

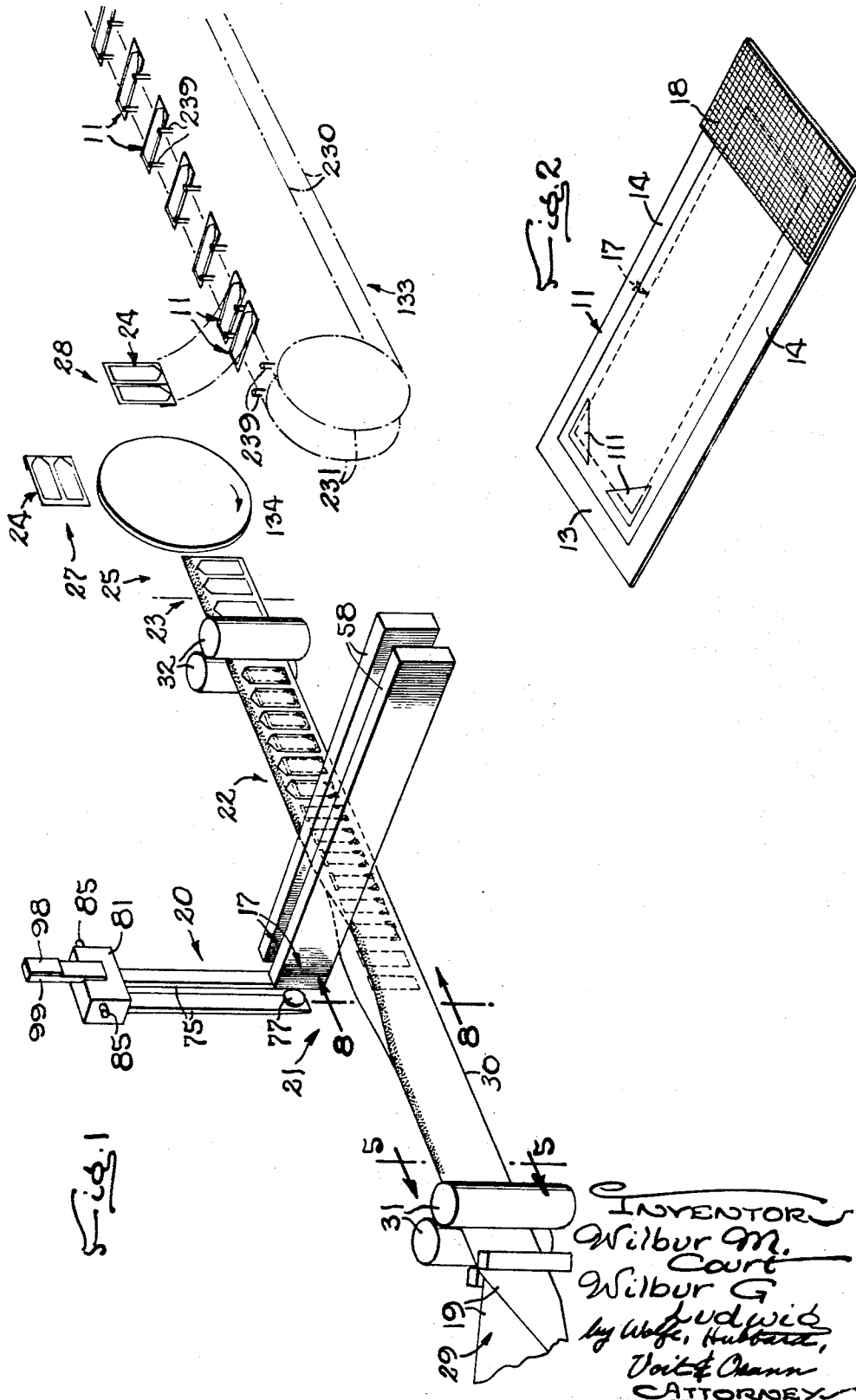
July 11, 1967

W. M. COURT ETAL
MACHINE AND METHOD FOR PACKAGING ARTICLES
IN ENVELOPE-TYPE PACKAGES

3,330,090

Filed Aug. 31, 1964

12 Sheets-Sheet 1



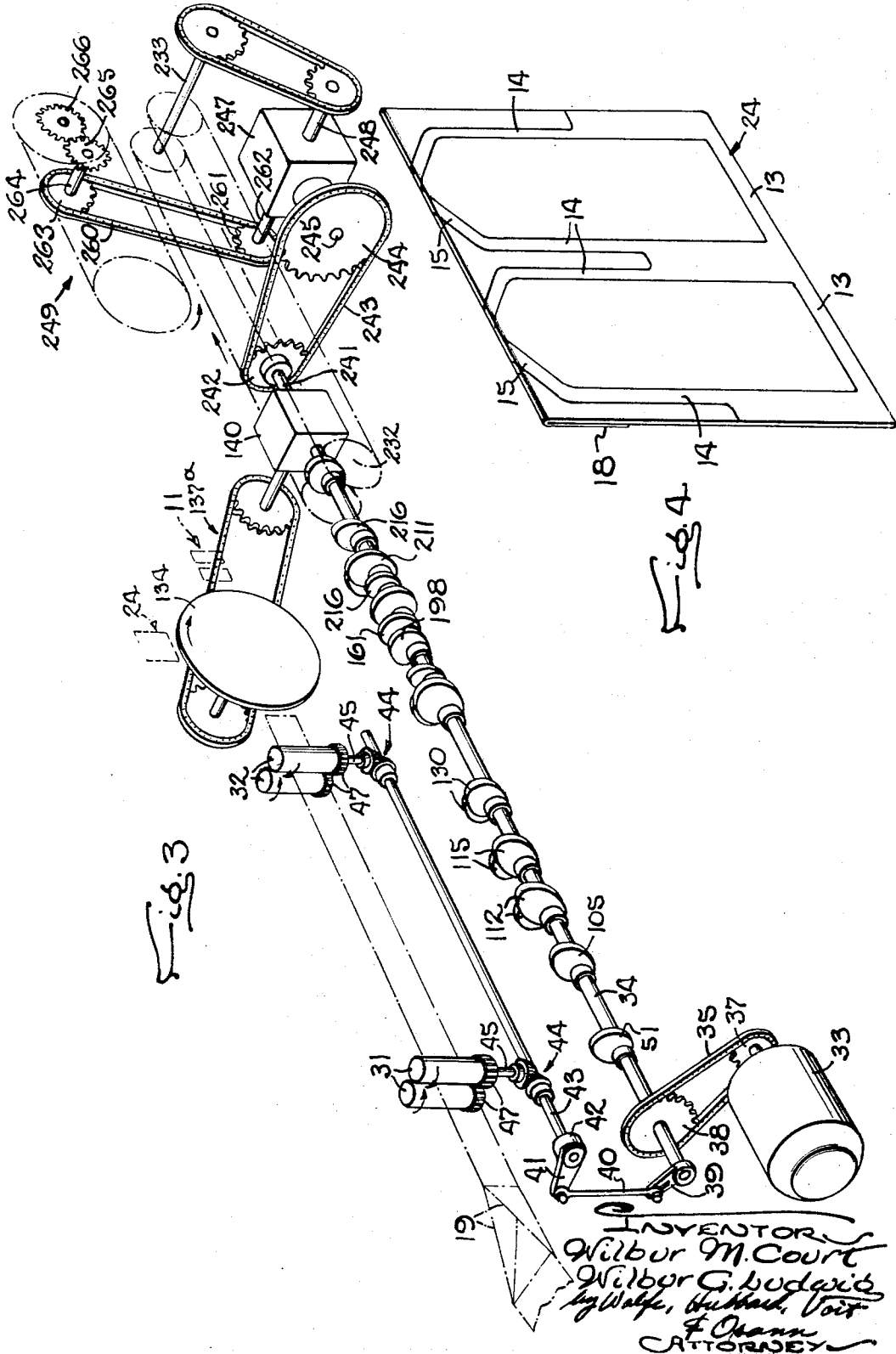
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12 Sheets-Sheet 2



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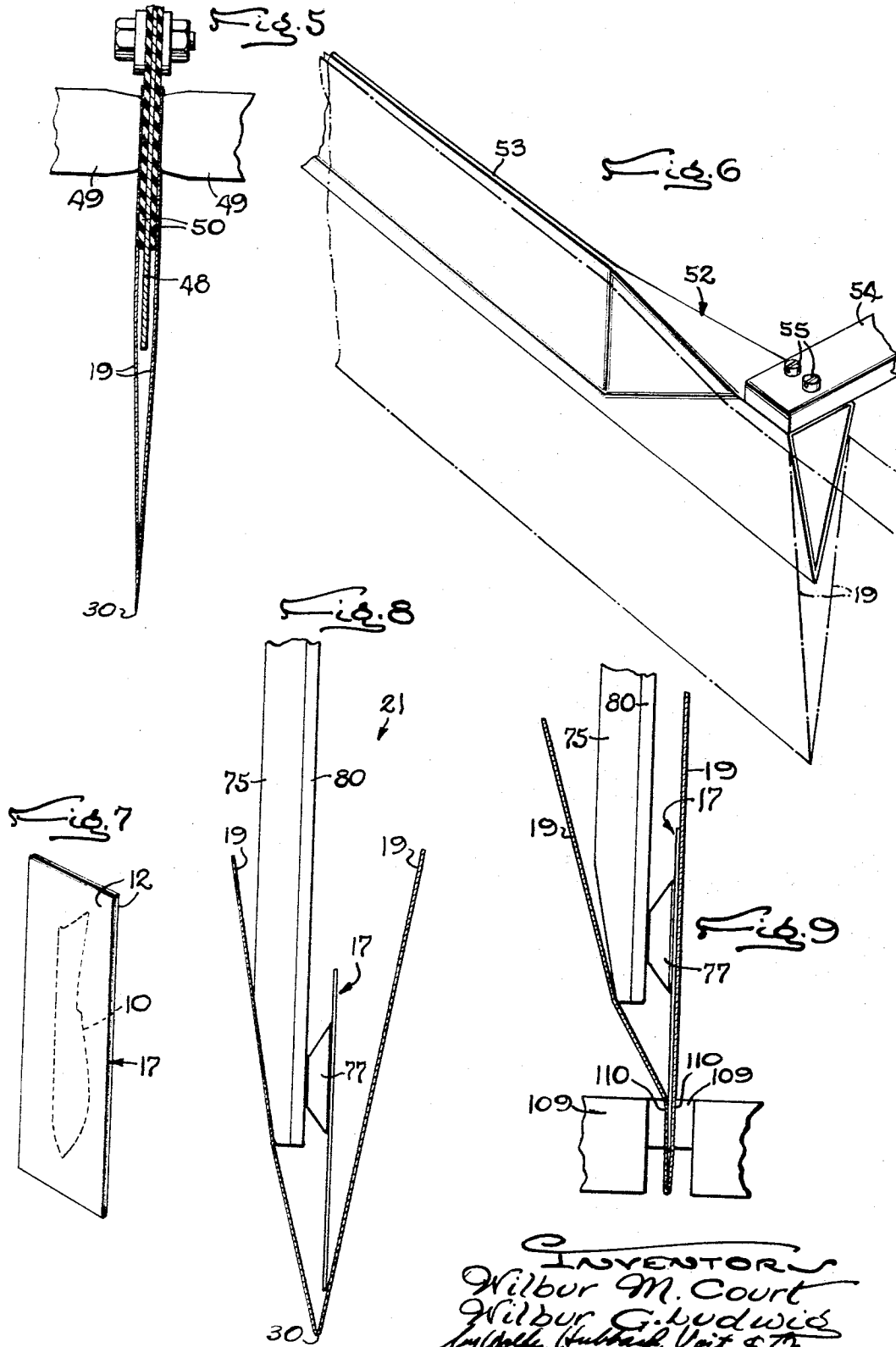
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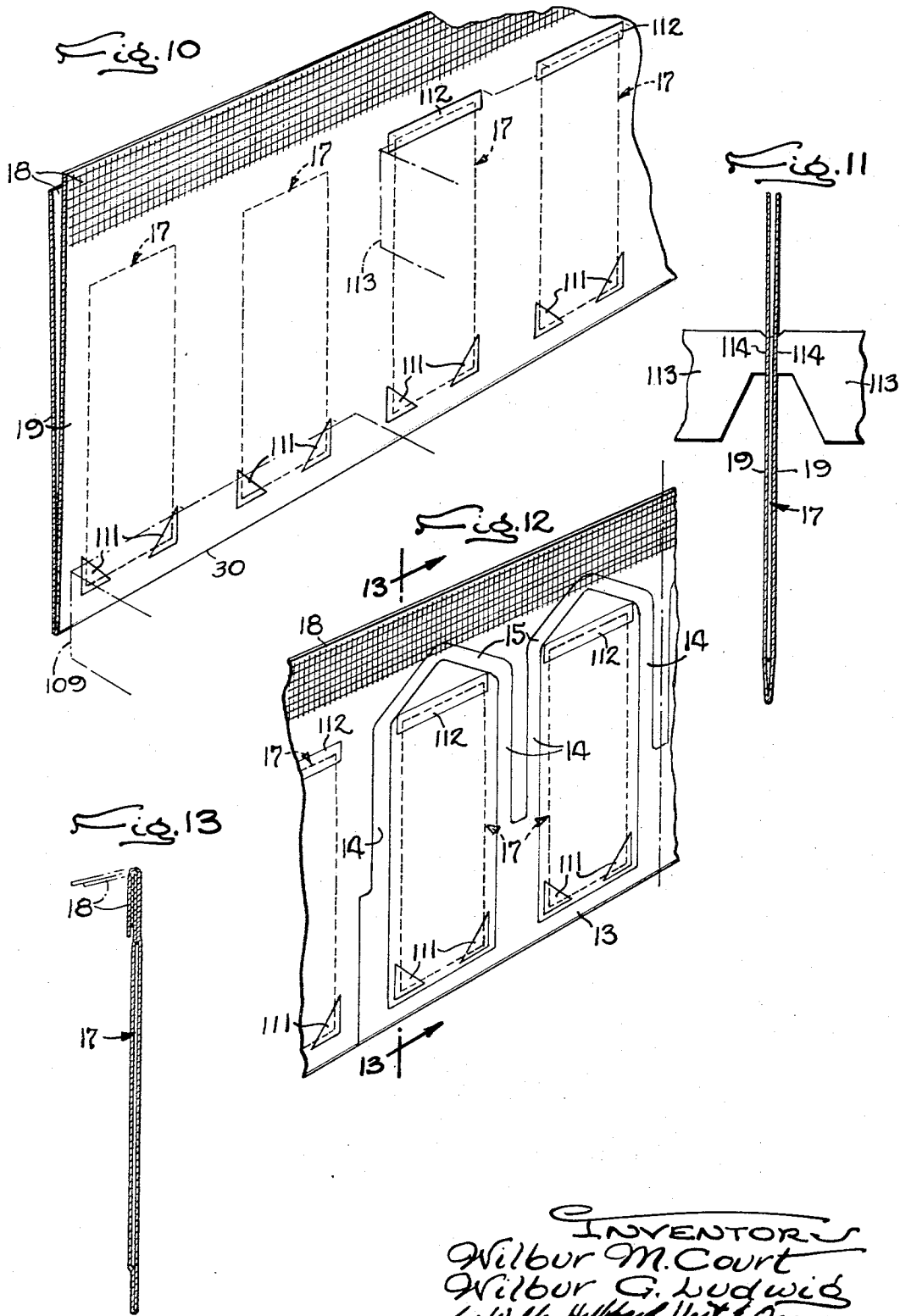
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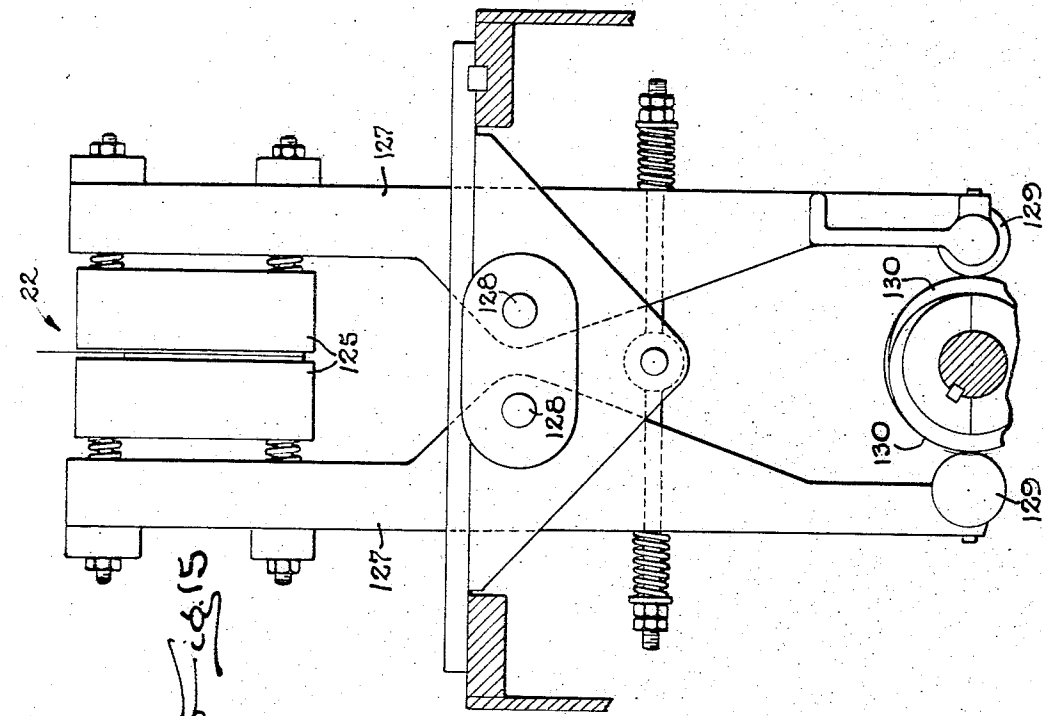


Fig. 15

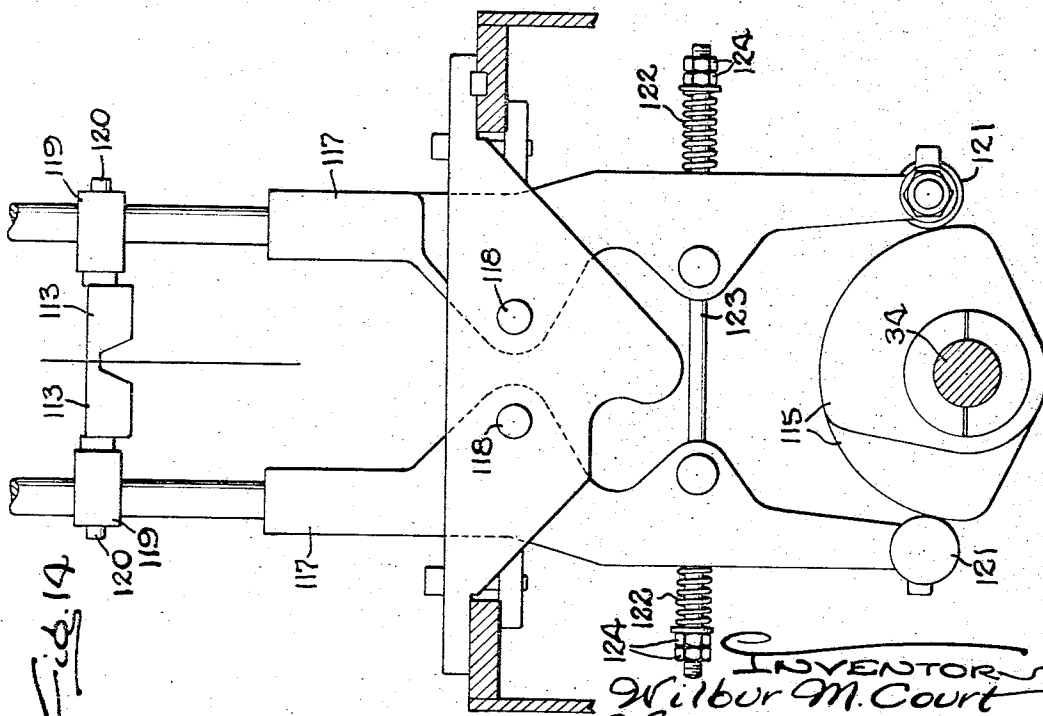


Fig. 14

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12 Sheets-Sheet 7

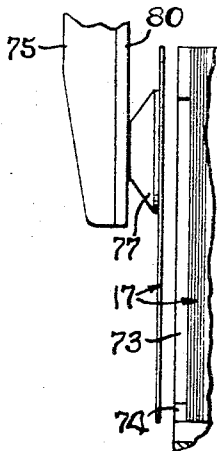
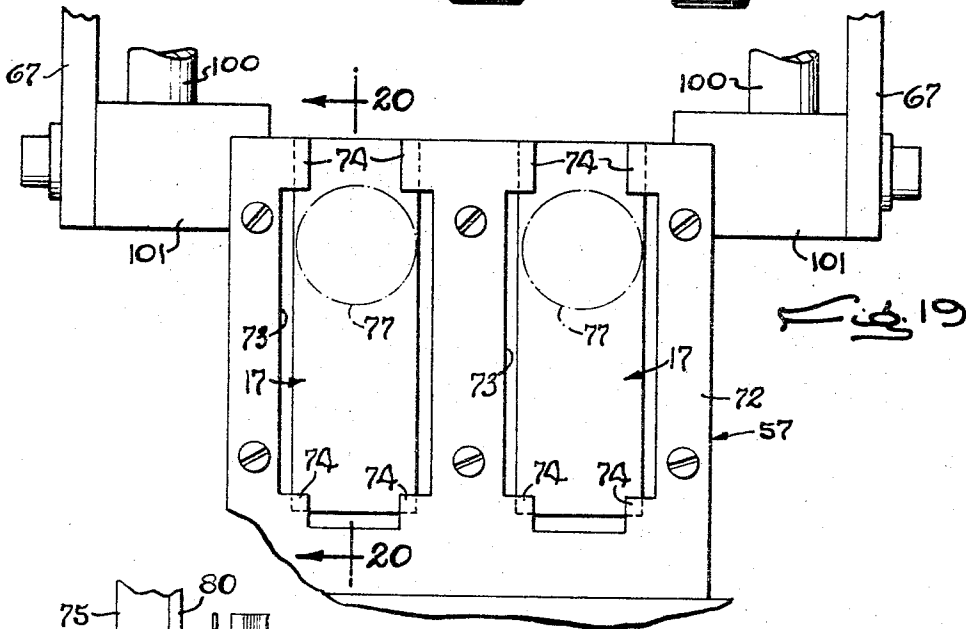
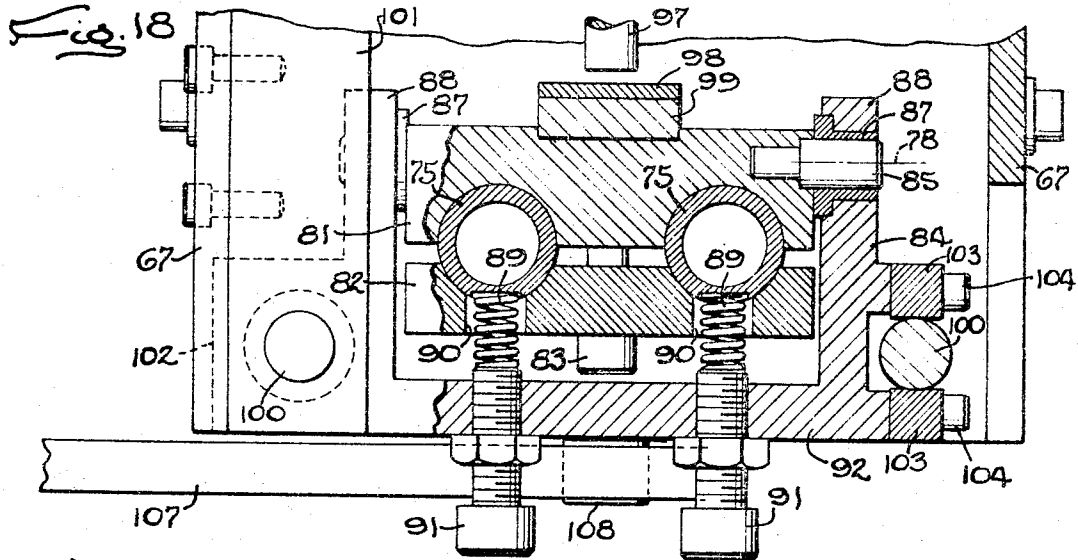


Fig. 20

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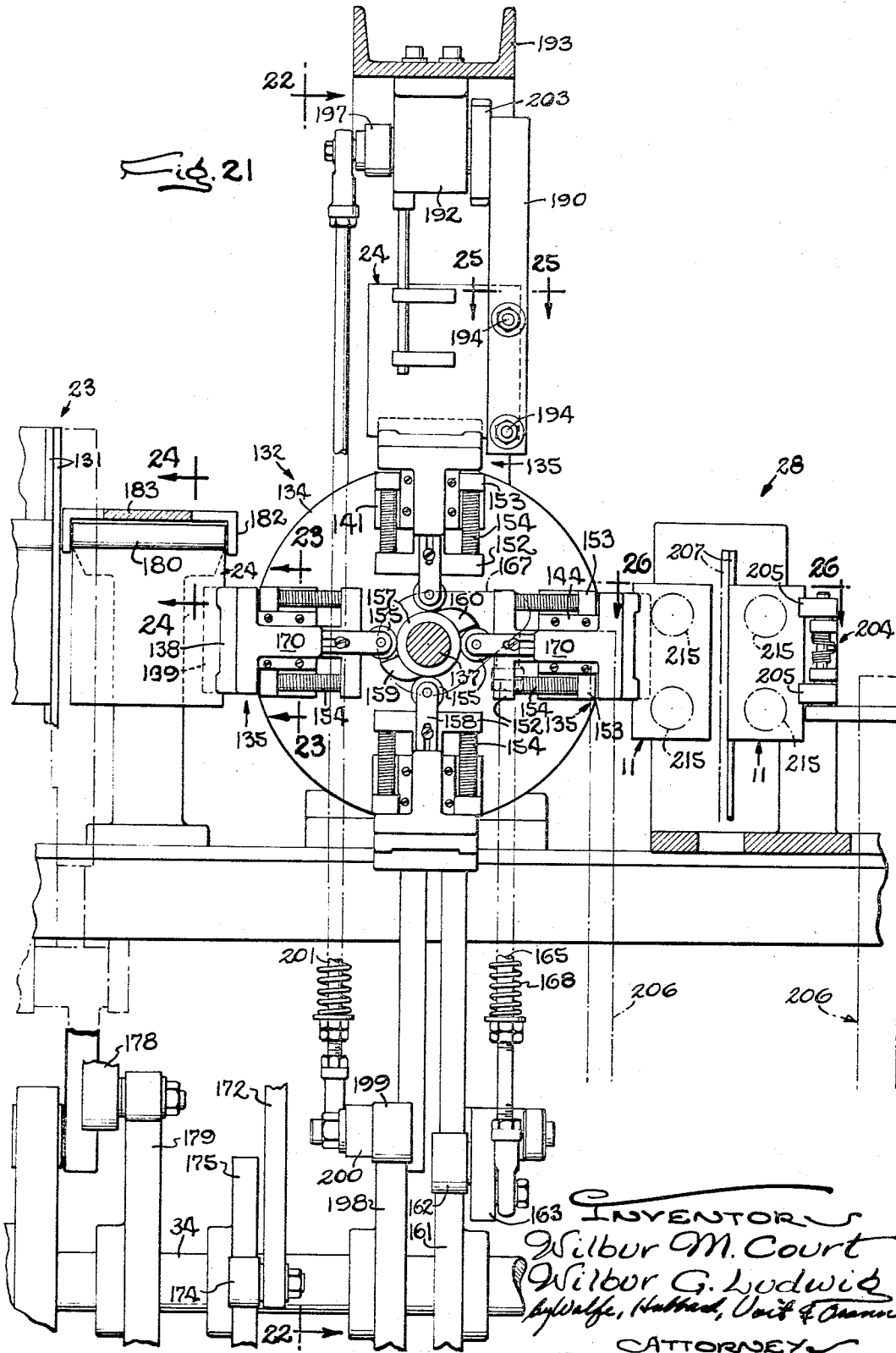
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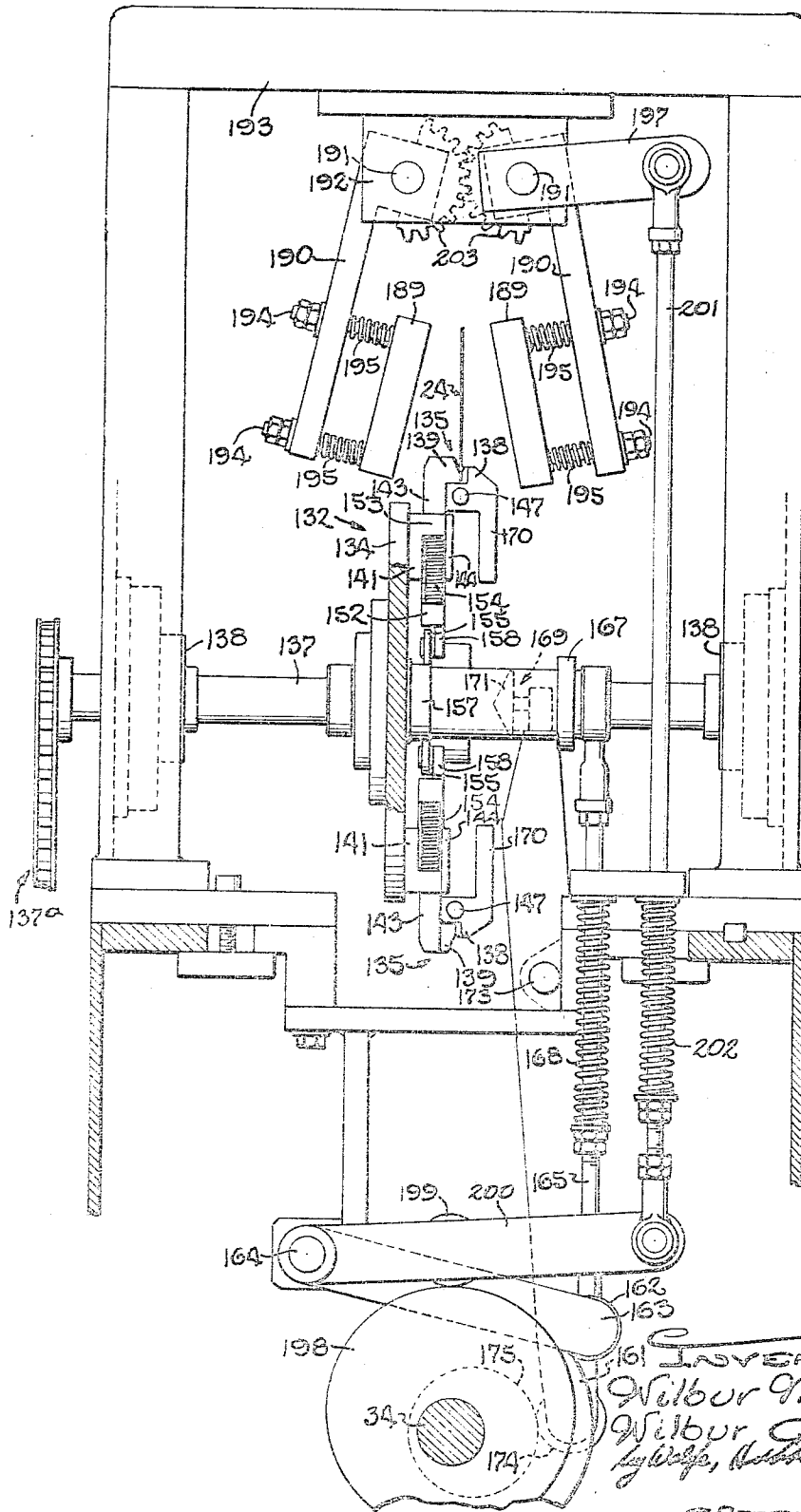


Fig. 22

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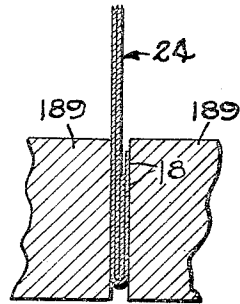
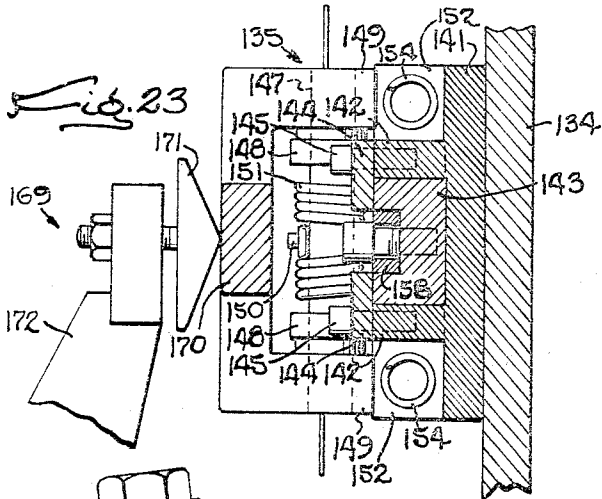


Fig. 25

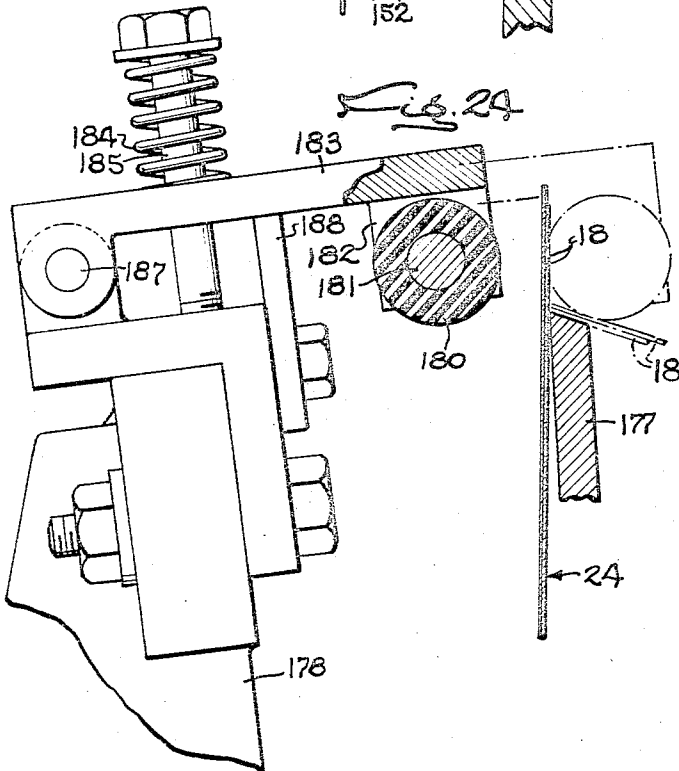
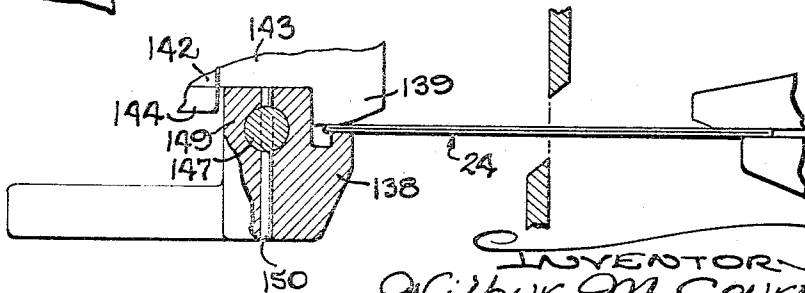


Fig. 26



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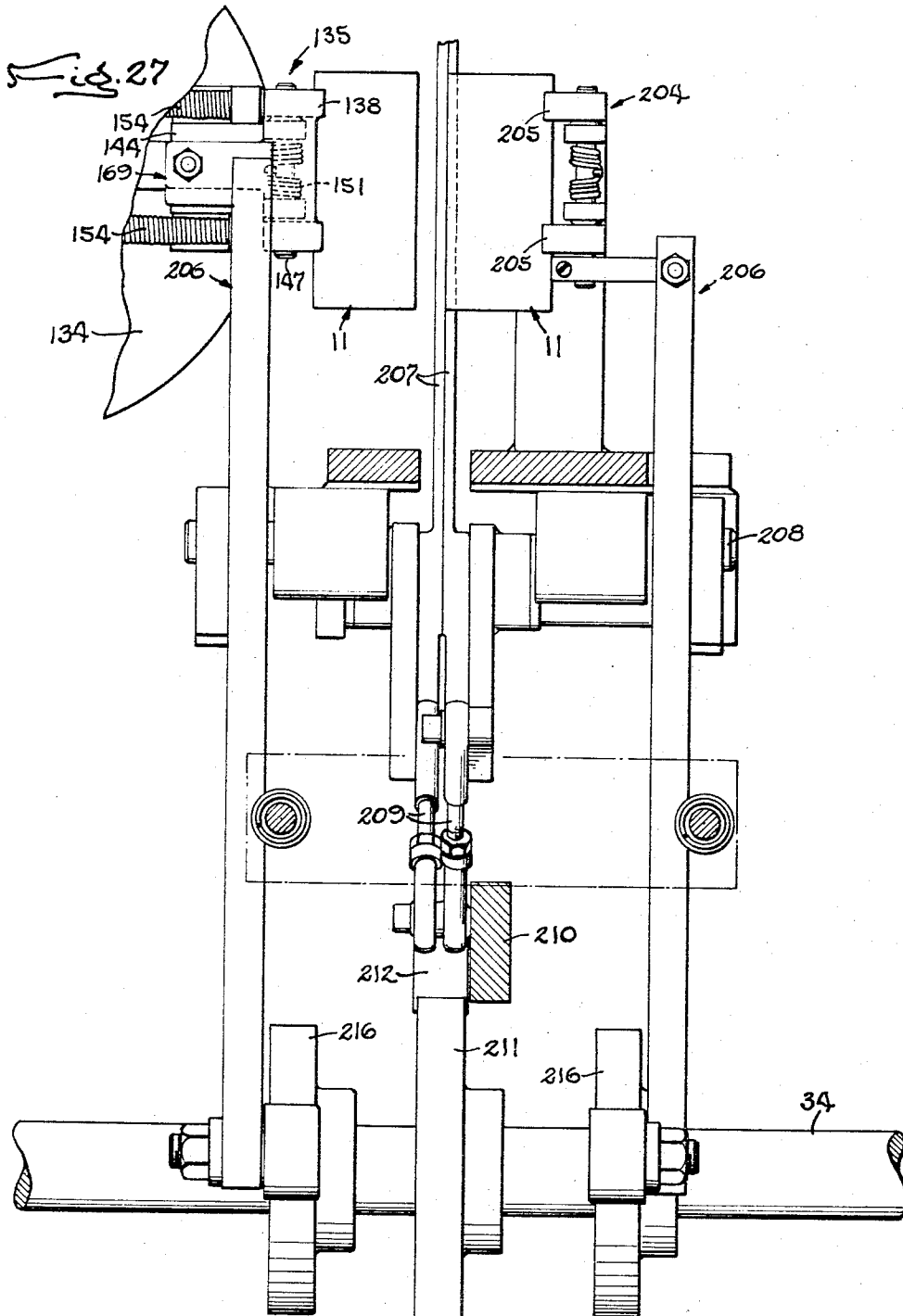
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12 Sheets-Sheet 11



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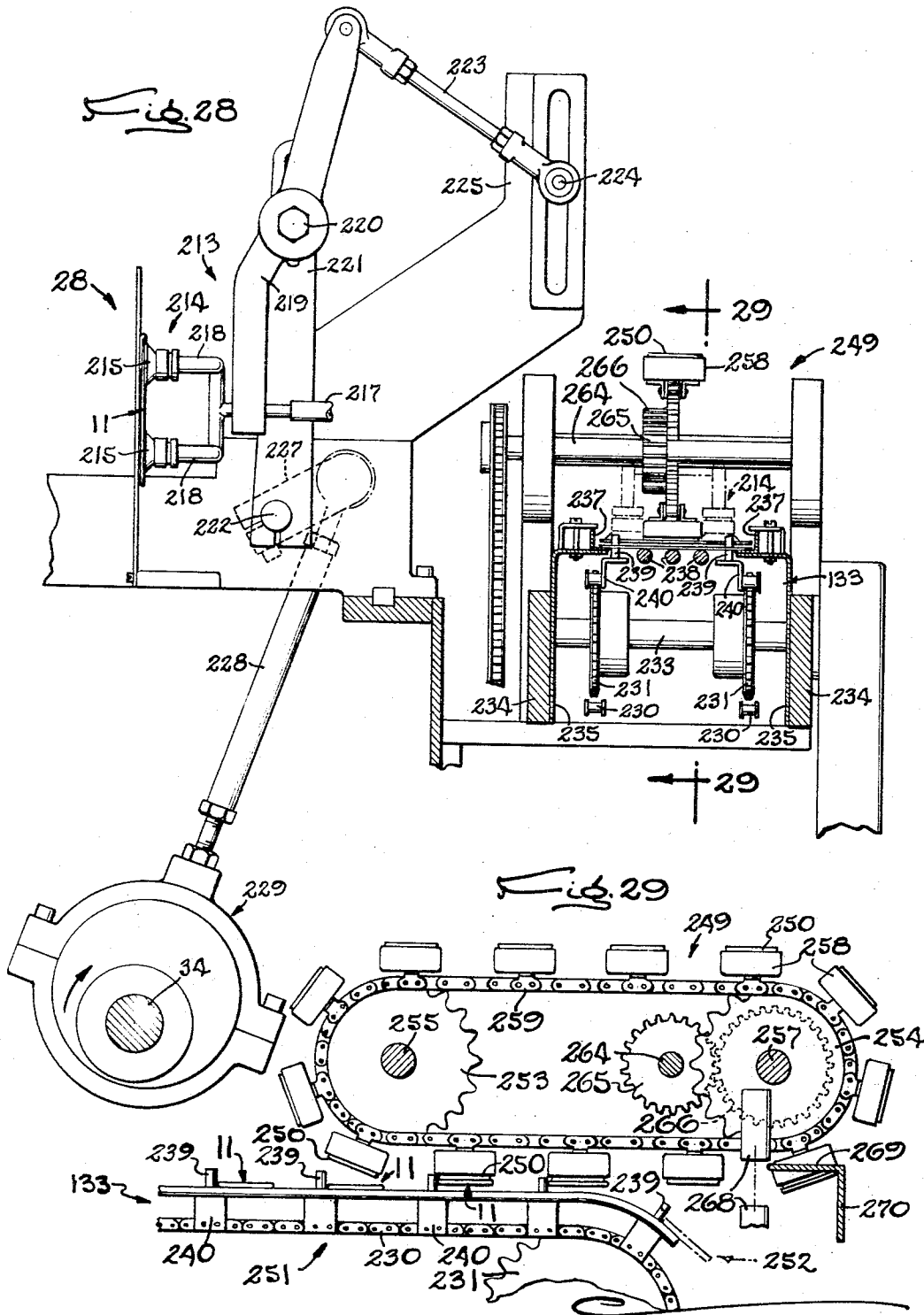
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12 Sheets-Sheet 12



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3,330,090

MACHINE AND METHOD FOR PACKAGING ARTICLES IN ENVELOPE-TYPE PACKAGES

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 Filed Aug. 31, 1964, Ser. No. 393,019
 16 Claims. (Cl. 53-28)

This invention relates to packaging machinery and, more particularly, to a method and machine for packaging articles in envelope-type packages formed by two sheets of cover material having opposed faces heat-sealed together around the article disposed between the cover sheets. Such packages are formed by advancing two elongated strips of cover material endwise along a path extending through a series of operating stations where the packages are formed, filled and closed in successive operations.

The general object of the present invention is to provide a new and improved machine of the foregoing character capable of producing packages at higher speed in a completely automatic operation.

Another object is to insert articles in a novel manner at high speed and in preselected positions between the cover strips before the separate packages are formed and then form the packages around the articles.

A further object is to produce packages at high speed with heat-sealed areas of substantial width completely surrounding the articles in the packages.

Still another object is to separate the packages from the strips in a novel manner that contributes to the higher rate of package production.

Another object is to form flaps on the package in a two-step operation performed in a novel manner in conjunction with the package separation.

An additional object is to inspect the completed packages in a high speed, completely automatic operation to insure that each package contains an article as it should, and to reject all empty packages in a quick and simple manner.

The invention also resides in the unique transfer mechanism for carrying the packages step-by-step through successive flap-folding and final out-off stations.

Others objects and advantages of the invention will become apparent from the following detailed description, taken in connection with the accompanying drawings in which:

FIGURE 1 is a fragmentary diagrammatic perspective view of a packaging machine embodying the novel features of the present invention.

FIG. 2 is an enlarged perspective view of a package formed with the machine illustrated in FIG. 1.

FIG. 3 is a fragmentary diagrammatic perspective view showing the driving mechanism of the machine.

FIG. 4 is a perspective view of a double package.

FIG. 5 is an enlarged fragmentary cross sectional view taken in a vertical plane substantially along the line 5-5 of FIG. 1.

FIG. 6 is an enlarged fragmentary perspective view of the spreading device.

FIG. 7 is a perspective view of a blade packet.

FIG. 8 is an enlarged fragmentary cross sectional view taken in a vertical plane and substantially along the line 8-8 of FIG. 1 with the parts in moved positions.

FIG. 9 is a view similar to FIG. 8 showing the tack sealing bars in engagement with the web strips.

FIG. 10 is an enlarged fragmentary perspective view of a portion of the web strips after the blade packets have been inserted between and tack sealed to the strips.

FIG. 11 is a view similar to FIG. 9 showing the second tack sealing bars in engagement with the web strips.

FIG. 12 is a fragmentary perspective view similar to a portion of FIG. 10 after the final seals have been formed.

FIG. 13 is a cross sectional view taken substantially along the line 13-13 of FIG. 12.

FIG. 14 is an enlarged fragmentary cross sectional view taken in a transverse vertical plane through the machine and showing the mechanism for applying the tack seals.

FIG. 15 is a view similar to FIG. 14 showing the mechanism for applying the finish seals.

FIG. 16 is a fragmentary cross sectional view taken in a transverse vertical plane through the machine and showing the packet inserting mechanism.

FIG. 17 is a cross sectional view taken substantially along the line 17-17 of FIG. 16.

FIG. 18 is an enlarged view taken from the top of FIG. 16 with parts broken away along the line 18-18 and shown in section.

FIG. 19 is an enlarged fragmentary side elevation showing a portion of the mechanism in FIG. 16.

FIG. 20 is a fragmentary cross sectional view taken substantially along the line 20-20 of FIG. 19.

FIG. 21 is an enlarged fragmentary cross sectional view taken in a vertical longitudinal plane extending along one side of the path of the web through the machine, and showing the turret-type transfer mechanism and the associated machine elements.

FIG. 22 is a fragmentary cross sectional view taken substantially along the line 22-22 of FIG. 21.

FIG. 23 is an enlarged fragmentary cross sectional view taken substantially along the line 23-23 of FIG. 21.

FIG. 24 is an enlarged fragmentary view taken substantially along the line 24-24 of FIG. 21 and shown partly in section.

FIG. 25 is an enlarged fragmentary cross sectional view taken substantially along the line 25-25 of FIG. 21 with the parts in moved positions.

FIG. 26 is an enlarged fragmentary view taken substantially along the line 26-26 of FIG. 21 with a double package held by the clamps and with parts broken away and shown in section.

FIG. 27 is an enlarged fragmentary view showing the machine elements of the lower right-hand portion of FIG. 21.

FIG. 28 is a fragmentary cross sectional view taken in a transverse vertical plane through the machine and showing the final transfer mechanism and the associated machine elements.

FIG. 29 is an enlarged fragmentary cross sectional view taken substantially along the line 29-29 of FIG. 28.

As shown in the drawings for purposes of illustration, the invention is embodied in a machine for packaging articles such as surgical blades 10 in envelope-type packages or bags 11 (FIG. 2) comprising two rectangular sheets of suitable cover material such as aluminum foil having opposed sealable faces. The two cover sheets, which preferably are on the order of .002 of an inch thick, are disposed in side-by-side relation and sealed together entirely around the blade to maintain the sterilized condition of the latter after the sealed package has been sterilized in the usual manner.

In the illustrative package 11, the blade 10 is disposed between two relatively stiff sheets 12 (see FIG. 7) of paper which protect the sharp edge of the blade from contact with the foil thereby maintaining the sharpness of the edge and also preventing rupturing of the sealed cover. The protective sheets are rectangular in shape and substantially smaller than the cover sheets so that the latter extend beyond all four edges of the protective sheets to provide sealable marginal areas 13, 14 and 15 in op-

posed face-to-face contacting relation on all sides of the protective sheets. Herein, the inner faces of the two cover sheets are coated with vinyl to make them heat-sealable, and the two protective sheets are suitably secured together as by an adhesive so that these sheets and the enclosed blade form a packet 17 easily handled as a unit.

The facilitate opening of the package 11 in the operating room, two elongated flaps 18 are formed at the top of the package beyond the top seals 15 thereof and are folded over against one side sheet of the package. The flaps preferably are embossed as shown in FIG. 2 for ease of gripping and are of different lengths for ease of separation. Thus, the package may be opened quickly and easily by separating the flaps and pulling the cover sheets apart far enough to break the side seals 14 part way down the sides of the package and also break the relatively weak seal between the sheets 11, thereby exposing the upper end of the blade 10. The latter than can be inserted in a holder without being touched by the user.

Generally stated, the improved packaging machine of the present invention comprises mechanism for supporting two elongated strips 19 of cover material with the sealable faces of the material side by side, and advancing the strips endwise with an intermittent motion along a predetermined path from a supply roll (not shown) through successive operating stations spaced along the path of the strips. Blade packets 17 are inserted between the strips by a device 20 (FIGS. 1 and 16) at an inserting station 21 adjacent the left end of the path, and the strips are sealed together around the packets at a sealing station 22 (FIGS. 1 and 15) just beyond the inserting station, thereby forming a series of integrally connected, sealed packages 11 which are advanced through a cut-off station 23 (FIGS. 1 and 21) where the cover material is severed between adjacent packages to separate the latter from the strips.

To increase the rate of production, two blade packets 17 are inserted between the strips 19 in longitudinally spaced relation at the inserting station 21, two packages are sealed at the sealing station 22, and two joined packages (FIG. 4) are severed from the strips at the cut-off station 23 during each dwell of the strips. Then, the double package 24 is transferred through flap-folding stations 25 and 27 to a final cut-off station 28 (see FIGS. 3 and 21) where it is divided into two individual packages 11 each containing one blade 10. Finally, the packages are inspected automatically to insure that each package contains a blade, and are discharged from the machine for cartoning. With this arrangement, packages are formed, filled, closed and inspected in a completely automatic operation at rates on the order of 200 per minute.

In this instance, the two strips 19 of cover material are the opposite edge portions of a single web of cover material coated with vinyl on one side, the web being drawn off the supply roll at the left end of the machine with the coated side facing upwardly. At a folding station 29, the web is folded longitudinally to bring the edges of the web upwardly and together so that the lower edges of the strips are integrally joined by a fold 30. Devices for folding webs in this general manner are well known in the art as shown by Patent No. 2,762,273. Of course, it will be obvious that the strips could be drawn from separate supply rolls and guided into face-to-face relation.

To draw the web off the supply roll and advance it through the machine, two sets of vertical drive rolls 31 and 32 (FIGS. 1 and 3) are longitudinally spaced along the path of the web and journaled on the machine base or frame on opposite sides of the web for rotation in frictional engagement therewith. Herein, the rolls 31 are disposed between the folding station 29 and the inserting station 21 to pull the web past the folding device and the other rolls 32 are disposed between the sealing station 22 and the cut-off station 23 to pull the web through the

inserting and sealing stations and push the right end portion of the web into the cut-off station.

The drive rolls 31, 32 and the various operating mechanisms of the machine are driven in timed relation with each other by a power actuator, herein an electric motor 33 (FIG. 3), continuously rotating a cam shaft 34 journaled on the frame and extending along the path followed by the strips 19, the motor being connected to the cam shaft by an endless chain 35 trained around sprocket wheels 37 and 38 on the motor shaft and the cam shaft. On the left end of the latter is a radially projecting crank 39 formed with a longitudinal slot in its free end portion pivotally connected to the lower end of an upright connecting link 40. The upper end of the link is pivotally connected to the free end of a crank 41 connected by a one-way clutch 42 to a parallel shaft 43 journaled on the frame beneath the drive rolls 31 and 32 and spanning the distance between them.

With this arrangement, the continuous rotation of the cam shaft 34 is converted to intermittent rotation of the driven shaft 43 by the cranks 39 and 41 and the one-way clutch 42. This drive arrangement is well known in the art and therefore is shown only generally herein. The intermittent rotation of the driven shaft is transmitted to the drive rolls 31, 32 by means of meshing bevel gears 44 on the driven shaft and vertical shafts 45 depending from one drive roll of each pair to rotate these rolls in the direction indicated by the arrows in FIG. 3. The other roll of each pair is positively rotated in the opposite direction by meshing spur gears 47 on the rolls of each set beneath the folded edge 30 of the web. Thus, the intermittently rotating rolls advance the web endwise and step by step through the machine, and the various operations are performed on the web during dwells between successive steps, these operations being timed by the cams mounted on and rotating with the cam shaft. The length of each step of the web is equal to twice the width of each finished package 11.

After the web has been folded, the flap-forming upper edge portions 18 of the strips 19 are embossed. To provide a backing for the strips during this operation, a narrow splitter 48 is disposed between the strips where they come off the folding device and thus separates the two strips as shown in FIG. 5. The embossing operation is performed by two reciprocating dies 49 disposed on opposite sides of the strips and movable toward each other and against the strips to impress the contour of the adjacent die faces in the strips adjacent the free edges thereof. To permit portions of the foil to be indented, resiliently yieldable pads 50 are fastened to the splitter level with the dies. The dies are reciprocated by a cam 51 on the cam shaft 34 acting through the usual linkage (not shown) to move the die first toward each other into clamping engagement with the web and then away from the web, one stroke of the dies occurring during each dwell of the web.

Just ahead of the inserting station 21, the separation of the strips 19 is increased sufficiently to permit easy insertion of the blade packets 17 between the strips. For this purpose, a wedge-shaped spreader 52 (see FIG. 6) is disposed between the strips with its narrow end facing toward the left and its right end wide enough to hold the strips apart for entry of the blade-inserting device just beyond the spreader. Herein, the spreader is connected to the splitter by an elongated plate 53 as shown in FIG. 6. A cross bar 54 supported on an upright post (not shown) beside the spreader is secured to the latter by machine screws 55 to hold the spreader with its top just above the upper edges of the web. Thus, at the inserting station beyond the spreader, the top edges of the web are spaced apart a distance approximately the same as the maximum width of the spreader.

As shown generally in FIGS. 1 and 16, the packet-inserting mechanism 21 is disposed above the web path at the inserting station 20 and includes a double magazine

57 (FIG. 16) for supporting a pair of horizontal rows 58 of blade packets 17 with corresponding ends of the rows directly above the web, and a device 59 for picking off the terminal packets in the rows, inserting the two packets simultaneously between the web strips 19 and holding the packets momentarily in the desired position relative to the strips, releasing the packets, and then retracting preparatory to the next insertion stroke. The magazine is formed by a horizontal bottom plate 59a (FIGS. 16 and 17) supported on a vertical post 60 on the right side of the web path with the left end of the plate overhanging the web. Upstanding from the opposite side edges of this plate are two side plates 61 which cooperate with a parallel center plate 62 to define two longitudinal channels for holding the horizontal rows of upright packets. Preferably, the packets slide along the tops of spaced longitudinal ribs on the bottom plate and between opposed shoulders on the upright plates 61 and 62. The spacing of the two channels is the same as the desired spacing of adjacent packets when the latter are between the web strips.

To feed blade packets 17 along the channels, two cars 63 are guided for sliding along the tops of the channels on two horizontal rods 64 (FIGS. 16 and 17) and are urged to the left along the rods by two springs 65 mounted on parallel posts 67 projecting upwardly on opposite sides of the discharge end of the magazine 57. Each spring is coiled around a pin 68 fast on the post with its free end fastened to the associated car 63 by a machine screw 69 whereby the springs pull the cars to the left along the guide rods. Lugs 70 projecting laterally from the cars slide in grooves in the center plate to stabilize the cars. Depending from each car into the associated channel is a pusher finger 71 which engages the right end of the row of packets and pushes the packets to the left as the springs pull the cars to the left.

An escapement plate 72 (FIGS. 16 and 19) is fastened to the left end of the magazine 57 to hold the terminal packets 17 releasably in the magazine and release the packets in each row one by one for insertion between the web strips 19. For this purpose, the plate is formed with two openings 73 aligned with the two channels and the same size and shape as the packets except for detents 74 at the corners of the openings engageable with the corner portions of the terminal packets. The pusher fingers 71 hold the terminal packets snugly against these detents and advance the rows step by step to the left as packets are removed from the left ends of the rows. The packets bend adjacent each corner and yield to pass between the detents through the openings 73.

The packet-inserting device 59 is mounted between the two spaced posts 67 and includes two side-by-side upright arms 75 carrying suction cups 77 adjacent their lower ends spaced to fit through the openings 73 in the escapement plate 72, as shown in phantom in FIG. 19, and engage the terminal packets in the magazine rows. The arms are supported both for rocking movement about an axis 78 (FIG. 18) spaced above the magazine to swing the cups toward and away from the terminal packets in the magazine rows, and for vertical reciprocation to lower a pair of packets in between the web strips and raise the cups back to the level of the magazine rows after the packets are released.

Herein, the two arms 75 are hollow pipes (see FIG. 19) with a pair of flexible hoses 79 (FIG. 16) adapted to be connected to a vacuum pump are connected to the upper ends of the arms to communicate through the interior of the arms with the suction cups 77 adjacent the lower ends of the arms. The upper end portions of the arms are cylindrical while the lower portions are generally semi-cylindrical and are closed on the right side by a flat plate 80 which carries the suction cups. Adjacent their upper ends, the arms are clamped between two plates 81 and 82 (FIG. 18) which, when secured together by screws 83, form a block that is pivotally sup-

ported on a vertically slidable carriage 84 of U-shaped horizontal cross-section by means of trunnions 85 projecting from the opposite sides of the block along the axis 78 and journaled in bearings 87 in the parallel side sections 88 of the carriage.

Two coiled compression springs 89 (FIGS. 16 and 18) are inserted through laterally opening bores 90 in the clamping plate 82 and compressed between the arms 75 above the pivotal axis 78 and adjustable set screws 91 threaded through the cross-piece 92 of the carriage 84. Thus, the springs urge the arms clockwise (FIG. 16) about the pivotal axis. Adjustable stop screws 93 threaded through the carriage cross-piece below the level of the axis 78 abut against the left side of the clamp plate and cooperate with the springs in holding the arms in the vertical positions shown in FIG. 16.

To rock the arms back and forth at the appropriate times, a pneumatic cylinder 94 (FIG. 16) is mounted on a bracket 95 adjacent the tops of the posts 67 with a rod 97 guided in the cylinder for back and forth movement toward and away from a plate 98 mounted on a bar 99 projecting upwardly from the pivoted plate 81. As the rod is extended to the left, it engages the plate 98 and rocks the arms counterclockwise as permitted by yielding of the springs 89, thereby swinging the suction cups 77 to the right toward the magazine and against the terminal packets 17 therein. After suction is applied to the cups through a suitable control valve (not shown), the rod 97 is retracted to the right and the springs return the arms to the vertical position.

The carriage is slidable vertically between the two posts 67 along two rods 100 supported between vertically spaced bars 101 (FIGS. 16, 18 and 19) at the top and bottom of the posts. On one side of the carriage is a lug 102 (FIG. 18) having a vertical bore through which one guide rod 100 extends. On the other side, two guides 103 fastened by screws 104 threaded into the carriage ride along opposite sides of the second guide rod 100 as the carriage moves up and down.

Reciprocating movement of the carriage 84 in timed relation with the advance of the web is produced by a cam 105 on the cam shaft 34 which acts through the usual linkage (not shown) to rock the free end portion of a generally horizontal lever 107 (FIGS. 16 and 18) up and down about a horizontal axis (not shown) spaced to the left of the carriage as viewed in FIG. 18. A cylindrical bearing 108 on the carriage projects into a slot in the lever to connect the latter to the carriage. When the lever is in its raised position (FIG. 16), the suction cups 77 are level with the packets 17 in the magazine 57. While the lever is in this position, the cups are swung toward and away from the magazine by the actuator 94, 97 to pull two packets through the escapement plate 72. Then, the free end of the lever is rocked downwardly to lower the carriage and thereby lower the packets together to the desired level (see FIG. 8) between the web strips 19. After a momentary pause in the lowered position, the suction is released and the lever is raised to return the carriage to the raised position.

It will be seen in FIGS. 8 and 9 that the lower edges of the packets 17 are spaced above the web fold 30 when the suction cups 77 are in the lowered position. To hold the packets in this position after they are released by the cups, the packets are tacked to the web on at least one side, and preferably on both sides, prior to their release. Accordingly, continuous heat seals 13, 14 and 15 of substantial width subsequently may be applied all the way around the packets for optimum protection of the contents. To form the tack seals, two heated seal bars 109 (FIGS. 9, 10 and 16) are supported on the frame on opposite sides of the web at the inserting station 21 for movement toward each other and into sealing engagement with opposite sides of the web just above the lower edges of the packets. Each bar is formed with four triangular sealing surfaces 110 which overlie the corners of

the two packets while the latter are held by the cups and form two triangular tack seals at **111** (FIGS. 2, 10 and 12) between each packet and the foil strips. Two similar cams **112** are provided on the cam shaft **34** for reciprocating the bars in timed relation with the advance of the web. During each dwell of the web at the inserting station, two packets are inserted between and tacked to the web.

The web leaving the inserting station **21** is in the condition shown on the left in FIG. 10 with two packets **17** tack sealed at **111** to the two web strips **19**. During the next dwell in the web's advance, after these packets have been moved beyond the inserting station, two additional seals **112** are formed between the tops of the packets and the foil strips. These seals are stronger than the seal between the tops of the protective sheets so that, upon separation of the foil sheets in service use, the sheets **12** also will separate to expose the blade **10**. Heated seal bars **113** each having two longitudinally spaced sealing areas **114** are mounted on opposite sides of the web path and reciprocated by cams **115** to form these seals.

The tack sealing bars **109** and **113** are supported and reciprocated by identical mechanisms of the type shown in FIG. 14, and in part in FIG. 16, this mechanism including two upright arms **117** pivoted on the machine frame beneath the web on shafts **118** paralleling the web path so that the upper end portions of the arms are swingable toward and away from the web. The seal bars are adjustably supported on the upper ends of these arms on vertically slidable carriers **119** held at the selected level by set screws **120** clamped against the arms. Follower rollers **121** (FIG. 14) are journaled on the lower ends of the arms to ride on the cams **115** on the cam shaft **34**, and the lower ends of the arms are urged together and toward the cams by two springs **122** coiled around a rod **123** pivotally and slidably connected to the arms. The springs are compressed between the outer sides of the arms and nuts **124** threaded on the rod ends.

Thus, the followers **121** ride on the cams **115** and the latter rock the sealing bars **113** toward and away from each other in timed relation with the advance of the web to form the top tack seals. The lower tack-seal mechanism is the same except for the level of the carriers **119** and the configuration of the sealing faces of the sealing bars.

The next station along the web path is the final sealing station **22** where two opposed sealing bars **125** (FIG. 15) engage the web from opposite sides of the latter. The sealing faces of these bars are shaped to fit together around two packets **17** and in between the packets, in effect forming two completely enclosed pockets within the webs as indicated in FIGS. 4 and 12. These bars are supported and actuated in a manner similar to that for the tack bars **113** as shown in FIG. 15, the bars being carried on the upper ends of two arms **127** pivoted on the frame at **128** with followers **129** journaled on the lower ends of the arms and spring-urged toward two cams **130** on the cam shaft. The cams rock the upper ends of the arms toward and away from each other in timed relation with the advance of the web to complete the seals around each pair of packets. Since the manner of heating sealing bars is well known, the details of the heating arrangements are not shown herein.

Thus, the web passing between the second set of drive rolls **32** comprises a series of filled and sealed packages **11** integrally joined together and each containing one blade **10**. The first step in the separation of the packages is the severance of the web at the first cut-off station **23** (FIGS. 3 and 21) between contiguous packages along transverse lines two package widths from the end of the web to separate double units **24** from the web as illustrated in FIG. 4. For this purpose, two knife element **131** are pivoted on the frame beneath the web at the first cut-off station and project upwardly on opposite sides of the web and above the latter as shown in FIG. 21. The upper end portions of these knives swing toward each other and engage the web with a scissoring action during each dwell in the web and thus cut off successive double units.

A unique turret-type transfer device **132** is provided for handling the double packages **24** during the successive flap-folding and final separation operations prior to the transfer of the single packages **11** to an inspection and discharge conveyor **133** (FIGS. 28 and 29). As shown in FIGS. 21 through 23, the transfer device comprises generally a disk **134** journaled on the machine frame beyond the initial cut-off station **23** with a plurality of clamps **135** equally spaced around the disk and projecting radially therefrom in the plane of the web. The disk is indexed step by step in one direction to move successive clamps into a receiving position adjacent the initial cut-off station where each clamp is extended outwardly and opened to receive the end of the web, is closed to grip the web, and is retracted to shift the package edgewise away from the cut-off knives **131**. Then the double package is carried step by step through angularly spaced pre-folding, final folding and discharge positions by the clamp and, after a cut-off operation in the discharge position, is released for transfer to the discharge conveyor.

In this instance, the disk **134** is mounted on a shaft **137** (FIGS. 3, 21 and 22) journaled on the frame in laterally spaced bearings **138** (FIG. 22) for rotation about a horizontal axis at the level of the web path, the disk being secured to the shaft for rotation in a plane offset slightly to the left of the plane of the web with the clamps **135** mounted on the right side of the disk. The two jaws **138** and **139** of each clamp come together from the opposite sides of the web plane and meet at that plane.

To index the disk **134**, a Geneva drive **140** (FIG. 3) of well known construction is operated by the cam shaft **34** and intermittently rotates the shaft **137** through the chain-and-sprocket connection **137a** shown in FIG. 3, thereby rotating the disk step by step and clockwise as indicated by the arrow in FIG. 3. Herein, the disk turns ninety degrees during each step of the web and there are four clamps **135** equally spaced around the disk to bring one clamp into the first or receiving position prior to the separation of each double package **24** from the web.

Each clamp **135** is formed with a base plate **141** (FIGS. 21, 23 and 26) secured to the side of the disk **134** adjacent the periphery thereof with two ribs **142** (FIG. 23) projecting laterally outwardly and defining an open-sided slideway extending radially of the disk. Slidably received between these ribs is a bar **143** which is held in the slideway by two clamping plates **144** fastened by screws **145** to the outer ends of the ribs and overhanging the exposed side of the bar. This bar is integral with the clamp jaw **139** and pivotally supports the other jaw **138** on a pin **147** rotatably carried in aligned holes in two lugs **148** (FIG. 23) projecting laterally from the sliding bar **143** and straddled by two lugs **149** on the pivoted jaw. The pin **147** is anchored to the pivoted jaw by means of a radial pin **150** (FIG. 26) and thus turns with the pivoted jaw. The latter is urged counterclockwise as viewed in FIG. 22 by a torsion spring **151** (FIG. 23) coiled around the pivot pin with its ends secured to the base plate **141** and its intermediate portion secured to the pivot pin by the anchor pin **150**. Thus, the clamp jaws normally are held closed.

On the inner end of the slide bar **143** are two wings **152** disposed in opposed relation with two lugs **153** adjacent at the outer edge of the base plate **141**. Coiled springs **154** compressed between these opposed abutments urge the slide bar radially inwardly relative to the disk **134**. Inward movement of each clamp is limited by a roller **155** mounted on the inner end of the slide bar and normally held by the springs in abutting engagement with a sleeve **157** telescoped over the shaft **137** on the same side of the disk as the clamps. The rollers **155** are journaled on the inner ends of arms **158** slidable along the slide bars in grooves therein and adjustably positioned on the bars by set screws threaded into the bar through longitudinal slots in the arm (see FIGS. 21 and 23).

In order to extend and retract these clamps 135 relative to the disk 134, two cams 159 and 160 are mounted on the sleeve 157 for selective engagement with the follower rollers 155 and are shaped to shift the rollers, and thus the clamp jaws 138 and 139, radially outwardly as the rollers ride up the rise surfaces of the cams. Herein, the cams are spaced 180 degrees apart around the sleeve and are oscillated back and forth between the inactive positions shown in FIG. 21 and generally horizontally projecting active positions in angular alinement with the rollers of the clamps in the receiving and discharge positions. For this purpose, the sleeve is freely rotatable on the shaft 137 and is oscillated back and forth relative to the shaft by a cam 161 (FIGS. 3, 21 and 22) on the cam shaft 34 operable to rock a follower roller 162 and its supporting arm 163 up and down about the shaft 164 on which the arm is pivoted. The up-and-down motion of the follower roller is transmitted by an upright link 165 to a crank 167 projecting radially to one side of sleeve as shown in dot-dash lines in FIG. 21, and the crank oscillates the sleeve 157 back and forth on the shaft 137. A return spring 168 urges the arm 163 down and holds the roller 162 against the cam.

The oscillation is correlated with the indexing steps of the disk 134 to swing the cams 159 and 160 into the active positions during each indexing step and return the cams to the inactive positions after the web is severed. Thus, each clamp moving into the receiving and discharge positions is extended outwardly relative to the disk and then is retracted after a short pause and prior to the next indexing step of the disk.

To open the clamp 135 in the receiving position, an actuator 169 (FIGS. 22 and 23) is provided to engage an inwardly extending wing 170 on the pivoted jaw 138 and press the wing laterally toward the slide bar 143 thereby swinging the pivoted jaw clockwise about the axis defined by the pin 147. The actuator is in the form of a block 171 mounted on the upper end of an upright lever 172 pivoted intermediate its ends on the machine frame at 173 (FIG. 22) to rock in a plane perpendicular to the plane of the disk. On the lower end of the lever is a follower roller 174 which rides on the side of a cam 175 on the cam shaft 34 and thus rocks the lever back and forth as the cam turns, swinging the block 171 toward and away from the clamp wing 170.

The wing is elongated in the direction of movement of the clamp as it is extended radially of the disk so that the clamp may be opened and held open during its outward movement. When the web comes to rest with its free end between the open jaws 138 and 139, the lever 172 is rocked clockwise (FIG. 22) away from the wing to permit the clamp to close on the web. Then the knives 131 are operated to sever the double package 24 from the web.

Since the clamp 135 is held in the extended position by the cam 159, the separated double package 24 may be shifted edgewise away from the cut-off knives 131 simply by shifting the cam back to its inactive position and releasing the clamp to the action of the springs 154, thereby spacing the left edge of the package from the knives and the web by an amount equal to the radial height of the cam. In this position, the package is far enough from the web and the knives for a flap-folding operation in which the upper edge portion of the package is folded over one side by a device including a backing plate 177 closely adjacent one side of the package and having an upper horizontal edge (see FIG. 24) at the level of the desired fold. On the other side of the package is a folding arm 178 (FIG. 24) pivoted on the machine frame beneath the cut-off station and rocked back and forth by a cam 179 (FIG. 21) in generally the same manner as the clamp actuator 169 to bend the top of the package over the backing plate.

The folding arm 178 carries a horizontal roller 180 at least as long as the width of the double package 24

and rotatably mounted on a pin 181 spanning two lugs 182 depending from the free end of a bracket 183 which is pivoted on the upper end of the folding arm and projects laterally from the arm toward the package and the top edge of the backing plate 177. The bracket is held yieldably in the position shown in FIG. 24 by a spring 184 mounted on a bolt 185 projecting through and above the bracket so that the spring urges the bracket clockwise about its pivot 187 toward a stop lug 188 fastened to the upper end of the folding arm in position to abut against the underside of the bracket when the latter is generally perpendicular to the arm.

With the folding roller 180 in this position, the arm 178 swings to the right as viewed in FIG. 24 against the top of the package and across the top edge of the backing plate 177. Preferably, the bottom of the roller is slightly below the level of the folding edge so as to engage the latter, yield upwardly in crossing the backing plate, and then press the folded flaps 18 down against the beveled top surface of the backing plate as shown in dot-dash lines in FIG. 24. Then, as the arm swings back to the left, the roller rides back over the edge to the retracted position shown in full lines in FIG. 24.

The folding and return strokes of this unit are effected very rapidly during the portion of the dwell of the web remaining after the initial cut-off is performed. As soon as the folding roller 180 is retracted, the disk 134 is indexed one step to swing the double package 24 upwardly to the second position where the two-step flap-folding operation is completed. At the same time, the next clamp is brought into the first position to receive the next double package to be severed from the web.

During the indexing step, the package in the first clamp is turned ninety degrees onto its side with the partly folded flaps 18 on the right-hand edge as viewed in FIG. 21. In this position, the flaps and the upper edge portion of the package are disposed between two clamping bars 189 (FIGS. 21, 22 and 25) on the lower ends of two arms 190 pivoted adjacent their upper ends on a pair of side by side horizontal shafts 191 journaled in a block 192 suspended from an overhead rail 193 above the turret, the free end portions of the arms being swingable toward each other from the position shown in FIG. 21 to clamp the package between the blocks and crimp the flaps 18 as shown in FIG. 25. Each clamping block is mounted on the associated arm by means of two bolts 194 projecting through and slidable in holes through the arm. Coiled springs 195 on the bolts between the bars and the supporting arms hold the bars yieldably in the extended position shown with nuts on the ends of the bolts abutting against the arms.

To operate this device, a radial crank arm 197 (FIGS. 21 and 22) is fastened at one end to one of the shafts 191 and is rocked up and down by a cam 198 on the cam shaft 34 acting on a follower roller 199 journaled on a lever 200 pivoted on the shaft 164 and extending across the top of the cam, this lever being connected to the crank by an upright link 201. A return spring 202 on the lower portion of the link urges the latter downwardly and thus holds the roller against the cam.

As the lever 200 and the crank 197 are rocked up and down, the right-hand shaft 191 oscillates back and forth thereby swinging the right-hand arm 190 toward and away from the package 24 held by the clamp 135. Through meshing gear segments 203 on the two shafts 191, the other arm is operated in unison with the first arm. Preferably, the arms not only press the blocks 189 against opposite sides of the package but also swing close enough together to partially compress the springs 195. The clamping stroke of the arms 190 is produced by the down swing of the lever 200 and the return stroke of the arms is produced by the upswing of the lever.

After the flaps 18 have been crimped tightly against the side of the package, the disk 134 is indexed one step to move the package into the discharge position adjacent the

final cut-off station 28 (FIGS. 21, 26 and 27). As the clamp moves into this third position, the cam 160 is shifted clockwise into its active position to extend the clamp in the manner previously described with respect to the clamp in the first position. The free edge of the package in the discharge position thus is extended into a stationary clamp 204 whose jaws 205 immediately are closed to grip the package as shown in FIG. 26. As soon as the stationary clamp is closed, the double package is cut in half by the second cut-off device which also comprises a pair of elongated knives 207 (see FIG. 27) pivoted on a single shaft 208 beneath the final cut-off station for a scissoring cut-off action. The actuators for both the initial and final cut-off devices are the same, and only one is shown in detail herein.

Each knife 207 extends downwardly beyond the pivot shaft 208 as shown in FIG. 27 and two connecting links 209 are pivoted at their lower ends on a lever 210 and pivotally connected at their upper ends to the lower ends of the blades. Thus, as the lever is rocked up and down by a cam 211 on the cam shaft 34 acting on a follower roller 212 journaled on the lever, the lower ends of the knives are alternately spread apart and pulled together to produce the scissoring action of the upper end portions of the knives.

As soon as the double package 24 is cut in half, the clamp 135 is retracted as shown in FIG. 27 to separate the two single packages from each other. This is accomplished simply by turning the cam 160 counterclockwise to its inactive position. It will be evident that the two cut-off actions at the receiving and discharging positions take place simultaneously with the respective clamps 135 extended, and the two separating actions also take place simultaneously as the two clamps are retracted. Then, in the period of time during which the initial flap-folding operation is accomplished on the double package in the receiving position, a transfer device 213 (FIG. 28) grips the two individual packages 11 preparatory to transferring them to the inspection and discharge conveyor 133. The clamp 204 is opened and closed and the transfer clamps 135 are opened by actuators 206 generally similar to the actuator 169 at the receiving position. The actuators are controlled by cams 216 which open both of the clamps long enough to permit the transfer device 213 to pull the packages laterally out of the clamps.

The transfer device 213 is of a type well-known in the art and will be described only generally herein. It includes a gripper 214 (FIG. 28) having four suction cups 215 positioned to engage the sides of the two packages 11 held by the clamps 135 and 204 as shown in phantom in FIG. 21. Suction is applied to the cups through a flexible line 217 and the pipes 218 carrying the cups. The gripper is carried on one end of an elongated arm 219 pivoted intermediate its ends at 220 on a second arm 221 that is fastened at one end to a shaft 222 journaled on the frame. Pivoted on the end of the carrier arm 219 remote from the gripper is a link 223 which also is pivoted at 224 on a post 225 upstanding from the machine frame. The pivots 220 and 224 are selectively adjustable along slots in the arm 221 and the post 225. To operate this device, a crank 227 on the shaft 222 in angularly spaced relation with the arm 221 is rocked up and down through a preselected arc by a link 228 reciprocated generally endwise by an eccentric connection 229 with the cam shaft 34.

When the shaft 222 supporting the arm 221 turns clockwise from the position shown in FIG. 28, the arm tilts to the right and the links 223 simultaneously rocks the carrier arm 219 counterclockwise to swing the gripper laterally away from the cut-off station 28 while turning the packages 11 from vertical positions to horizontal positions. The general path of the packages and the final position of the gripper 214 are indicated by dot-dash lines in FIG. 28. As the shaft 222 is turned back to its original position, the arms 219 and 221 return to the

positions shown in FIG. 28 to press the suction cups 215 against the next two packages at the cut-off station 28.

As shown in FIGS. 1, 28 and 29, the inspection and discharge conveyor 133 is formed by a pair of endless chains 230 disposed in spaced vertical planes and trained around two sets of side-by-side sprocket wheels 231 mounted on horizontally spaced shafts 232 and 233. The latter are journaled at their ends in two horizontal frame rails 234 (FIG. 28). Fastened to the adjacent sides of the rails are two metal strips 235 of inverted L-shaped cross-section with the upper sections of these plates projecting toward each other and overhanging the respective chains. Two elongated angle-shaped bars 237 are mounted on top of these sections in the positions shown in FIG. 28 and clamped in place with flat surfaces of the bars disposed in a common plane to define a slide for the packages 11, the adjacent edges of the angle bars being spaced apart a distance less than the length of the packages. Three horizontal rods 238 preferably are disposed between the angle bars with their upper surfaces level with the slide surfaces thereby to support the intermediate portions of the packages against sagging.

To advance the packages 11 along this slide, a plurality of pins 239 are spaced along each chain 230 and mounted thereon by means of L-shaped brackets 240 each having one leg fastened to the inner side of a link of the chain and a second leg projecting horizontally inwardly from the chain. The pins are fastened to the upper sides of the horizontal legs and project upwardly from the upper run of the chain above the level of packages on the slide. The spacing of successive pairs of pins 239 on the conveyor is substantially greater than the width of the packages. Adjacent sets of pins on the chains cooperate with each other and with the slideway to define conveyor pockets for receiving the packages, and the trailing set constitutes a pusher for advancing packages along the slide.

The conveyor 133 is driven continuously from an extension 241 of the cam shaft 34, as shown in FIG. 3, by a sprocket wheel 242 driving an endless chain 243 trained around a sprocket wheel 244 on a stub shaft 245 journaled in a gear box 247 and geared to a stub shaft 248 having a chain-and-sprocket connection with the conveyor shaft 233. The linear speed of the chains and the spacing of the pins 239 is such that one set of pins on the conveyor is aligned with the space between each pair of packages released by the gripper 214 in the manner shown in FIG. 1. Accordingly, the leading package of the pair immediately is pushed away along the slide while the trailing package remains momentarily in place as the trailing set of pins moves toward it. Thus, the spacing of the two packages automatically is increased to the distance shown in FIG. 29.

Also provided is a device for inspecting the completed packages 11 on the conveyor 133 and automatically rejecting any package that does not contain a blade 10. To this end, the inspection device comprises an endless carrier 249 mounted on the machine frame above the conveyor with a run of the carrier extending along the path of the packages and with a series of permanent magnets 250 spaced along the carrier at intervals equal to the spacing of the packages. The carrier also is driven continuously in unison with the conveyor 133 with one magnet above and closely adjacent each package so that the blades in the packages are within the fields of the magnets. Accordingly, the magnets attract the blades and pick up the filled packages as shown in FIG. 29 at the inspection station 251 where the two come close together. Since the aluminum foil is non-magnetic, empty packages simply remain on the conveyor and eventually are discharged therefrom as indicated at 252.

In this instance, the carrier 249 is a single endless chain disposed in a vertical plane and trained around two sprocket wheels 253 and 254 mounted on parallel shafts 255 and 257 supported on the machine frame above the

conveyor so that the lower run of the chain is parallel to the path of the packages on the conveyor. The magnets 250 are mounted in cup-shaped holders 258 secured to the chain by clips 259 in position to hang downwardly from the lower run and carry the magnets just above the tops of the packages. Any well known type of magnet may be used.

The carrier 249 is driven in unison with the conveyor 133 by an endless chain 260 (FIG. 3) trained around a sprocket wheel 261 mounted on a stub shaft 262 driven through the gearing in the box 247 and around a second sprocket wheel 263 on a stub shaft 264 driving the carrier shaft 233 through meshing gears 265 and 267. Thus, the carrier is driven in timed relation with the conveyor and in the direction indicated by the arrow in FIG. 3.

As each magnet 250 comes around the forward carrier sprocket 253, it moves toward one of the packages 11 on the conveyor and into closely spaced relation with the package as shown in FIG. 29. Thus, each package containing a blade 10 is picked up by the aligned magnet and thereafter is carried to the left by the magnet. The empty packages simply continue along the conveyor 133 and eventually slide off the ends of the bars and into a suitable receptacle (not shown).

Beyond the discharge end of the conveyor 133 is a pick-off device which strips each package 11 from the carrier 249 after the packages pass between the two elements 268 of a photoelectric counter of well known construction. The pick-off device has two laterally spaced fingers 269 which are spaced to lie closely adjacent the sides of the magnet units and extend across the paths of the projecting end portions of the packages as the latter swing upwardly around the sprocket wheel 254. It will be seen in FIG. 29 that the pick-off device is generally L-shaped in vertical cross-section, the vertical portion of the "L" being disposed beneath the path of the magnets and with the fingers 269, in effect, inclined across the path of the packages. Thus, the packages engage the underside of the fingers and are trapped beneath the fingers and against the vertical portion as the magnets pass between the fingers and continue on. Below the pick-off, the packages dropping from the magnets may be collected in stacks on a conveyor (not shown) arranged to be advanced step by step under the control of the counter, indexing one step after a preselected number of packages are collected in each stack.

We claim as our invention:

1. In a machine for packaging flat articles in envelope-type packages, the combination of, a base, mechanism on said base for supporting two elongated strips of cover material having opposed sealable faces and advancing said strips endwise and step-by-step along a predetermined path through an inserting station, means for holding two side-by-side rows of articles to be packaged on said base with one end of each row above said path and releasing said articles one-by-one at said row ends for insertion between said strips, means for spreading said strips at said inserting station to receive articles from said rows, an inserting device at said inserting station including an upright arm above said path and adjacent said row ends, a gripper on said arm level with the articles in said magazine, mechanism for swinging said arm toward said row ends to move said gripper against the terminal articles, and then away from the row ends to pull the articles therefrom, mechanism for lowering said arm toward said strips to lower the articles to a preselected level between the strips, holding the arm momentarily at said preselected level, and then raising the arm to lift the gripper from between the strips and back to the level of the row ends, two heat sealing bars disposed on opposite sides of said path at said inserting station, and mechanism for moving said bars together against opposite sides of areas of said strips overlying said articles while the latter are held at said preselected level thereby to tack the article to the strips.

2. In a machine for packaging flat articles in envelope-

type packages, the combination of, a base, mechanism on said base for supporting two elongated strips of cover material having opposed sealable faces and advancing said strips endwise and step-by-step along a predetermined path through an inserting station, a magazine for holding a supply of articles to be packaged supported on said base with one end above said path and operable to release said articles one-by-one at said one end for insertion between said strips, means for spreading said strips at said inserting station to receive articles from said magazine, an inserting device at said inserting station including an upright arm above said path and adjacent said magazine end, a gripping device on said arm level with the articles in said magazine, means for swinging said arm toward said magazine to grip the terminal article therein and then away from the magazine to pull the article therefrom, lowering said arm toward said strips to lower the article to a preselected level between the strips, holding the arm momentarily at said preselected level, and then raising the arm to lift the gripper from between the strips and then back to the level of the magazine, two heat sealing bars disposed on opposite sides of said path at said inserting station, and mechanism for moving said bars together against opposite sides of areas of said strips overlying said article while the latter is held at said preselected level thereby to tack the article to the strips.

3. In a machine for packaging articles in envelope-type packages, the combination of, mechanism for supporting two elongated strips of cover material having opposed heat-sealable faces and advancing said strips endwise and step-by-step along a predetermined path first through an inserting station and then through a sealing station, a magazine at said sealing station for holding a supply of the articles to be packaged and having a discharge end above said path, means for spreading said strips at said inserting station to receive articles from said magazine, an inserting device at said inserting station operable to grip the terminal article in said magazine at a point spaced from the bottom thereof, pull the article from said magazine and insert it between said strips, hold the article momentarily in a predetermined position between said strips in spaced relation with the bottom edges thereof, and then release the article and withdraw from between the strips, means at said inserting station for sealing each article to said strips at a point adjacent the bottom thereof while the article is held between the strips, means at said sealing station for sealing the strips together completely around each article to form a series of integrally joined, filled and closed packages, and a cutter for severing said strips along longitudinally spaced transverse lines between contiguous packages to separate the packages from the strips.

4. In a machine for packaging articles in envelope-type packages, the combination of, mechanism for supporting two elongated strips of cover material having opposed heat-sealable faces and advancing said strips endwise and step-by-step along a predetermined path first through an inserting station and then through a sealing station, means at said inserting station for inserting successive articles between said strips in longitudinally spaced relation, holding each article momentarily between the strips in spaced relation with the edges thereof, and then releasing the articles, means at said inserting station for securing each article to at least one of said strips while the article is held by said inserting means, means at said sealing station for sealing said strips together completely around each article to form a series of integrally joined, filled and closed packages, and a cutter for severing said strips along longitudinally spaced transverse lines between contiguous packages to separate the packages from the strips.

5. The combination defined in claim 4 in which said securing means comprises two opposed sealing bars mounted on opposite sides of said path at said inserting station for movement toward each other into sealing en-

gagement with areas of said strips overlying said articles thereby to tack seal the articles to said strips.

6. The combination defined in claim 4 further including means for spreading said strips apart in advance of said inserting station to a distance substantially greater than the thickness of said articles.

7. The combination defined in claim 6 in which said spreading means is a wedge-shaped element disposed between said strips and having a narrow end well in advance of said inserting station and a wider end closely adjacent said inserting station.

8. In a machine for packaging articles in envelope-type packages, the combination of, mechanism for supporting two elongated strips of cover material having opposed sealable faces and advancing said strips endwise in side-by-side upright planes along a predetermined path first through an inserting station and then through a sealing station, means at said inserting station for inserting successive articles between said strips in longitudinally spaced relation and holding the articles in preselected positions between the strips, means at said sealing station said strips together between and around successive articles to form a series of integrally joined, filled and closed packages, and a cutter along said path beyond said sealing station for severing said strips along longitudinally spaced transverse lines between contiguous packages to separate the packages from said strips.

9. The method of forming and filling packages including the steps of, advancing two elongated strips of cover material having opposed sealable faces endwise along a predetermined path in side-by-side upright planes with said faces in side-by-side relation, inserting successive articles to be packaged between said strips in longitudinally spaced relation and holding the articles in preselected position between the strips, sealing said strips together between successive articles to form a series of integrally joined filled packages, and subsequently severing the strips along longitudinally spaced transverse lines between contiguous packages to separate the packages from said strips.

10. The method of forming and filling packages including the steps of, advancing two elongated strips of cover material having opposed sealable faces endwise along a predetermined path with said faces in side-by-side relation, inserting successive articles to be packaged between said strips in longitudinally spaced relation with each other and holding each article momentarily in a preselected position spaced from the edges of the strips, sealing each article to the strips in said preselected position, subsequently sealing said strips together completely around each article to form a series of integrally joined, filled and closed packages, and severing the strips along longitudinally spaced transverse lines between contiguous packages to separate the packages from said strips.

11. The method of forming and filling packages including the steps of, advancing two elongated strips of cover material having opposed sealable faces endwise and step by step through inserting, sealing and first and second cut-off stations, simultaneously inserting two articles between said strips in longitudinally spaced relation during each dwell of the strips at said inserting station, sealing said strips together around each article at said sealing station to form a series of integrally joined, filled packages, separating two packages as a unit from the strips during each dwell of the strips at said first cut-off station, and subsequently separating the packages of the unit at said second cut-off station.

12. In a machine for packaging articles in envelope-type packages, the combination of, a base, mechanism on said base for supporting two elongated strips of cover material having sealable faces in face-to-face relation and advancing said strips endwise and step-by-step along a predetermined path to a cut-off station, means on said base along said path for inserting articles in longitudinally spaced relation between said strips and sealing the strips

together to form a series of integrally joined, filled and closed packages, a cut-off device on said base at said cut-off station for severing said strips along longitudinally spaced transverse lines between contiguous packages to separate the packages from said strips in integrally joined pairs, a disk rotatably mounted on said base beyond said cut-off station for rotation in a plane parallel to the plane of said strips, a plurality of equally spaced clamps mounted on said disk and projecting radially outwardly therefrom in the plane of said strips, mechanism for indexing said disk step-by-step in one direction to move successive clamps first into a receiving position in the path of said strips at said cut-off station and then through successive work positions angularly spaced around said disk, the last of said positions being a discharge position in which the double package is held in a final cut-off station, means for extending each clamp radially of said disk in said receiving position to receive the end of the strips and retracting the clamp immediately after severance of the strips to space the separated packages edgewise from the end of the strips, means for extending each clamp radially of said disk in said discharge position and retracting the clamp after a short pause in the extended position, means spaced radially from the clamp in the discharge position for gripping the free edge of the separated package when the clamp is extended, and a second cut-off device at said final cut-off station positioned to sever the package between said clamp and said gripping means whereby subsequent retraction of the clamp spaces the two separated parts of the package edgewise from each other.

13. In a machine for packaging articles in envelope-type packages, the combination of, a base, mechanism on said base for supporting two elongated strips of cover material having sealable faces in face-to-face relation and advancing said strips endwise and step-by-step along a predetermined path to a cut-off station, means on said base along said path for inserting articles in longitudinally spaced relation between said strips and sealing the strips together around the articles to form a series of integrally joined, filled and closed packages, a cut-off device on said base at said cut-off station for severing said strips along longitudinally spaced transverse lines between contiguous packages to separate the packages from said strips, a turret-type transfer device mounted on said base adjacent said cut-off station including a plurality of clamps supported for step-by-step indexing movement in the plane of said strips from a receiving position in the path of the strips through successive angularly spaced positions to receive the separated packages at said cut-off station and carry the packages step-by-step along an arcuate path through successive angularly spaced work positions, mechanism for indexing said transfer device step-by-step in timed relation with the advance of said strips to move a clamp to said receiving position to receive each package severed from the strips, means for extending each clamp radially in said receiving position and retracting the clamp after severance of a package, and mechanism operating said clamps to grip each package severed from said strips prior to retraction of the clamps whereby the clamps space each package edgewise from the strips.

14. The combination defined in claim 13 further including flap-folding means on said base at said receiving station operating on each severed package to form a flap on the package after the latter has been spaced from said strips.

15. The combination defined in claim 13 in which said cut-off device is positioned to sever said strips between integrally joined pairs of packages, and further including a second cut-off device at a discharge station spaced around said arcuate path from said receiving station, said extending means also extending each clamp in said discharge station for severance and separation of the packages of each pair prior to discharge thereof.

16. The combination defined in claim 15 in which said

extending means simultaneously extends the clamps in said receiving and discharge station, holds the two clamps extended during severance, and then retracts the two clamps for simultaneous separation of the packages.

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