stripper will correspond to the combined length of the stacked articles 21 on the band so that all of these articles will be engaged by the finger and fed downwardly upon the channelled surface 79 of a package supporting member 80. In the construction shown, the member 80 is in the form of a downwardly extending plate having outwardly flanged sides 81 forming the channel surface 79. The lower end of the plate is curved, as

seen at 82, note Fig. 4, facilitating the free insertion of an envelope like package 83 onto the plate with the closure flap 84 of the envelope arranged on the rear surface of the plate. The side flanges 81 serve to support the open end of the envelope in extended position, as indicated at 85, in Fig. 7 of the drawing, to insure delivery of all of the articles 21 into the envelope when stripped from the band 18.

One side of the plate 65 has a dove-tailed channel 86, note Fig. 5, in which is mounted a slide 87. Secured to the lower end of this slide is a horizontal plate 88 supporting two anti-friction guide rollers 89 for guiding and alining the band 18. Two scraper blades 90 are adjustably supported on the plate 88, as seen at 91 to operate upon the surfaces of the rollers 89 to scrape these rollers to free them of any foreign material which may have a tendency to collect thereon, in order to maintain at all times, proper alinement of the band and to position the products in proper alinement with the ejector or stripper device. In producing products such as the bobby-pins illustrated, at times these pins or wire forms are plated or coated with suitable materials, and this coating also collects upon the band 18 and may be transferred to the rollers 89. However, the scrapers 90 will maintain the rollers clear at all times.

Secured to the slide 87 is a plate 92, note Fig. 6, which carries at one side an elongated rack bar 93 guided in the plates 61 and 65. Supported in the upper end portion of the plate 65 is an elongated gear 94 which meshes with the rack 93 and secured to one end of the gear is a hand crank 95 by which the gear 94 may be rotated. The rack 93 extends downwardly through the plate 61 and also operates upon another elongated gear 96 supported in the plate 61 and also operating upon an elongated rack portion 97 constituting part of the backing finger or bar 57.

In Fig. 8 of the drawing is shown a slight modification of the structure shown in Figs. 4 to 7 inclusive, which comprises employing a rod 64' which differs from the rod 64 in that the pins 67 are omitted and the upper end of the rod includes an outwardly directed extension 98 engaging a straight ejector or stripper 99. Or in other words, a stripper which moves vertically in the vertical plates 65' to operate upon the straight bobby-pin 21A, as seen in Fig. 8. With this construction, an adjustable stop screw 100 is arranged at the front of the plate 65' to control upward movement of the stripper 99. Considering Figs. 7 and 8, it will appear that the stripper 58 has a tooth like surface 101 for engagement with the flange 23 of the wire forms 21 and a similar tooth like surface 102 is provided on the stripper 99. As the rest of the structure is identical with that shown in Figs. 4 to 7 inclusive, no further description is necessary and like parts will have like references.

In Figs. 9 and 10 of the drawing is shown diagrammatically a different mechanism for controlling automatic operation of the stripper mechanism. In other words, this will be substituted for the control and counting mechanism 16 shown in detail in Figs. 2 and 3 of the drawing.

In Figs. 9 and 10, 103 represents a part of the band or carrier for the articles 104, which again, for illustrative purposes, are wire forms; 105 represents a stop or backing finger similar to the finger 57 in order to stack or bunch the products 104 on the band 103, as partially indicated at 106

in Fig. 10 of the drawing. A supplemental backing 105a is also employed, similar to a supplemental backing shown in Figs. 4 to 7 inclusive and Fig. 11, later described. The supporting plate or frame of the machine generally indicated by the reference 107 will have a transverse slot or opening 108 extending above and below the band 103, and at a position which would constitute an alinement with the last product or pin of a stack 106, the slot being of such dimensions as to be completely blocked off by the last pin when in alinement with the slot 108 and yet the angular relationship of the articles as they approach the stacking position will at no time completely shut off transmission of light through the slot or opening 108. Arranged in opposed alinement to the slot or opening is a light projector 109 and tube or cell 110 of an electric eye mechanism for directing the light beam 111 of this mechanism through the slot or opening 108. At 112 and 113 are represented circuit wires of the electric eye mechanism, in which is a switch relay 114 energized upon the complete blocking off of the beam 111 to actuate the solenoid 115 in operating the core 116 thereof, which is equivalent to the core 77. It will of course be understood that the packaging mechanism, which can also be referred to as the stripper mechanism, will have no obstacle or operative part interfering with the beam of light 111, except the band 103 and the articles 104 thereon. It will be apparent however, that as the stripper finger 117 completes its stripping operation, a recess or clearance space 118 provided on one side of the finger, as seen in Fig. 10, will provide a quick break in the beam of light 111 in order to release the switch and deenergize the solenoid 15, allowing the finger 117 to return to its inoperative position. The control mechanism diagrammatically illustrated in Figs. 9 and 10 is applicable to both forms of strippers shown in Figs. 7 and 8 and, except as modified above, these mechanisms will be of the same structure and for this reason, no further specific description of the parts shown in Figs. 9 and 10 is deemed necessary.

In addition to the stop 57, the articles are also stopped by an upper block 119 shown in perspective in Fig. 11 of the drawing. This block has at its lower surface a slot 120 for the reception of the band 18. This slot in combination with the rollers 89 maintain the alinement of the band with respect to the stripper. The block 119 is supported upon the rear surface of the slide 87 and passes through an elongated aperture 121 in the standard 65, as seen in Fig. 4 of the drawing. It will thus be apparent that in the operation of the crank 95 to raise the rollers 89, the backing block 119 is also raised to clear the band 18, as well as the articles or wire forms 21—21A, arranged thereon to provide for free passage through the stripper mechanism.

At times it is possible that a faulty arrangement of the products or pins 21 may prevail on the band 18, and the operator, who is stationed adjacent the mechanism 20 to attach and detach the envelopes 83, will rotate the crank 95 so as to raise the rollers 89 together with the supplemental backing 119 out of engagement with the band. Simultaneously, the backing finger or bar 57 is moved inwardly or out of the path of movement of the article. The misarranged articles are now free to pass through the mechanism 20 for any other removal from the band. As soon as the articles are in proper position on the band, the crank is rotated in the

opposite direction and the rollers 89 and supplemental backing 119 are returned to operative position, as is also the backing finger or bar 57. In some cases, the fault in arrangement of the products on the band may be cared for by simply placing the hand of the operator under the plate 80 to catch a few of the articles in the hand for placement in another receptacle. On the other hand, a large receptacle may be arranged below the plate in wide spaced relationship thereto and the articles allowed to drop or to be delivered into this receptacle and afterwards packaged therefrom.

From the foregoing, it will be apparent that the articles or products are continuously formed and applied to the endless band or carrier and delivered in a spaced relationship to each other controlled by the speed of the band and the speed of forming and mounting the products. As these products are delivered by the band to the stripper or packaging mechanism, they are stacked into groups of predetermined number controlled by the mechanism as in Figs. 2 and 3 or by the position of the slot 108 with respect to the stop 105. When a complete stacking is provided, instantaneously the stripper is operated to remove all of the products from the band and deliver them into the envelope or other package or receptacle, as at 83. The envelopes 83 may have the flaps 84 thereof gummed and in removing the envelopes from the supporting plate 80, the operator will have ample time to seal these flaps and arrange the package in a suitable container ready for shipment.

It will be apparent that the illustrations in the accompanying drawings are simply to indicate one adaptation and use of the invention. It will be understood that the mechanism or apparatus is generally applicable to the packaging of products of any type or kind arranged upon or supported on a carrier or conveyor and counted or stacked as to numbers for delivery to a receiver which may constitute a packaging member of any type or kind. In other words, means is provided to control the grouping or stacking of the products either from the standpoint of mounting the same upon the conveyor after being formed, or from a standpoint of stacking. Here it is to be borne in mind that by utilizing the electric eye control, it is immaterial as to what particular arrangement the products may assume upon the band. No stripping operation will take place until the required number of products have been stacked or grouped. This will dispose with the need of the hand operator mechanism actuated through the crank 95. At least while this mechanism may be employed, its need for operation would be at very few intervals and only when faulty products, that is to say, misshaped or mistreated products would appear on the band. It will also be apparent that the particular shape and contour of the band or conveyor may be modified to suit different types and kinds of products being formed.

According to the invention, a machine is employed to shape or form the article or products and in some way mount or place it upon the carrier or conveyor. The conveyor is utilized to bring the articles or products to what may be termed a packaging unit or which also may be referred to as a packaging station. The question of packaging should be considered in a general sense to cover any type of group assemblage or support of the articles or products. From this standpoint, of course, the necessity for counting the articles is desirable in order that the same number of articles will always be delivered to the receiver. If preferred, the unit controlling removal of the articles from the carrer or conveyor may simply be for the purpose of counting and grouping the articles after which they may be packaged in any desired manner.

Having fully described our invention, what we claim as new and desire to secure by Letters Patent is:

1. An apparatus for automatically counting and packaging predetermined number of products, a carrier having a plurality of products arranged at spaced intervals thereon, a mechanism arranged along the path of movement of said carrier for grouping a predetermined number of the products on the carrier and supporting the same in predetermined position with the carrier movable through said grouped products, said mechanism having means for supporting a receiver thereon, means for simultaneously removing all of the grouped products from the carrier and delivering the same into said receiver, automatically actuated means controlling the operation of said last named means, and said automatically actuated means comprising an electric eye control actuated upon completion of the grouping of a predetermined number of said products.

2. In a mechanism for forming and applying predetermined number of articles to an endless conveyor, means for stacking a predetermined number of articles on said conveyor and in fixed position with respect to the movable conveyor, a stripper arranged adjacent the fixed position of the stacked articles on the conveyor and adapted to concurrently remove all of the stacked articles from the conveyor when a predetermined number of articles have been arranged in the stack, automatically actuated means for operating the stripper when the required number of articles are arranged in the stack, said last named means comprising an electric eye control actuated by arrangement of the last article in said stack.

3. In a machine for forming and mounting wire forms upon a band like carrier at spaced intervals, means adjacent the band for engaging the wire forms to collect a predetermined grouped number of the wire forms in a row on the band at a removal station, with the band movable through said grouped wire forms at said station, automatically actuated means for stripping the group of wire forms from the band when a required number of wire forms in a group have been collected at said station, said means comprising a stripper finger movable transversely of the band, and means establishing an electric eye beam transversing the band and the wire forms thereon at a point in alinement with the last wire form of said group.

4. In a machine for forming and mounting wire forms upon a band like carrier at spaced intervals, means adjacent the band for engaging the wire forms to collect a predetermined grouped number of the wire forms in a row on the band at a removal station, with the band movable through said grouped wire forms at said station, automatically actuated means for stripping the group of wire forms from the band when a required number of wire forms in a group have been collected at said station, said means comprising a stripper finger movable transversely of the band, means establishing an electric eye beam transversing the band and the wire forms

thereon at a point in alinement with the last wire form of said group, and said wire forms being arranged angularly upon the band in transversing the light beam in the grouping thereof.

5. In a machine of the class described, an endless movable conveyor comprising a wide band having flat opposed surfaces, means for stacking a predetermined number of wire forms on said conveyor in fixed position with respect to the movable conveyor, the wire forms having side members frictionally engaging side surfaces of said conveyor band, a stripper finger arranged adjacent the fixed position of the stacked wire forms on the conveyor, said finger being adapted to move over one of said surfaces of the band in stripping the wire forms therefrom, and said stripper finger concurrently removing all of the stacked wire forms from the conveyor band when a predetermined number of wire forms have been arranged in the stack.

6. In a machine of the class described, an endless movable conveyor comprising a wide band having flat opposed surfaces, means for stacking a predetermined number of wire forms on said conveyor in fixed position with respect to the movable conveyor, the wire forms having side members frictionally engaging side surfaces of said conveyor band, a stripper finger arranged adjacent the fixed position of the stacked wire forms on the conveyor, said finger being adapted to move over one of said surfaces of the band in stripping the wire forms therefrom, said stripper finger concurrently removing all of the stacked wire forms from the conveyor band when a predetermined number of wire forms have been arranged in the stack, and said stripper finger being movable in an arcuate path.

7. In a machine of the class described, an endless movable conveyor comprising a wide band having flat opposed surfaces, means for stacking a predetermined number of wire forms on said conveyor in fixed position with respect to the movable conveyor, the wire forms having side members frictionally engaging side surfaces of said conveyor band, a stripper finger arranged adjacent the fixed position of the stacked wire forms

on the conveyor, said finger being adapted to move over one of said surfaces of the band in stripping the wire forms therefrom, said stripper finger concurrently removing all of the stacked wire forms from the conveyor band when a predetermined number of wire forms have been arranged in the stack, said stripper finger being movable in an arcuate path, one common side portion of all of the wire forms having an offset finger engaging end, and the stripper finger having a free end shaped to engage the offset ends of the wire forms in establishing positive engagement of the finger with the wire forms in stripping the same from the conveyor band.

8. In a machine for forming and mounting wire forms upon an endless movable carrier at predetermined spaced intervals thereon, said carrier comprising a wide band and the wire forms having spring ends frictionally engaging side faces of the band, means along the path of travel of the band for engaging the wire forms to collect a predetermined grouped number of wire forms in a row on said band at a removal station, with the band moving between side members of the wire forms at said station, and automatically actuated means at said station and movable across one surface of the band and engaging one side member of said grouped wire forms for stripping the wire forms from the band when a required number of wire forms are collected in the group at said station.

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