United States Patent [19]

De Shazor

[11] **3,777,450**

[45] **Dec. 11, 1973**

[54] **ARTICLE HANDLING AND PACKAGING MACHINE**

[76] Inventor: **James C. De Shazor,** 3314 Coy Dr., Sherman Oaks, Calif. 91403

[22] Filed: **July 7, 1971**

[21] Appl. No.: **160,436**

[52] **U.S. Cl.** ..... **53/138 R,** 53/48

[51] **Int. Cl.** **B65b 21/06**

[58] **Field of Search** 53/48, 138; 198/172, 198/173, 162, 165

[56] **References Cited**

UNITED STATES PATENTS

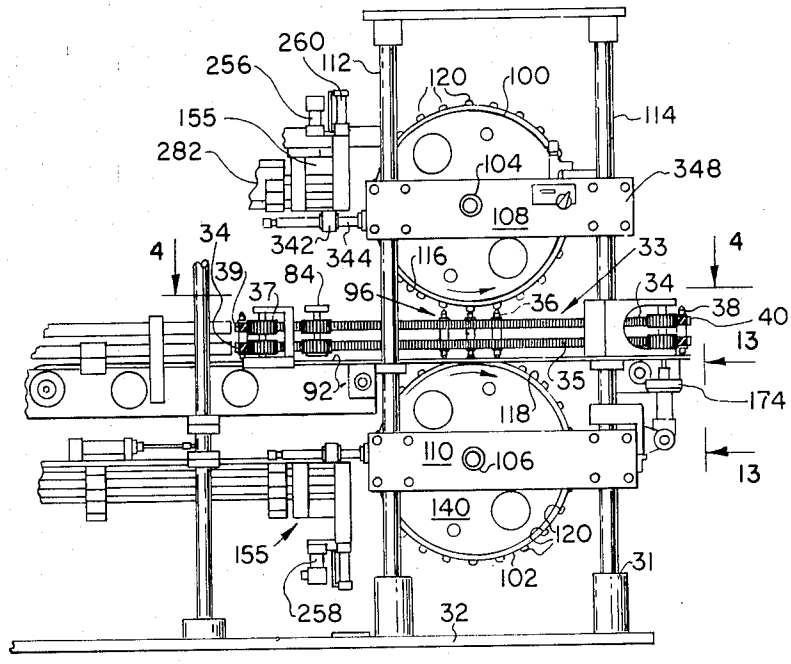
3,393,490 7/1968 De Shazor, Jr. et al. 53/48

Primary Examiner—Travis S. McGehee
Assistant Examiner—John Sipos
Attorney—William H. Dean

[57] **ABSTRACT**

The disclosure relates to an article handling and packaging machine particularly adapted for use in supplying packaging clips such as shown in U.S. Pat. No. 3,370,700 to pluralities of containers such as beer cans in order to assemble and connect pluralities of beer cans in unitary packaged groups such as four-packs, six-packs or eight-packs as desired. While the said packaging machine is particularly adapted for use in applying such packaging clips to articles such as cans of beer or the like the machine may be readily adapted for use in applying caps to open containers or for applying labels or indicia on various articles. The disclosure includes endless belt structures provided with rotor engaging surfaces and opposed surfaces having pockets therein adapted to engage articles; drive means on the belts is adapted to cooperate with an applicator rotor which rotates in unison with the linear movement of the belts; said applicator rotor having peripheral portions disposed to roll in to close proximity to articles carried in said pockets of said belt so that said applicator rotor may apply connecting clips to a plurality of articles held in said pockets and moved therein whereby said articles are packaged into a unitary assembly such as a four-pack, six-pack or eight-pack of beverage cans or the like; the disclosure also includes means for coordinating the timing of the various features of the machine so that a plurality of said belts may be adjusted relative to each other so that their pocket portions are precisely aligned in opposition to each other for engaging opposite sides of articles or containers; the disclosure further including switch operating means on the applicator rotor for timing and initiating operation of a part feeder mechanism adapted to feed packaging clips or other parts from a magazine and to place the parts precisely on peripheral portions of the applicator rotor as it rotates in relation to the magazine; additionally the disclosure includes details of a variety of feed mechanisms for feeding packaging clips as well as other parts from the magazine of the machine on to the applicator rotor of the machine; further the disclosure includes novel mechanisms for driving parts longitudally in contiguous stacked relation to each other in the magazine of the machine for maintaining the parts constantly in a feed relation to the parts feed mechanism which is intermittently operable to place parts, such as packaging clips, on the peripheral portions of the applicator rotor of the machine during its rotation relative to the parts feed mechanism and the magazine.

21 Claims, 29 Drawing Figures



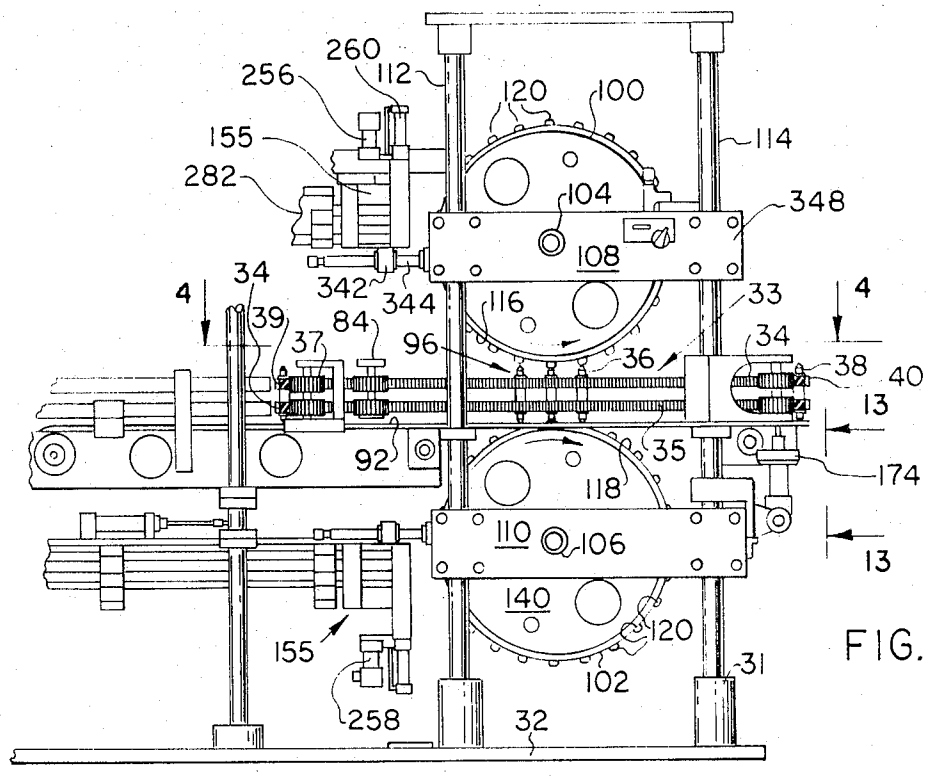


FIG. 1

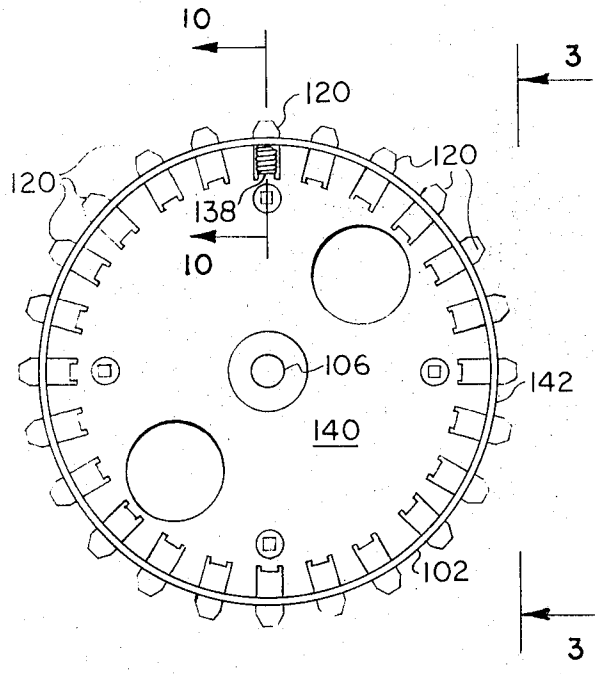


FIG. 2

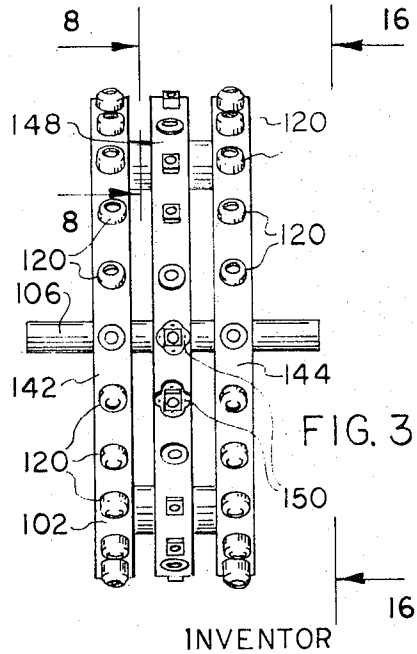


FIG. 3

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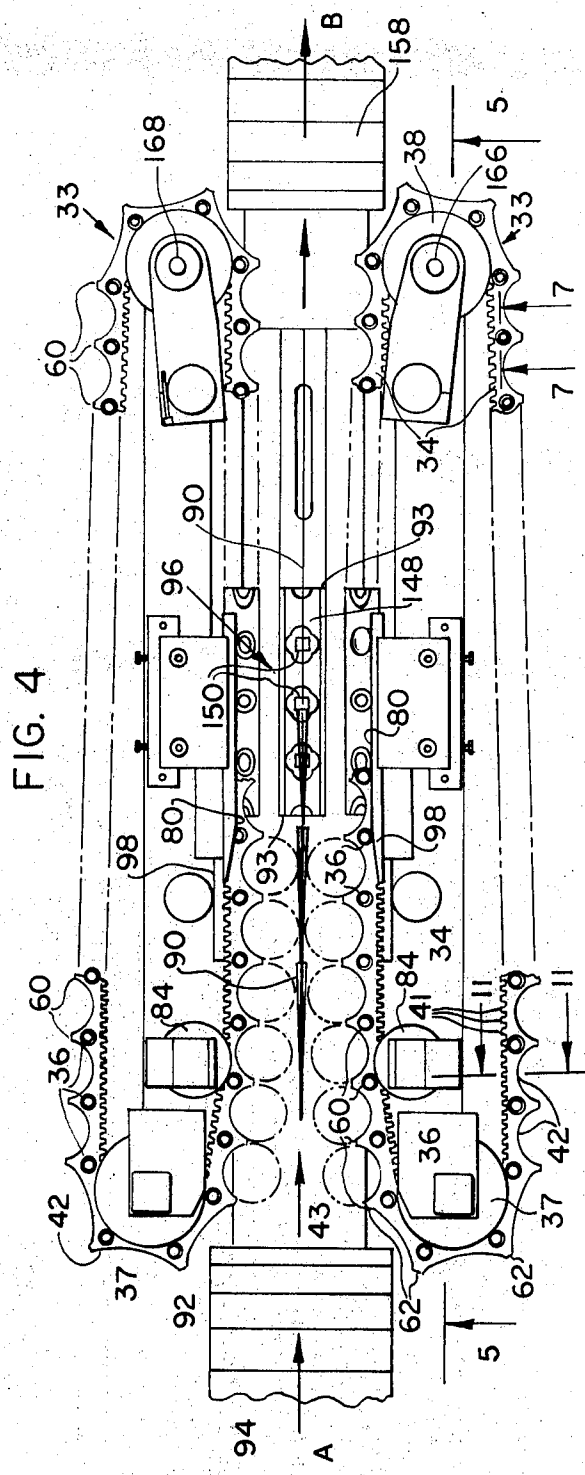

FIG. 4

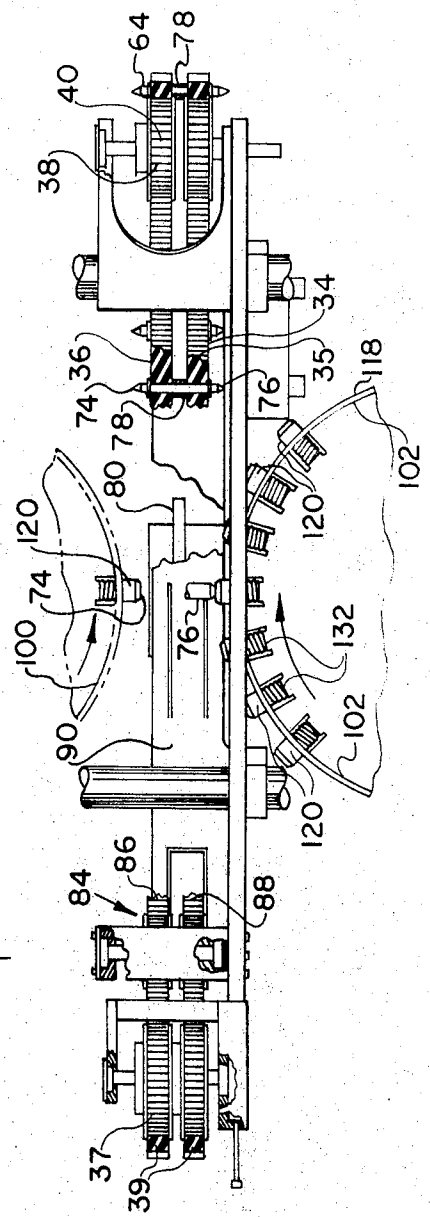

FIG. 5

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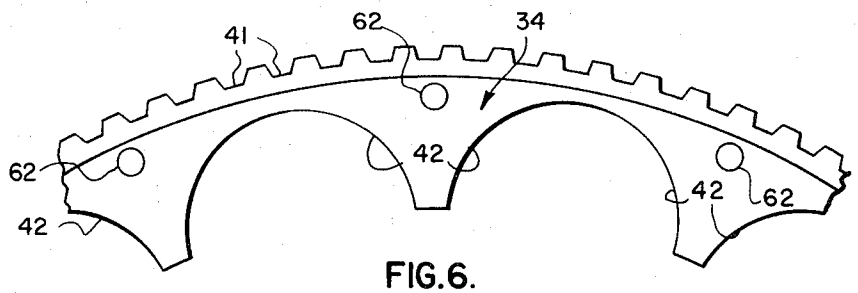

FIG.6.

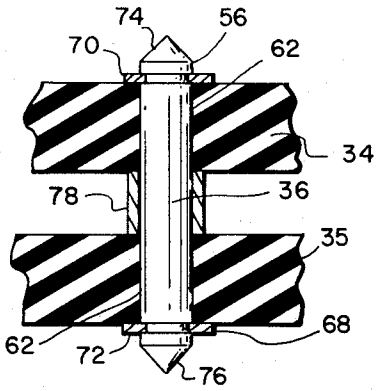

FIG. 7.

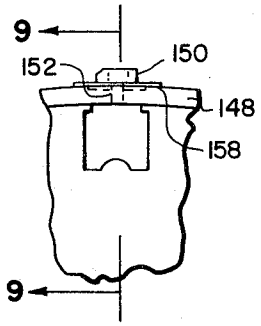

FIG.8.

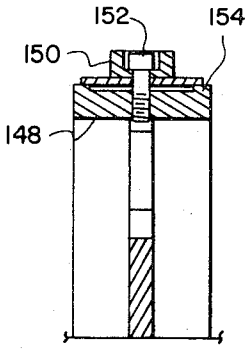

FIG.9.

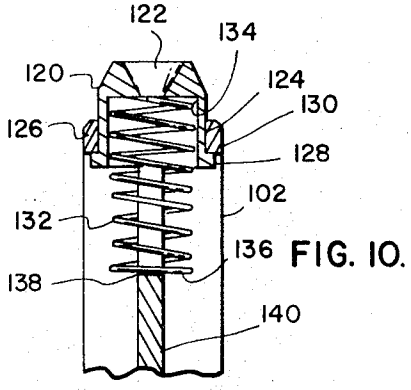

FIG. 10.

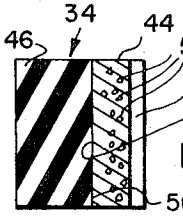

FIG.11.

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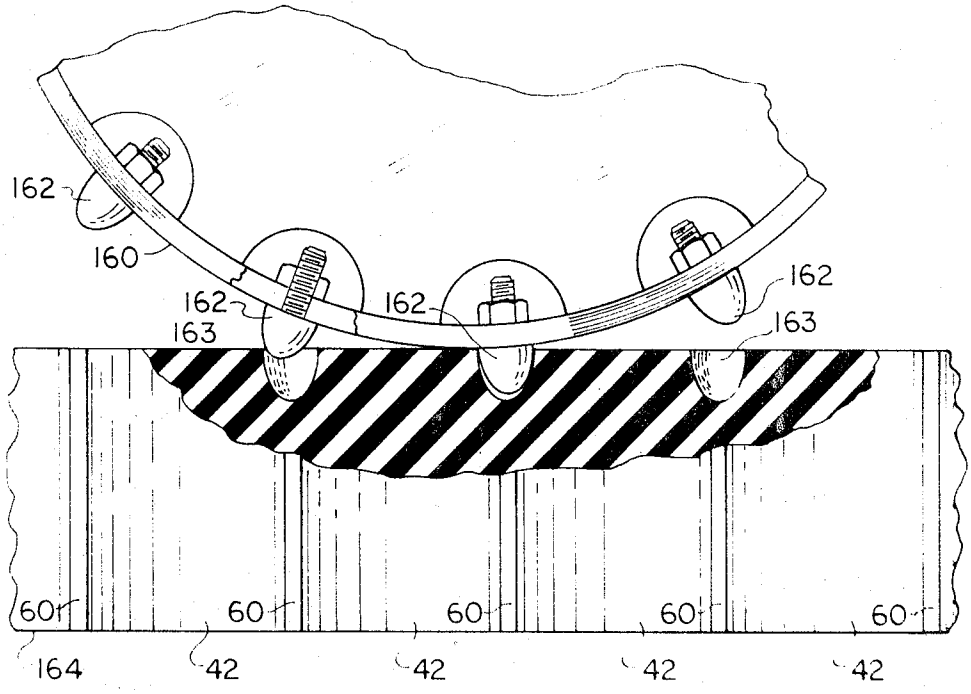

FIG. 12

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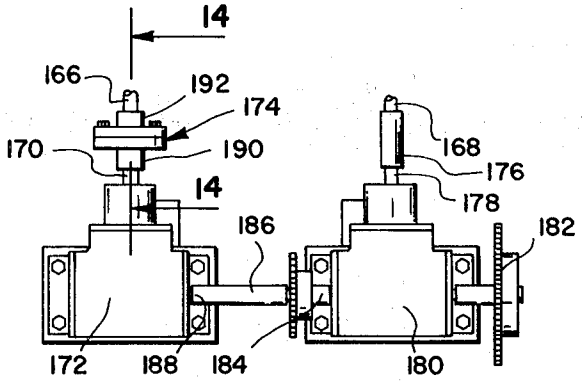

FIG. 13

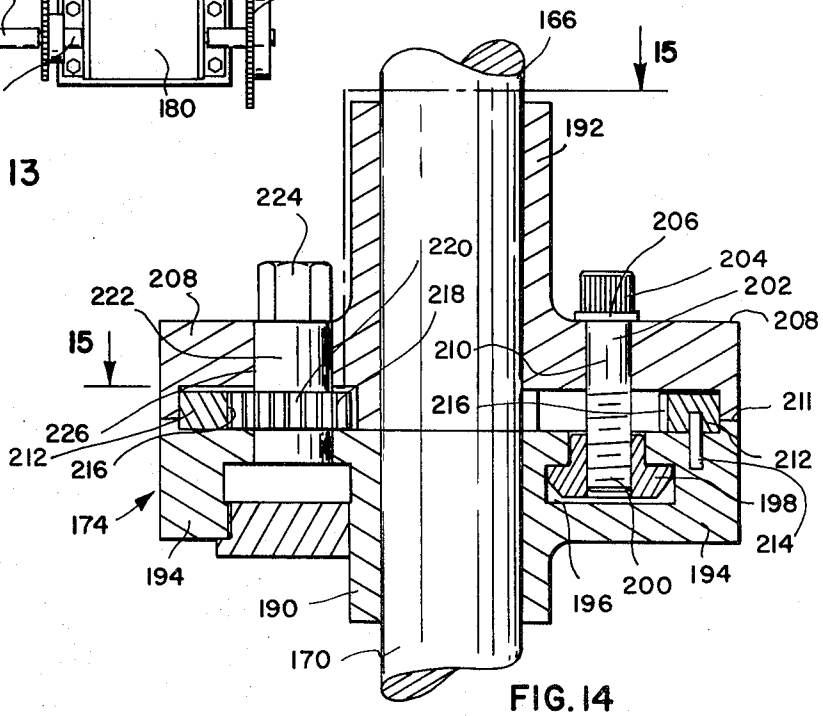

FIG. 14

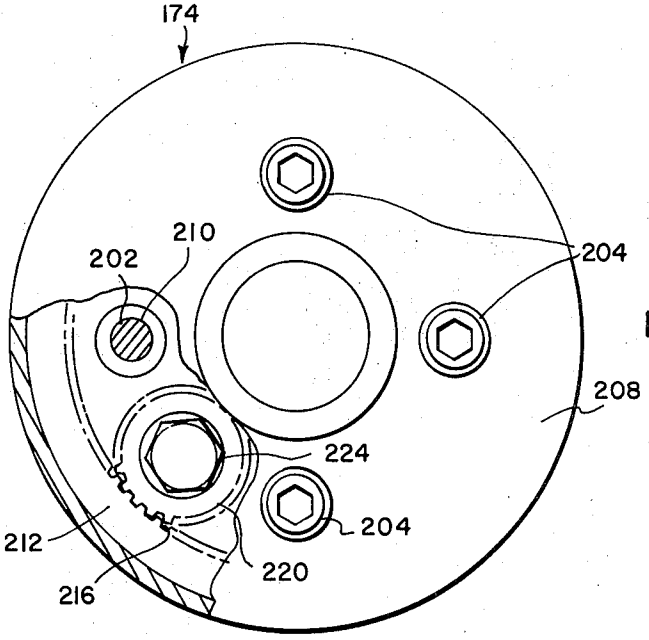

FIG. 15

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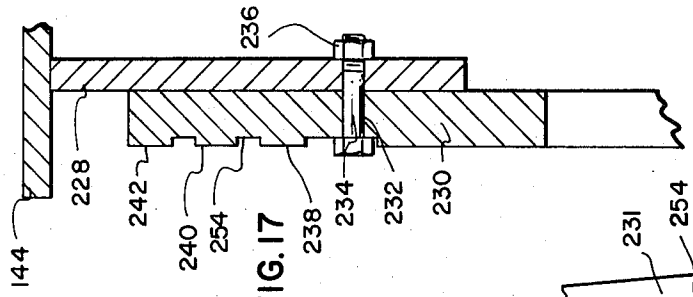

FIG. 17

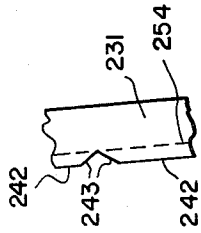

FIG. 18

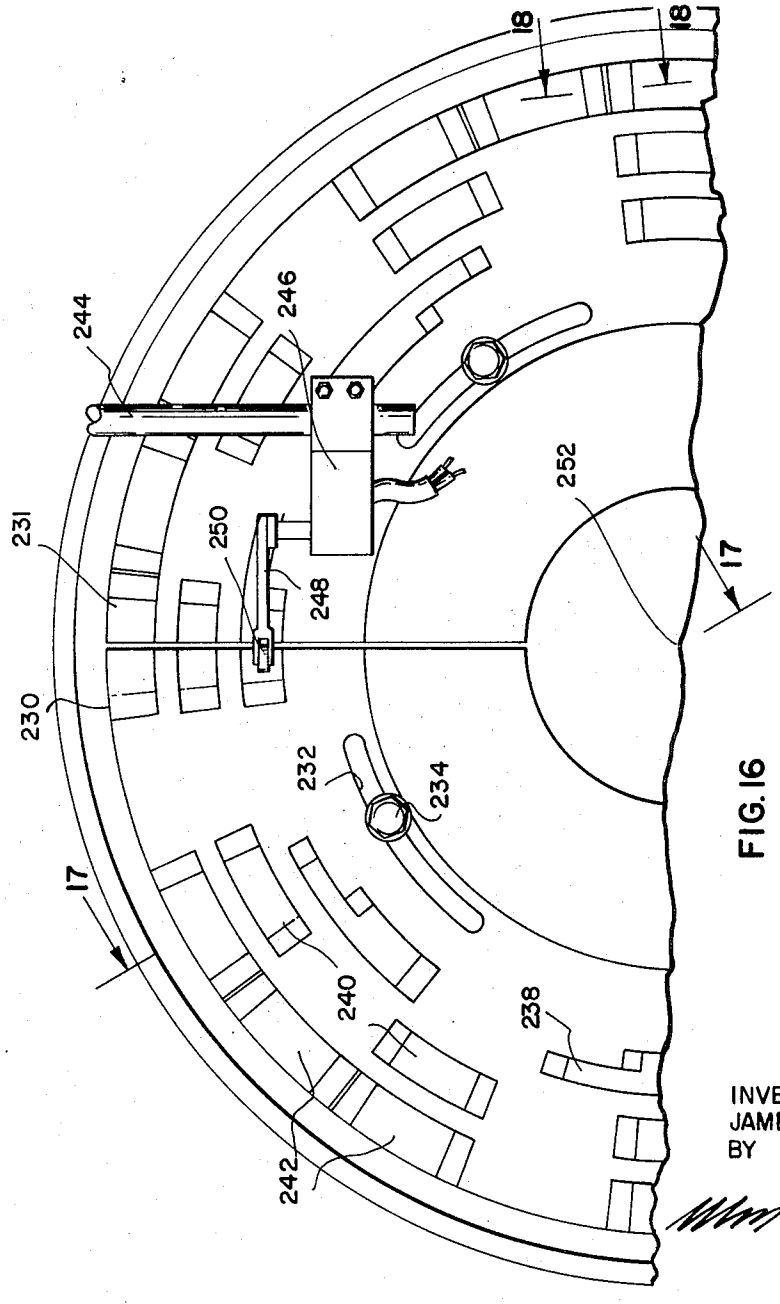

FIG. 16

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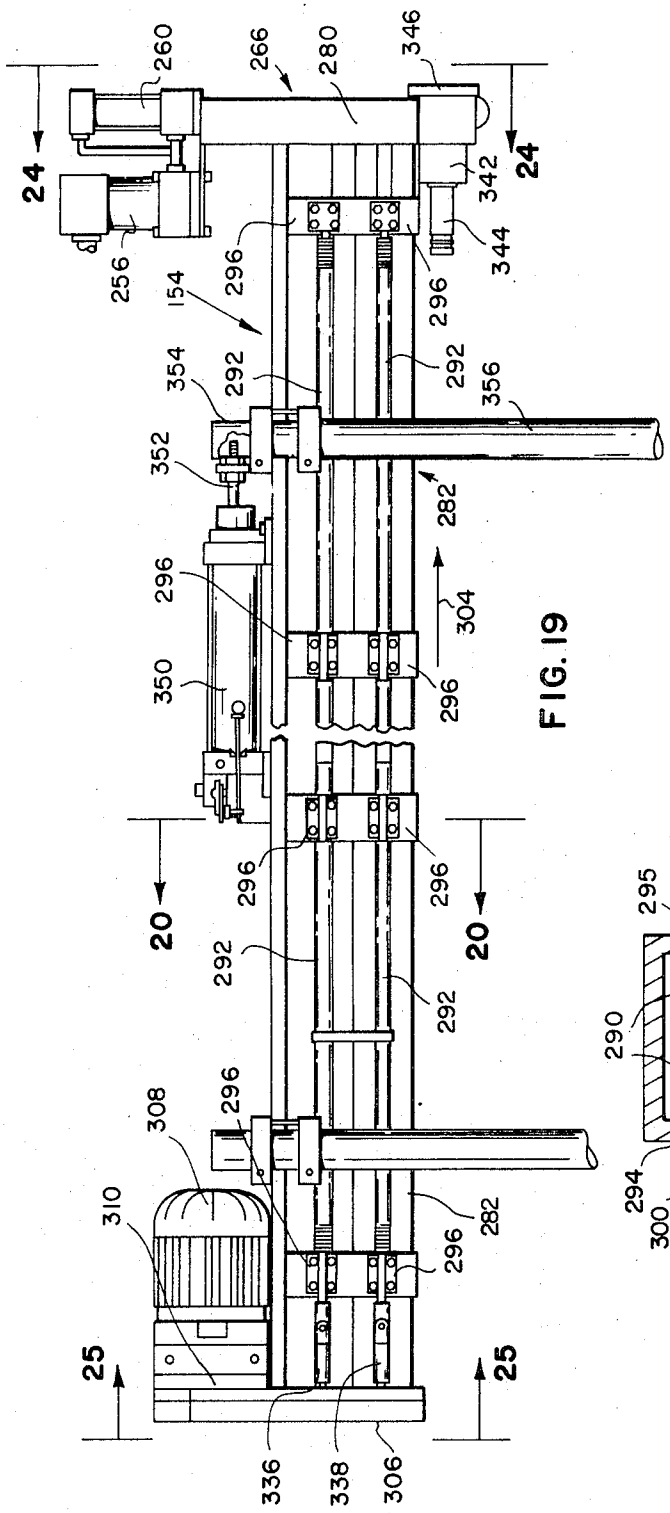


FIG. 19

FIG. 21

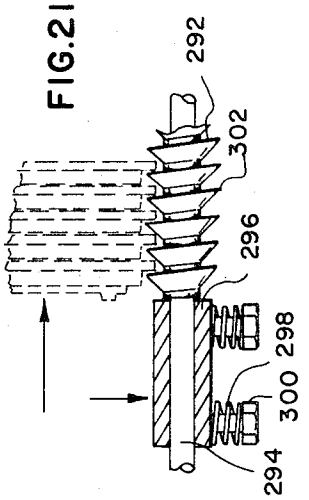
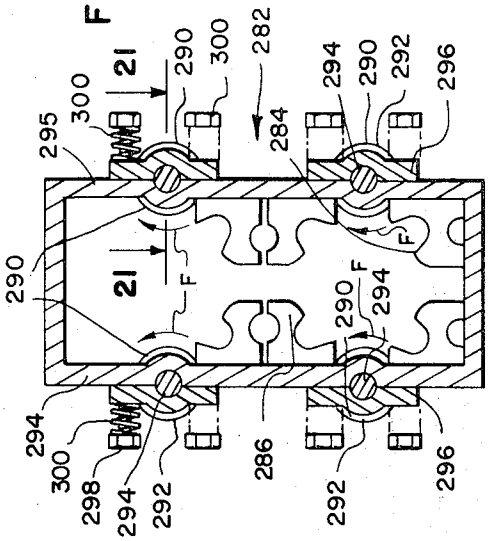


FIG. 20



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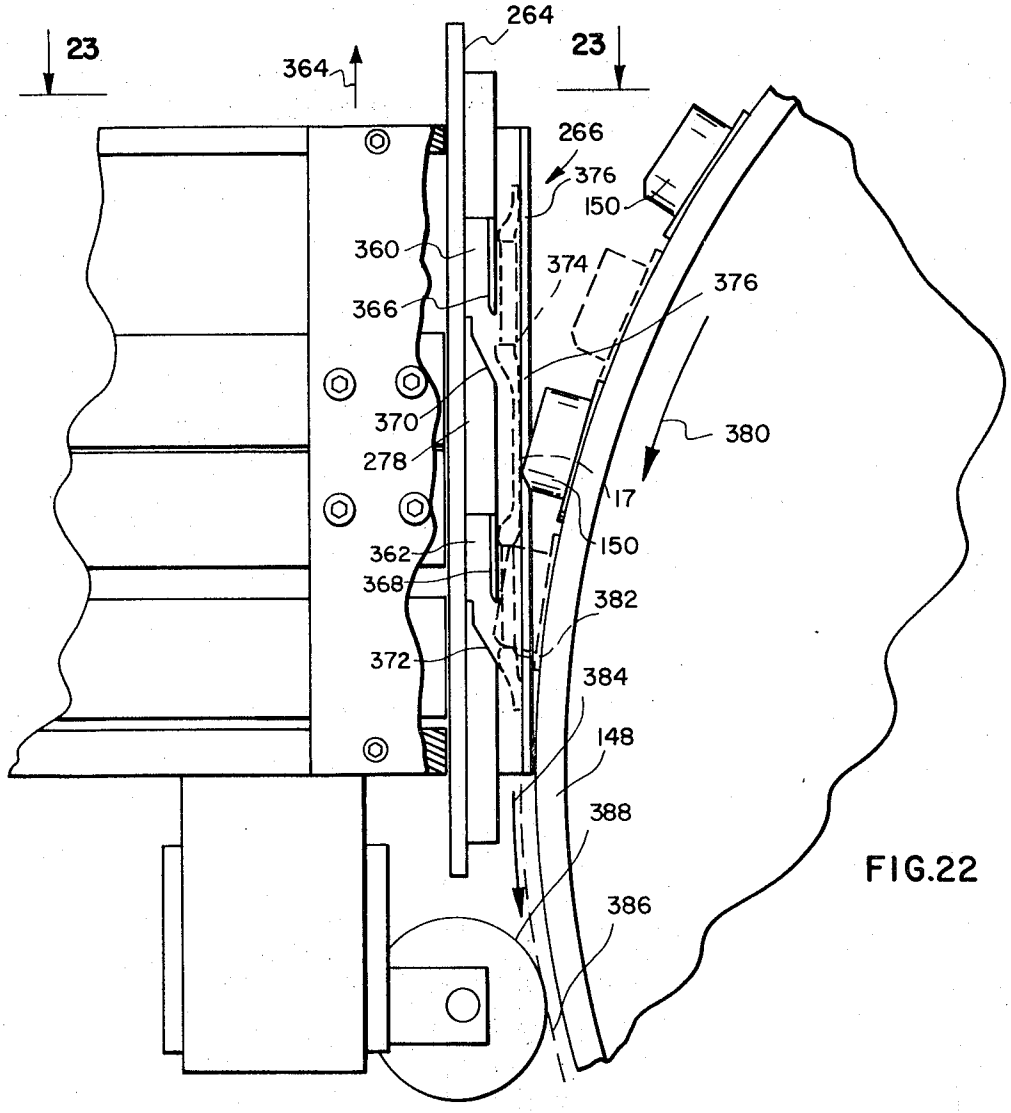

FIG.22

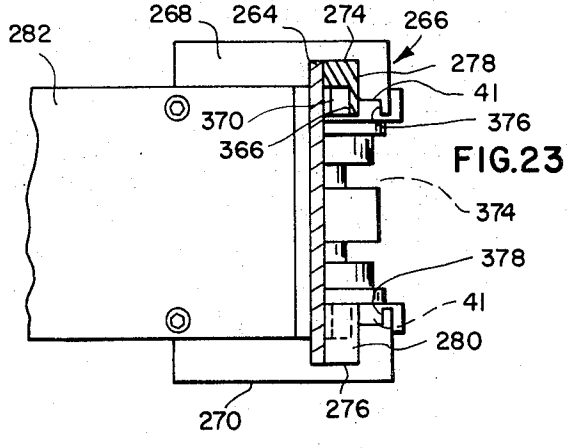

FIG.23

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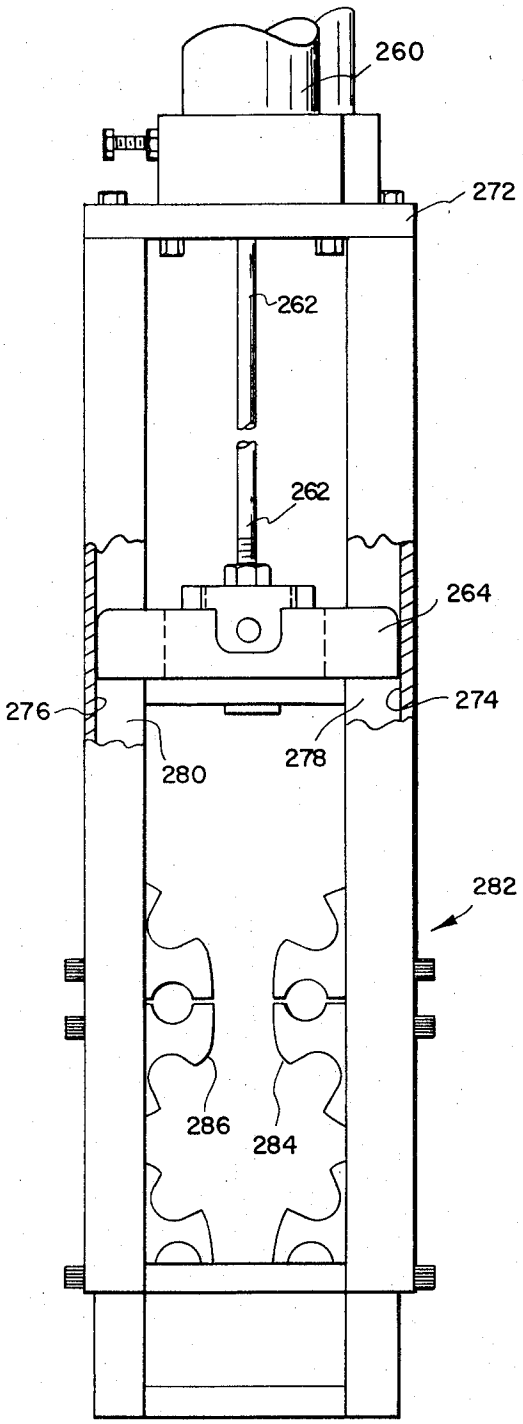

FIG. 24

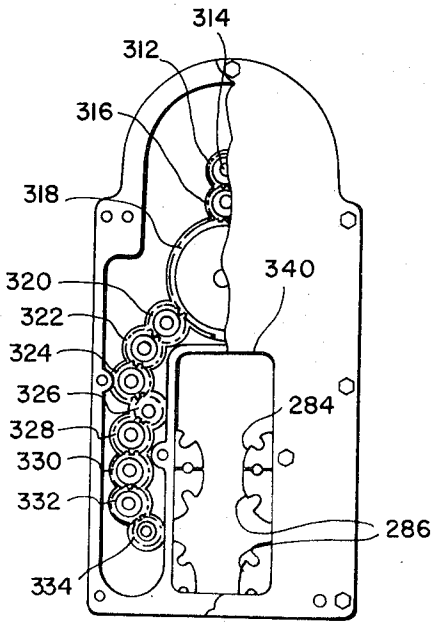

FIG. 25

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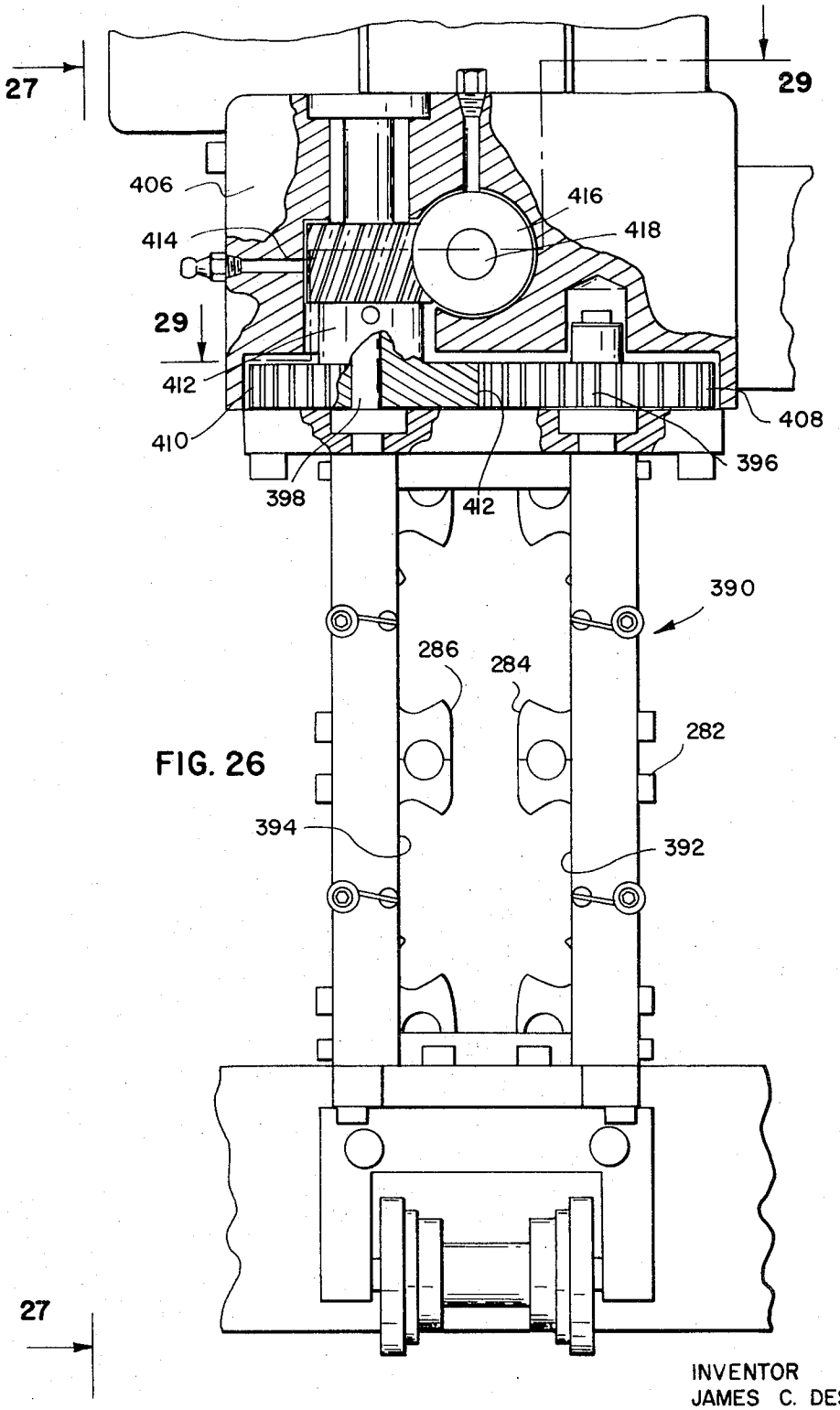

FIG. 26

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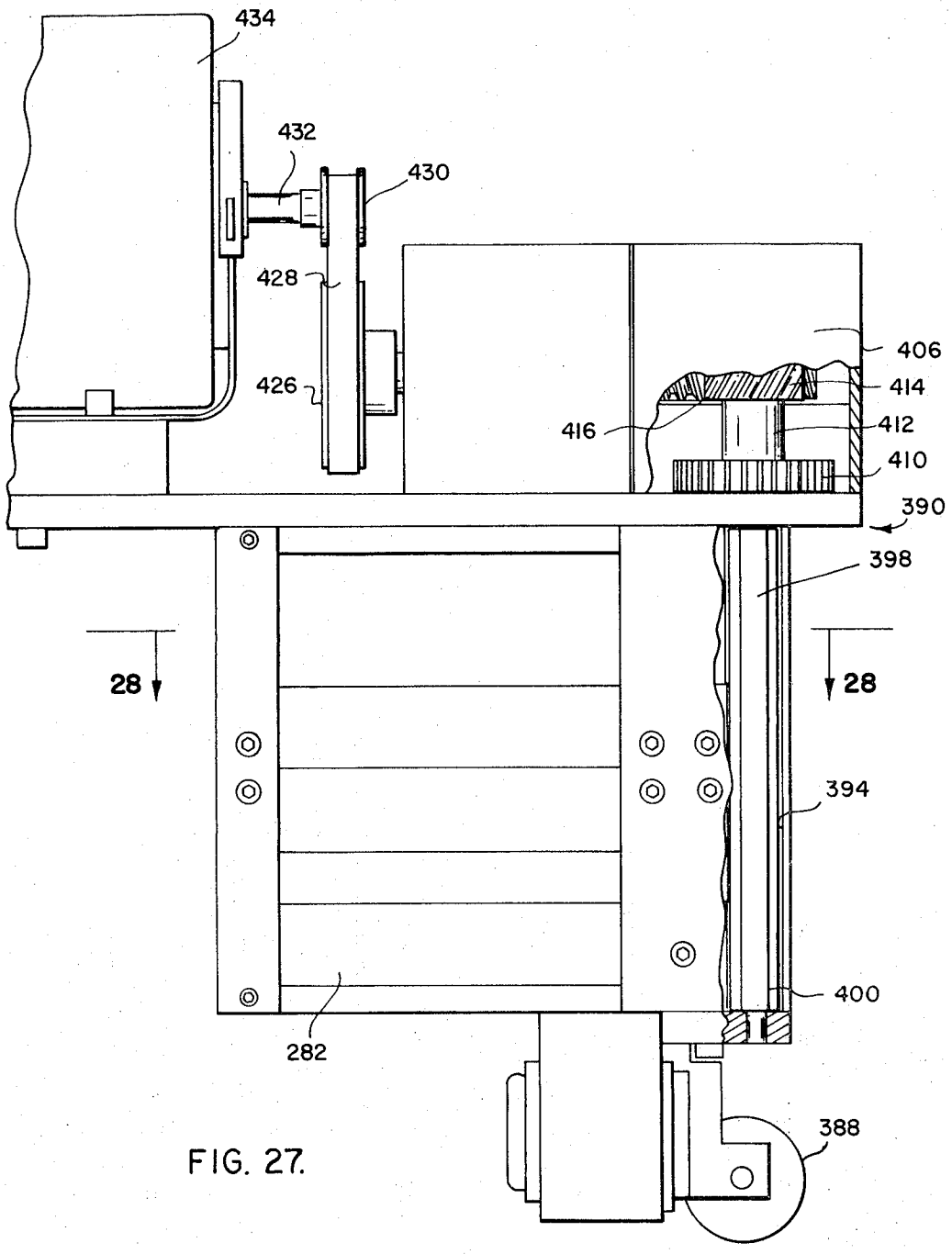

FIG. 27.

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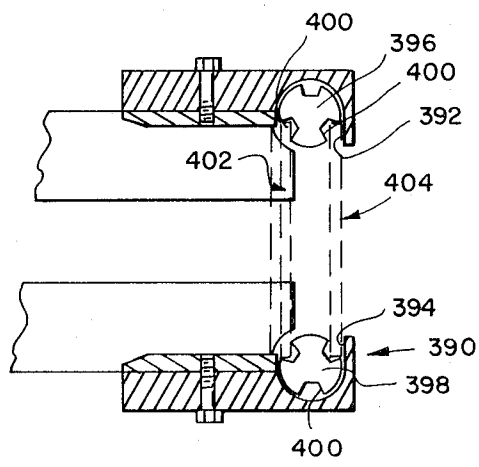

FIG. 28

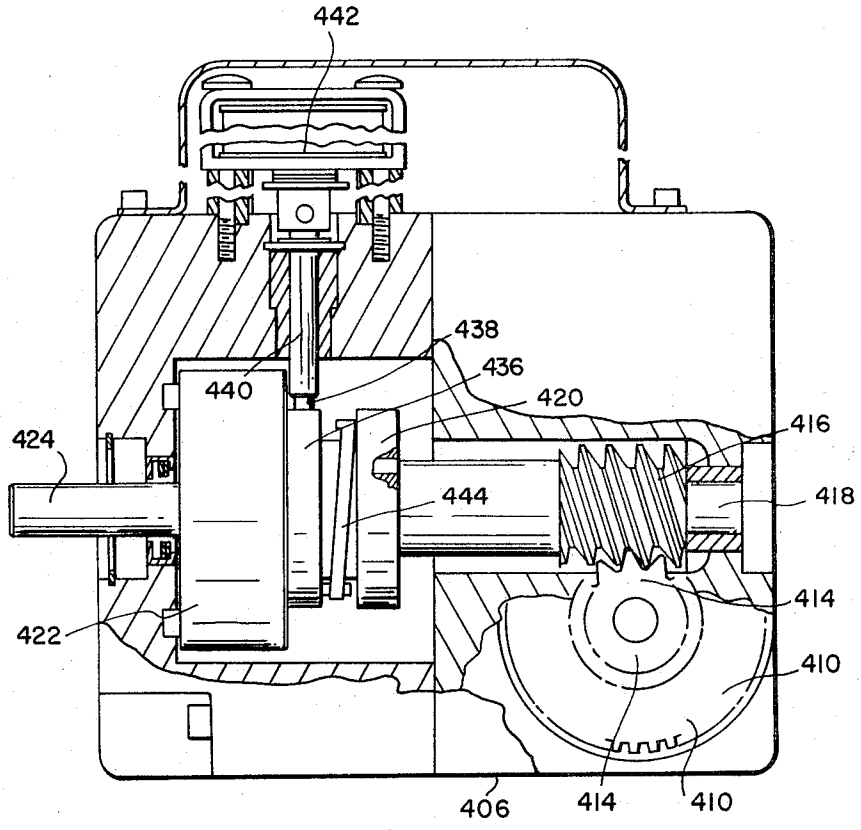

FIG. 29

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ARTICLE HANDLING AND PACKAGING MACHINE

BACKGROUND OF THE INVENTION

Various articles and containers have required high speed handling and packaging as well as capping and labeling, and in the volume production of packaged consumer goods such as foods and beverages machines have been used to package glass and metal cntainers with relation to various means for retaining several food or beverage containers in a single group, as for example canned beverages such as beer or soft drinks as well as those contained in glass containers have been produced in high volume and have been packaged in groups wherein a plurality of the containers have been held together by a common device or means and machines have been employed to assemble the containers with relation to means or devices for holding them in packs or groups such as the conventional six pack of beer wherein six cans of beer may be packaged for sale as a unitary group. It has been desirable to package a plurality of such containers varying in numbers from two containers to six or eight containers in one package and to produce such packaged arrangements of containers at very high speed as for example a requirement has been existent for the packaging of over 1,000 containers per minute so as to meet reasonable production volume demands within a given manufacturing and packaging space area. Various prior art machines have been developed and are utilized for assembling articles, or various packages or containers into a unitary group for retain trade. Many problems have arisen relative to high speed packaging of containers and particularly those holding relatively heavy material such as liquids or the like. The high speed handling of such containers full of liquid tends to cause high inertial stresses incompatible with the economy of packaging many of the containers which are either made of fragile material or very thin metal so as to save material and weight. Accordingly high speed inertial forces acting on containers during packaging have posed many problems relative to the damage or deformation of the containers in accordance with the use of prior art machines and methods for assembling such containers into multiple unit packages. Additionally, many of the prior art machines may not be able to handle containers at high speed and particularly those of thin metal or glass without either damaging the containers or the contents thereof. As an example, in the handling of packaged beer it is necessary to avoid extremely high inertial forces or accelerative forces in order to prevent the separation of carbonation gases from the beer in the containers. Additionally, many prior art handling problems involved the jamming of packaging machines when a deformed package was moved into the packaging assembly area. Many machines may thus be subject to considerable down time due to the fact that a crushed or deformed container may jam the machine or stop the flow of articles or packages therethrough. Additionally, many machines using reciprocating action are incapable of attaining a sufficiently high cycle rate in order to properly handle high speed flow of containers or packages without undue stress on the mechanism of the machine or inertial damage to the containers, packages or articles being handled by the machine. In accordance with the foregoing it will be realized that the high speed, high volume packaging or handling of articles for the consumer market have posed many problems which relate to packaging or labeling articles or containers at high volume without damaging the articles or containers and accomplishing the packaging of such articles or containers at rates of over 1,000 units per minute to provide economic efficiency as required by modern production demands.

SUMMARY OF THE INVENTION

The machine of the present invention is particularly adapted to high speed production packaging or labeling of various packages, containers and/or articles in a very efficient manner without substantial damage to containers, contents of the containers, or other articles being handled by the machine of the invention. The machine of the invention comprises a novel belt mechanism wherein a single endless belt or a plurality of such belts are provided with rotor engaging surfaces and opposed surfaces having article or package engaging pockets therein. Each belt carries drive means and specifically pins which are disposed in spaced relation longitudinally along the belt and extending on axes parallel to the axes of the rotors on which the belt is mounted. These pins, in spaced apart relationship to each other, are drivingly engageable with spring loaded sockets on an applicator rotor mechanism which is adapted, at its periphery, to rotate in close proximity to articles carried in the pockets of the belt at a station location provided by stationary guide means supported on the frame of the machine of the invention carrying the aforementioned belt. Accordingly, the pins in the belt and the spring loaded socket structure on the applicator rotor coordinate linear movement of the belt and concurrent rotary movement of the applicator rotor which is adapted to carry packaging clips and roll them onto beads of cans or other containers for clipping the beads of the cans together, such clips being, as for example, disclosed in U.S. Pat. of James C. DeShazor, Nos. 3,357,551 and 3,370,700. Additionally various label means may be applied to cans or articles or the periphery of the applicator rotor of the invention may be used to print indicia on cans, packages, containers or various articles carried in the pockets of the belt of the invention. One or more of the belts may be used relative to a stationary guide means carried by a frame of a machine on which the belts are utilized and when a pair of the belts are used the pockets of the belts may be opposed to each other at opposite sides of an elongated guide means which is disposed substantially parallel to a line extending through the axes of rotors supporting the belts such that two rows of containers may be engaged in the pockets of the two belts at opposite sides of the elongated guide means and whereby peripheral portions of the applicator rotor of the invention may apply clips such as disclosed in the aforementioned patents at tangential intersection of the cans or containers simply by rolling these clips onto the beads of the cans or containers as they move in a linear direction while the applicator rotor is merely rotating adjacent the ends thereof. The invention also comprises a novel combination of guide mechanism for articles or containers, such as beer cans received from a conveyor, so as to precisely position the cans in a station area for application of clips or packaging means thereto. The guide means comprises pins extending through the article handling belts of the invention wherein the belts are provided with a pair of spaced

apart belt portions with drive pins extending therethrough and sleeves on the drive pins between the belt portions and wherein guides engage the sleeves in opposed relation to a longitudinal guide means so as to force the pockets of the belt in precise relation to longitudinal guide means so that the containers held in the pockets are precisely moved into a station area adjacent the periphery of the applicator rotor of the invention in order that close tolerances may be attained in the positioning of beer cans or the like with respect to timed areas on the periphery of the applicator rotors which may carry packaging clips for coupling the cans together in a multiple unit package and for accomplishing such functions at very speed. The article handling pockets of the belt of the invention are very resilient and are provided with fingers between the pockets and these resilient pockets are capable of handling articles or thin wall containers such as aluminum beer cans at very high speed without deforming the cans and furthermore the resilience of these pockets permits a crushed can or deformed article or package to pass through the station area of a machine on which the belt operates due to the fact that the fingers between the pockets and the pockets themselves are readily yieldable and may temporarily deform to allow a deformed article to pass through a machine of the invention without interrupting operation thereof.

The invention also comprises a novel rotary adjustable coupling adapted to provide for relative movement of the pocketed belts of the machine so as to permit adjustment of one belt in a linear relationship relative to the other belt in order that the pockets of the belt may be directly opposed to each other for accurately holding rows of containers in alignment with each other.

The invention also includes a novel switch operating means coupled to the applicator rotor of the machine; the switch operating means being adapted to time the initiation of operation of the parts feed mechanism which automatically feeds parts such as packaging clips from the magazine of the invention onto peripheral portions of the applicator rotor. The switch operating means includes adjustable features for timing various switching operations to coincide with peripheral portions of the applicator rotor as they move into alignment with the magazine and parts feed mechanism of the invention so that parts such as packaging clips are accurately and rapidly applied to the periphery of the rotor as it rotates relative to the magazine and the parts feed mechanism.

The invention also comprises a novel cam means for actuating said switch means and the cam means being traversable by an adjustable switch that follows the cam mechanism so as to enable adjustments of the switching mechanism to accommodate the placement of the packaging clips or other articles or parts from the magazine onto the applicator rotor so that, as for example, packaging clips may be applied to the rotor in order to package either four-pack, eight-pack or six-pack assemblies of beer cans or other beverage containers as desired.

The invention also comprises novel intermittent mechanism for intermittently feeding parts from the magazine of the invention onto the periphery of the applicator rotor of the machine. Specifically, one species of the parts feed mechanism includes a reciprocating cam device whereas another species of the parts feed mechanism includes a pair of slotted parallel rotory shafts adapted to engage opposite edges of clips, such as the packaging clips disclosed in the aforementioned patent. Likewise the various species of the clip feed mechanism may be adapted for use in engaging and feeding various articles such as container covers or caps or labeling devices onto the periphery of the applicator rotor of the invention for rolling and compressive application to containers carried between the belts of the invention which operate in a linear manner in unison with the rotation of the applicator rotor of the invention.

The invention also includes novel drive mechanism for the conveyance of packaging clips or other parts in the magazine of the invention. Specifically, the magazine is provided with resiliently mounted helical screws on each opposite side thereof. The peripheries of the screws are extended into the opposite sides of the magazine to engage opposite edges of packaging clips or the like and the screws are spring loaded so that when stacks of clips are contiguous with each other and the magazine is full all the way to the part feed mechanism, adjacent the applicator rotor, that the resilient mounting of the screws permits them to flex outwardly away from the edges of the parts or packaging clips in the magazine and to thereby constantly maintain a contiguous stack of parts or packaging clips in the magazine while the screws continue to rotate.

The invention may also be used for capping or placing covers on various open containers and this capping or covering function may be very similar to the placement of packaging clips in connection with groups of beer cans or other similar contents as described in the aforementioned patents.

Accordingly it is an object of the invention to provide a machine particularly adapted for high speed, high volume packaging, labeling or capping of various containers, packages or other articles.

Another object of the invention is to provide a very novel combination of a resilient pocketed belt and precision guide means for coordinating resilient pockets of the belt relative to a station area at which the periphery of an applicator rotor rotates in unison with linear movement of the belt so that a plurality of articles or containers may be disposed at the station area in a moving condition while the rotor rotates and rolls a packaging clip onto the rims of containers such as beer cans or the like at very high speeds.

Another object of the invention is to provide a novel rotary adjustable coupling which allows relative movement of the belts of the invention so that a pair of said belts with their pockets in opposed relationship to each other may be aligned by moving one belt relative to the other until the pockets are precisely aligned in opposed relation to each other whereupon the coupling may be fixed and thereby accommodate the precise alignment of a pair of the belts of the invention for precisely holding opposite sides of articles in alignment with each other and thereby maintain a precision alignment of a plurality of containers so as to permit precision application of packaging clips or the like to a plurality of containers as the applicator rotor carries such packaging clips on the periphery thereof into a station area in which the belts move a plurality of containers to allow the periphery of the applicator rotor to rotatably press the packaging clips on to several of the containers at

once for attaining a unitary packaged relationship of said plurality of containers.

Another object of the invention is to provide a novel cam operated switch means driven by the applicator rotor of the invention precisely to initiate the timed operation of a part feed mechanism which feeds parts such as packaging clips from the magazine of the invention onto the periphery of the applicator rotor as it rotates relative to the magazine.

Another object of the invention is to provide a novel switch operating cam mechanism wherein a plurality of concentric rows of cams allow the switch operating mechanism to be adjusted so that a switch is operated in timed relationship with the periphery of the applicator rotor to energize the parts feed mechanism optionally to feed packaging clips onto the periphery of the rotor so as to attain either four-pack, six-pack of eight-pack assemblies of containers carried between the belts of the machine as they pass relative to the periphery of the applicator rotor.

Another object of the invention is to provide a variety of novel intermittently operated mechanisms for feeding parts from the magazine of the invention onto the periphery of the applicator rotor, the various mechanisms including reciprocating cam mechanisms as well as rotary notched shaft mechanisms having a pair of notched shafts adapted to engage opposite ends of packaging clips and rotatable from the magazine toward the applicator rotor so as to apply one clip at a time to the periphery of the applicator rotor as it moves relative to the magazine of the invention.

Another object of the invention is to provide novel resiliently mounted screw means having peripheral portions projecting into opposite sides of the magazine for resiliently packing stacks of packaging clips or other articles in the magazine contiguous with the part feed mechanism at the end thereof so that when the magazine is full of contiguous parts such as packaging clips the resilient mounting of the screws will allow them to move laterally relative to the edges of the packaging clips and to slip relative thereto and continue to rotate so that there will be constant feeding of parts in the magazine at all times as required.

Another object of the invention is to provide a machine which is particular'y adapted for use in packaging a plurality of containers in accordance with the use of packaging clips such as disclosed in U.S. Pat. No. 3,357,551 and U.S. Pat. No. 3,370,700 hereinbefore referred to.

Further objects and advantages of the invention may be apparent from the following specification, appended claims, and accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary side elevational view of an article handling and packaging machine in accordance with the present invention.

FIG. 2 is a side elevational view of an applicator rotor mechanism shown on enlarged scale relative to that shown in FIG. 1 of the drawings;

FIG. 3 is an elevational view of the applicator rotor shown in FIG. 2 and taken from line 3—3 of FIG. 2;

FIG. 4 is an enlarged fragmentary plan sectional view taken from the line 4—4 of FIG. 1;

FIG. 5 is a fragmentary sectional view taken from the line 5—5 of FIG. 4;

FIG. 6 is a fragmentary view of a belt mechanism of the invention shown in FIGS. 4 and 5 of the drawings and showing a portion of the belt on enlarged scale.

FIG. 7 is an enlarged fragmentary sectional view taken from the line 7—7 of FIG. 4;

FIG. 8 is an enlarged fragmentary elevational view taken from the line 8—8 of FIG. 3;

FIG. 9 is an enlarged fragmentary sectional view taken from the line 9—9 of FIG. 8;

FIG. 10 is an enlarged fragmentary sectional view taken from the line 10—10 of FIG. 2;

FIG. 11 is an enlarged fragmentary sectional view of one of the belts of the machine of the invention taken from the line 11—11 of FIG. 4;

FIG. 12 is a fragmentary side elevational view of an applicator rotor and belt mechanism which constitutes a modification of the invention;

FIG. 13 is an enlarged fragmentary elevational view taken from line 13—13 of FIG. 1 showing belt drive mechanism of the invention and a rotary adjustable clutch adapted to allow linear adjustment of one of the belts of the invention relative to the other;

FIG. 14 is an enlarged fragmentary sectional view taken from line 14—14 of FIG. 13 and showing parts and portions in elevation to facilitate the illustration;

FIG. 15 is a fragmentary plan sectional view taken from line 15—15 of FIG. 14;

FIG. 16 is an enlarged fragmentary side elevational view taken from line 16—16 of FIG. 3; showing an applicator rotor of the invention and showing switch operating cam means in connection therewith;

FIG. 17 is an enlarged fragmentary sectional view taken from line 17—17 of FIG. 16;

FIG. 18 is an enlarged fragmentary sectional view taken from line 18—18 of FIG. 16;

FIG. 19 is an enlarged fragmentary side elevational view of one magazine and part feed mechanism of the invention;

FIG. 20 is an enlarged fragmentary cross-sectional view of the magazine of the invention aken from line 20—20 of FIG. 19;

FIG. 21 is an enlarged fragmentary sectional view taken from line 21—21 of FIG. 20;

FIG. 22 is an enlarged fragmentary side elevational view of a peripheral portion of the applicator rotor of the machine of the invention shown in relation to the part feed magazine and part feed mechanism of the invention and showing by broken lines a packaging clip being fed onto the periphery of the applicator rotor of the machine of the invention;

FIG. 23 is a fragmentary plan sectional view taken from a line 23—23 of FIG. 22;

FIG. 24 is an enlarged fragmentary end elevational view of the magazine and part feed mechanism taken from a line 24—24 of FIG. 19;

FIG. 25 is an enlarged fragmentary end view of the part magazine of the invention taken from a line 25—25 of FIG. 19 and showing portions of the structure broken away to amplify the illustration;

FIG. 26 is a view similar to FIG. 24 but showing a modified part feed mechanism at the end of the magazine of the machine and showing portions of the part feed mechanism broken away and in section to amplify the illustration;

FIG. 27 is a side elevational view of the modified part feed mechanism taken from line 27—27 of FIG. 26;

FIG. 28 is a fragmentary plan sectional view taken from a line 28—28 of FIG. 27; and

FIG. 29 is a fragmentary plan sectional view taken from line 29—29 of FIG. 26.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

As shown in FIG. 1 of the drawings a frame 31 is provided with a base 32 and portions of this frame support the subject matter of the present invention or inventions disclosed herein.

An article moving and positioning belt mechanism 33 is disclosed best in FIGS. 1, 4, 5 and 6 of the drawings. This belt mechanism comprises a pair of superimposed belts 34 and 35 which are connected together by drive pins as will be hereafter described. These belts 34 and 35 are superimposed as shown in FIG. 1 but may be spaced horizontally when used in various positions or may be mounted on supporting rotors having their axes disposed at various angles to the horizontal or vertical as desired.

The belts 34 and 35 are similar in construction and are coupled together by drive pins 36 and several of these belts 34 and 35, forming belt mechanisms 33, may be utilized in a machine in accordance with the present invention, as for example a pair of the belt mechanisms 33 are shown in FIG. 4 of the drawings, and it will be apparent to those skilled in the art from the following description that one or more belt assemblies 33 may be used depending upon the manner in which various articles, packages or containers may be packaged, labeled or capped by a machine utilizing the belt mechanisms 33.

As an example, the belt 34 will be described in detail. This belt 34 as shown in FIG. 4 of the drawings, is an endless belt and adapted to be supported by a pair of gear belt supporting and driving rotors 37 and 38 which are shown operable on a vertical axis in FIGS. 1 and 4 of the drawings but which may be operated on an axis disposed at any angle to the vertical, if desired.

The rotors 37 and 38 are provided with conventional gear belt toothed peripheries 39 and 40 respectively which drivingly engage rotor engaging surfaces of the belt 34. The rotor engaging surface of the belt 34 is provided with gear belt teeth 41 conformingly engageable with the toothed peripheries 39 and 40 of the rotors 37 and 38. The belt 34, at a side opposite the rotor engaging surfaces 41, is provided with a plurality of adjacent article engaging pockets 42 and these pockets are adapted to engage articles such as beer cans or the like, indicated by broken lines 43 in FIG. 4 of the drawings, all as will be hereinafter described.

Specific construction of the belt 34 is shown in detail in FIGS. 6 and 11 of the drawings. As shown in FIGS. 6 and 11 the belt 34 is provided with a first layer having said rotor engaging surface 41 thereon. This first layer is designated 44 in FIG. 6 of the drawings. A second layer 46 of the belt 34 is provided with the pockets 42 therein. The first layer 44 is provided with a first surface 48 bonded to a second surface 50 of the second layer 46. As shown in FIG. 11 of the drawings the first layer 44 is provided with a plurality of tension resisting strands 52 therein. These strands 52 may be made of steel, nylon, or other suitable tension resisting material and this first layer 44 of the belt 34 is similar to conventional commercially available geared rotor engaging belts. The layer 44 is basically composed of a flexible material and preferably neoprene. The second layer of material 46 is generally of elastomeric character, preferably of abrasion resistant material such as polyurethane.

Each belt mechanism 33 comprises structure such as shown in FIGS. 1, 5 and 7 wherein the pins 36 extend through a pair of the belts 34 and 35. The pins 36 are provided with snap ring receiving grooves 66 and 68 engaged by snap rings 70 and 72 near opposite driving ends 74 and 76 respectively of the drive pins 36. Intermediate portions of the drive pins 36 are surrounded by sleeves 78 which are rotatably mounted on the pins 36 and adapted to engage belt guides as will be hereinafter described.

It will be seen that the belts 34 and 35 of the belt mechanism 24, shown in FIG. 7, are spaced apart in engagement with opposite ends of the sleeves 78. The sleeves 78 are adapted to rotatably engage stationary guides 80 as shown in FIG. 4 of the drawings and as will be hereinafter described in detail. It will be seen that the belt 34 is provided with openings 62 and similar openings are provided in the belt 28 such that these openings snugly engage the peripheries of the pins 36 so as to precisely form the assembly as shown in FIG. 7 of the drawings and precisely to effect uniform spacing of the pins 36 all as shown best in FIGS. 4 and 6 of the drawings.

As shown in FIG. 4 of the drawings a pair of the belt mechanisms 33 are disposed to operate in opposed relation to each other and with respect to two rows of beer cans or the like for the purpose of packaging cans in either four pack, six pack or eight pack assemblies or packages as desired.

It will be seen that the pockets 42, radially outward from the belt supporting rotors 37 and 38, are deflected out of normal shape and into open diverging disposition so as to be considerably broader and more open than when in normal shape which is arcuate and which reoccurs after each pocket 42 has passed over a respective rotor 37 or 38 and is disposed in a path therebetween.

As shown in FIG. 4 of the drawings the frame of the machine supports a pair of idler rotors 84 and these rotors 84 are each provided with superimposed rotor portions 86 and 88 as shown in FIG. 5 of the drawings and the rotor portions 86 and 88 engage the belts 34 and 35 of each belt mechanism 33.

The axes of the idler rotors 84 are offset laterally relative to the axes of the rotors 37 and 38 and offset laterally relative to a line passing through respective rotors 37 and 38 and in the machine arrangement as shown in FIG. 4 of the drawings the idler rotors 84 are offset in a direction toward opposing belt mechanisms 33 so as to provide for converging sections of each belt mechanism 33 in a direction toward the opposing belt mechanism 33 and toward an elongated guide means 90 disposed midway between the two belt mechanisms 33 as shown in FIG. 4 of the drawings.

The elongated guide means 90 is generally in the form of a very thin wall structure and is disposed in upstanding relation from a receiving platform 92 which receives cans or other articles or containers from a conveyor 94 which is not disclosed in detail in this application but which may be the subject matter of another application.

As indicated by the broken lines 43, cans are moved in a direction of an arrow A by the conveyor 94 onto the platform 92 and the areas between the rotors 37

and 84 maintain portions of belt mechanisms 33 in a generally converging relationship to the guide means 90 in a direction of arrow A such that the cans or containers as shown by broken lines 43 are moved toward the guide means 90 as the cans progress on the platform 92 in a direction of arrow A toward a station area designated generally 96 in FIG. 4 of the drawings. It will be understood that the guide means 80 hereinbefore described are provided with inclined ramp portions 98 which are inclined inwardly toward the guide means 90 and that the guide means 90 is a very thin sheet metal structure adapted to separate the cans very slightly at their tangentially adjacent portions.

The inwardly converging portions of the opposed guides 80 force the belt mechanisms 33 inwardly toward the upstanding guide means 90 by engagement of the inclined portions 98 with the sleeves 78 on the pins 64 which extend through both belt portions 34 and 35 of each belt mechanism 33. Thus the belt mechanisms 33 as they proceed in a linear manner toward the station area 96 are forced inwardly and precisely in spaced relation to the upstanding guide means 90 which forms a partition of very thin dimensions between the two rows of cans as indicated by broken lines 43 in FIG. 4 of the drawings.

The material of the belt 34 as well as the belt 35, at the pocket portions 42, is soft and resilient and precisely conforms at each pocket portion 42 with the shape of the respective containers or articles which, as shown by broken lines 43 in FIG. 4 happen to be beverage cans having arcuate surfaces. Inasmuch as FIG. 4 is a plan view it generally discloses the cans in upright position and the view is directed toward the tops of the cans so that their cross-section appears circular and the arcuate pockets 42 conform precisely with these cans since these pockets are resilient and of relatively soft material capable of handling thin wall cans by intimate contact therewith and without damage to the cans such as to deform them in any way.

Accordingly, the belt mechanisms 33 move the beverage containers or cans into the station area 96 between a pair of applicator rotors 100 and 102. These rotors 100 and 102 are shown best in FIGS. 1, 2, 3 and 5 of the drawings. The rotors 100 and 102 are mounted respectively on axles 104 and 106 carried by frame members 108 and 110 which are vertically adjustably mounted on vertical members 112 and 114 of the frame 31. Thus respective peripheral portions 116 and 118 of the applicator rotors 100 and 102 are adjustable relative to respective upper and lower ends of cans as they reach the station area 96 as hereinbefore described, so that packaging clips, labels or indicia may be placed on the cans as desired.

The mechanism of the invention as shown, however, is devoted to the specific operation of connecting pluralities of the cans together by means of packaging clips as disclosed in the hereinbefore mentioned patents. Thus the peripheries of the applicator rotors and specifically the peripheries 116 and 118 are adjusted so that they are in close proximity to areas of the upper and lower ends of the cans at the station area 96.

As shown in FIG. 4 of the drawings the platform 92, serving as a portion of the guide means of the invention, is provided with an opening 93 therein through which peripheral portions of one of the applicator rotors 148 extends. The lowermost applicator rotor in connection with the rotor 102 may feed packaging clips onto the lower rim portions of cans or containers and the periphery of this lowermost rotor 102 is loaded with packaging clips in the same manner as hereinbefore described; it being noted that there are two magazines and two clip feeder assemblies 154 as shown in FIG. 1 of the drawings and each of these assemblies 154 includes structures such as shown in FIG. 19 of the drawings wherein a magazine 282 carries a part feed mechanism 266 or a modified parts feed mechanism such as shown in FIGS. 26 and 27 of the drawings. It will be noted that the applicator rotors 148 are identical and therefore both upper and lower rotors 100 and 102 each carry an applicator rotor 148, however, the switch operating mechanism as shown in FIG. 16 may be carried by only one of the rotors 100 or 102 and as disclosed herein the switch operating mechanism as shown in FIG. 16 is carried by the rotor assembly 100 as disclosed in FIG. 1 of the drawings.

Linear movement of the belt mechanisms 33 and rotary movement of the rotors 100 and 102 at the station area 96 is synchronized by means of pins 36 of the belt mechanisms 33 in engagement with cups 120 resiliently mounted generally at the peripheries 116 and 118 of the rotors 100 and 102.

This arrangement is shown best in assembly in FIG. 5 of the drawings wherein the cups 120 are shown projecting from the periphery 118 of the applicator roller 102 and the drive ends 74 and 76 of a pin 36 are engaged in respective cups 120 carried by the applicator rotors 100 and 102.

The drive cups or drive means 120 are shown best in FIGS. 2, 3 and 10 of the drawings. The rotor 102 is shown in FIGS. 2, 3 and 10 of the drawings and the construction of the rotor 100 is similar and therefore the features of the rotor 102 will suffice for the purpose of disclosing both applicator rotors 100 and 102.

Each drive cup 120 as shown in FIG. 10 of the drawings is provided with a generally conical cup portion 122 adapted to conformingly engage with a drive end 74 or 76 of one of the drive pins 36 as shown in FIG. 7 of the drawings and each cup 122 is radially reciprocally mounted in an opening 124 in a rim portion 126 of the rotor 102 and each cup 120 is provided with a flange 128 engaging an inner side of a rim portion 130 of the rotor 102. A coil spring 132 at one end is fitted in a socket 134 inwardly of the respective cup 120 and an opposite end 136 of the coil spring 132 is disposed over a radially disposed projection 138 of a disc portion 140 of the rotor 102. Thus each cup 120 is spring loaded radially outward and adapted conformingly and precisely to engage a respective end 74 or 76 of a drive pin 36 as respective drive pin reaches the station area 96 directly between peripheral portions 116 and 118 of the applicator rotors 100 and 102. The spring loaded moving of the cups 120 not only provides for honest and precise engagement with the ends 74 and 76 of the drive pin 36, but also permits camming release of the cups 120 relative to the ends 74 and 76 of the drive pin 36 in the event that a deformed container is carried through the station area 96 by the belt mechanisms 33 and thus the spring loaded mounting of the cups 120 allows camming release thereof relative to the drive pin 36 so that neither the applicator rotors or the belt mechanisms 33 may be damaged in the event that either of the rotors or the belt mechanisms may become restrained or unduly loaded by a damaged article or container which enters the station area 96 or which be-

comes indisposed with respect to its normal passage through the machine of the invention.

As shown in FIG. 3 of the drawings it will be seen that the spring loaded cups **120** are carried into rows on two separate rim portions **142** and **144** of the respective applicator rotor **102.** The row of cups **120** on the rim portion **142** may drivingly engage the belt mechanism **33** at one side of the guide means **90** as shown in FIG. **4** while the spring loaded cups **120** on the rim **144** may engage drive pins carried by the opposite belt mechanism **33,** shown in FIG. **4** of the drawings.

Each applicator rotor **100** or **102** is provided with an applicator rim and the applicator rotor **102** is provided with such an applicator rim **148** and this rim is shown between the rims **142** and **144** in FIG. 3 of the drawings. Carried by the applicator rim **148** are outwardly directed projections **150** such as shown in FIGS. **8** and **9** of the drawings. These projections **150** are spaced apart properly to be engaged in finger receiving holes of packaging clips such as shown in the aforementioned patents. Each applicator projection **150** is secured to the rim **148** by a screw **152** which is screw threaded into the rim **148** and each clip holding projection bears upon a supporting washer **154,** also held in place by the screw **152** which is screw threaded into the respective rim **148.**

Magazine and part feed mechanism **154** of the machine shown in FIG. **1** of the drawings is movable into close proximity with peripheral portions **116** and **118** of the applicator rotors **100** and **102** respectively and these mechanisms **154** are adapted automatically to place packaging clips on the clip holding projections **150** as the rotors **100** and **102** rotate in directions as indicated by arrows in FIG. **1** of the drawings.

Accordingly, it will be appreciated that when openings of the packaging clips as shown in the aforementioned patents are frictionally engaged over the projections **150** and when the rotors **100** and **102** are rotated in close proximity to ends of the cans as the belt mechanisms **33** proceed in a linear direction as indicated by the arrow A in FIG. **4** of the drawings that the clips are rolled onto the tops of the cans and frictionally engaged with the beads thereof and such friction is sufficient to remove the clips from the projections **150** automatically as the cans then proceed outwardly from the station area **96** and onto an outgoing conveyor **158** in a direction as indicated by an arrow B in FIG. **4** of the drawings. During high speed rotation of the applicator rotors **100** and **102** the drive pins **36** and spring loaded cups **120** maintain smooth, uniform and accurate synchronous movement of the belt mechanisms **33** in a linear direction while the peripheries of the rotors **100** and **102** roll packaging clips onto the rims of pluralities of the cans so as to package pluralities of the cans either in four pack, six pack, or eight pack assemblies or packages as desired and depending upon the use of the respective packaging clips as disclosed in the aforementioned paents.

It will be obvious to those skilled in the art that the mechanisms **154** shown in FIG. **1** of the drawings may apply packaging clips, labels or other indicia which may be transferred to ends of cans, containers, packages or other articles both by the belt mechanisms **33** into the station area **96,** and accordingly the belt mechanism of the invention as well as the applicator rotors are not limited specifically to the application of packaging clips such as disclosed in the hereinbefore mentioned patents.

In the modification as shown in FIG. **12,** an applicator rotor **160** of modified construction may be substituted for either or both of the rotors **100** or **102.** The rotor **160** is provided with an annular row of drive projections **162** which are cooperable with drive sockets **163** in a modified belt **164.** The belt **164** may be substituted for one of the drive belt mechanisms **24.** The belt **164** is provided with said drive sockets **163** such that said sockets **163** assume positions similar to those of the drive pins **36** hereinbefore described. It will be understood that the belt mechanism **164** is otherwise similar to the belt mechanisms **24** hereinbefore described. The drive sockets **163** are in the form of recesses in resilient material of the belt **164** so as to provide a precise yet yieldable driving relationship between the applicator **160** and the belt **164.**

As shown in FIG. **13** of the drawings a pair of shafts **166** and **168** extend downwardly from the ends of said shafts **166** and **168** shown in FIG. **4** of the drawings. These shafts **166** and **168** carrying the gear belt rollers **32** which drive the belt assemblies **33.**

As shown in FIG. **13** of the drawings the shaft **166** is coupled to a shaft **170** projecting from a gear box **172** and the shaft **166** and **170** are connected by an adjustable rotary coupling **174.**

The shaft **168** is connected by a fixed coupling **176** to a shaft **178** projecting from a gear box **180.**

The gear box **180** is driven by means of a motor driven sprocket **182** which may be engaged by a chain (not shown) however this sprocket **182** is power driven and the gear box **180** is provided with a shaft **184** driven in unison with the sprocket **182.** A coupling **186** connects a shaft **188** with the shaft **184** so that the shafts **184** and **188** operate in unison with the operation of the sprockets **182.** The gears boxes **172** and **180** are right angle drives and drive the shafts **170** and **178** in unison.

The rotary adjustable coupling **174** is shown in the detail in FIGS. **14** and **15** and is adapted to provide for rotational adjustments of the shaft **166** relative to the shaft **170** and relative to the shafts **178** and **168** so as to provide for relative movement of one of the belt assemblies **33** so as to provide for relative adjustment of the belt assemblies **33** in order that their pocket portions **42** directly face each other and are thus aligned to support the containers substantially as indicated by broken lines **43.**

The rotary adjustable coupling **174** is provided with a hub portion **190** to the shaft **170** and is provided with another hub portion **192** fixed to the shaft **166.** The hub **190** is provided with an enlarged annular body portion **194** having an annular T slot **196** therein. This T slot is disposed to support flange nuts **198** therein and these flange nuts are provided with internally screw threaded openings **200** in which screws **202** are screw threadably engaged. These screws **202** are provided with heads **204** engaging washers **206** which are abutted to a surface **208** of an enlarged body portion **208** integral with the sleeve **192.** The screws **202** extend through openings **210** in the body portion **208** and when the screws **202,** are tightened by means of their head portions **204,** they advance in the flange nuts **198** and tighten them in the T slots **196** so as to force the body portions **194** and **208** together to abut at a mating

faced area 211 forming a separation between the body portions 194 and 208.

Carried by the body portion 194 is a ring gear 212 secured in the body portion 198 by pins 214. This ring gear is provided with internal gear teeth 216 engaged by external teeth 218 of an adjusting pinion 220 which is coupled to a shaft 222 having a projecting nut 224 extending above the upper surface of the body 208. Thus the spur gear 220 may be rotated relative to the ring gear 212 such that the shaft 222 of the gear 220, fitted in a bore 226 of a body 208, may cause rotative movement of the body 208 relative to the body 194 when the screws 202 are loosened relative to the flange nuts 198. Thus application of a wrench to the nut 224 in connection with the spur gear 220 may provide for finite rotary adjustment of the sleeve 192 relative to the sleeve 190 and consequently provide for slight rotary adjustment between the shaft 166 and shaft 170. In this manner relative adjustment of the belt assembly 33, driven by the shaft 166, is accomplished relative to the belt assembly 33 driven by the shaft 168. Thus the pockets of one of the belt assemblies 33 may be directly aligned in opposition to the pockets 42 of the opposing belt assembly 33 shown in FIG. 4 of the drawings.

It will be understood that when proper rotary adjustment of the shaft 166 is accomplished relative to the shaft 170 that the screws 202 are tightened by applying a wrench to the heads 204 thereof for tightening the flange nuts 198 in the T slot 196.

It will be understood that the T slot 196 is annular and that the flange nuts 198 are slidable in the T slot 196 when the screws 202 are loosened relative to the flange nuts 198.

As shown in FIG. 14 of the drawings it will be seen that both of the body portions 194 and 208 at their parting surface area 211 are disposed at an intermediate area of the ring gear 212 so that the ring gear 212 at its periphery concentrically aligns the body portions 194 and 208.

The power driven sprocket 182 driving the gear boxes 172 and 180 causes the shafts 166 and 168 to be driven synchronously and the rotatably adjustable coupling 174 allows relative adjustment of the shafts 166 and 168 so as to provide for directly opposite alignment of the pockets 42 of the opposed belt assemblies 33 which are carried by the gear belt rotors 38 mounted on and driven by the shafts 166 and 168.

As shown in FIGS. 16, 17 and 18 a timing cam and switch mechanism is provided for controlling the positioning of packaging clips on the projections 150 of the applicator rotor 148 shown in FIG. 3 of the drawings. FIG. 16 is an enlarged fragmentary side elevational view of the rotor 144 which is provided with a disc 228 carrying a pair of semi circular cam plates 230 and 232. These semi circular cam plates 230 and 232 provide for a cam assembly extending throughout a 360° area on the side of the rotor disc 228. As shown in FIGS. 16 and 17 the semi circular cam plate 230 is provided with an elongated arcuate slot 232 through which a bolt 234 extends and this bolt 34 as shown in FIG. 17 extends through the disc 228 and is provided with a clamp nut 236 which clamps the cam plate 230 in a fixed position on the outer side of the rotor disc 228. The arcuate slot 232 is typical structure for adjustably supporting the semi circular cam plate 230 as well as the semi circular cam plate 231 thus allowing rotational adjustment of these cam plates to coordinate cycle operation of means for placing packaging clips on the projections 150 of the rotor 148 shown best in FIG. 3 of the drawings.

The cam plates 230 and 231 are provided with a row of cam projections 238 which are disposed in a generally circular row and angularly spaced apart to correspond with the cycle disposition of certain ones of the clip receiving projections 150 as will be hereinafter described. These cam portions 238 are disposed to program operation of a clip feeding mechanism for packaging six-packs of canned beer or other beverages by use of packaging clips as disclosed in the hereinbefore mentioned patent.

Likewise projecting cams 240 are disposed in an arcuate row on the side of the cam plates 230 and 231 and these cam portions 240 are disposed at a longer radius than the cam portions 238 and the cam portions 240 are arranged to program the machine of the invention for packaging four-pack packages of canned beer or the like. Disposed outwardly and radially beyond the cam portions 240 are cam portions 242 which are disposed to rogram operation of the machine of the invention for packaging eight-pack packages of canned beer or the like or as will hereinafter be described.

A switch supporting bar 244 is stationarily mounted on the frame 22 of the invention adjacent the rotor 144 and this bar is disposed to support a switch box 246 having a spring loaded contact arm 248 and having a contact roller 250 adapted to engage either the cams 238, 40 or 242 depending upon the position of the switch box 246 as it is slideably moved on the rod 244 and fixed thereon in variously adjusted positions.

It will be seen that the rod 244 is so aligned that it will allow the roller 252 to move precisely in a radical direction from the center 252 of the rotor disc 228.

The cam portions 242, as shown in FIG. 18 of the drawings, extend outwardly from a plane 254 of the cam plates 230 and 231 and ends of the adjacent cam portions 242 are provided with angularly inclined portions 243 extending from the plane 254 all as shown best in FIG. 18.

Opposite ends of the cam portions 238 and 240 are likewise provided with inclined portions similar to the inclined portions 243.

The switch box 246 contains a switch operable by the arm 248 and the roller 250. When the roller 250 rises on one of the cams 238, 240 or 242 the switch in the box 246 conducts electrical energy to a solenoid valve 256 and to a similar solenoid valve 258 which actuates the clip feed mechanisms which place packaging clips on respective applicator rotors disposed above and below the container guide platform 92.

The solenoid valves 256 and 258 of the respective magazine and part feed mechanisms 154 are similar and therefore the solenoid valve 256 in connection with its respective actuating mechanism will be hereinafter described in detail. This solenoid valve 256 is disposed in FIG. 19 and is related to clip feed mechanism 266 also shown in FIGS. 22, 23 and 24 as will be hereinafter described in detail.

As shown in FIGS. 1, 19 and 24 a fluid actuated cylinder 260 is coupled to the solenoid valve 256 and this cylinder 260 is a double acting cylinder having a plunger 262 shown best in FIG. 24 of the drawings. The plunger 262 is coupled to a crossbar 264 of a reciprocating clip feed mechanism 266 and the plunger 262 is therefore adapted to reciprocate the clip feed assembly

266 upward and downward in accordance with energization of the solenoid valve 256 and the fluid actuated cylinder 260.

The clip feed assembly 266 as shown in FIG. 23 comprises a pair of guide bars 268 and 270 which are coupled to a ross member 272 at their upper ends as shown in FIG. 24 of the drawings.

These guide bars 268 and 270, as shown in FIG. 23 of the drawings, are provided with opposed substantially vertical slots 274 and 276 wherein respective cam bars 279 and 280 are vertically reciprocally mounted and operated in connection with the cross bar 264.

These cam bars 278 and 280 are adapted to feed packaging clips from a packaging magazine 282 and into a position to be placed on the projections 150 of the applicator rotor 148. The clip magazine 282 is an enlarged generally horizontal magazine but may be disposed otherwise as desired.

This magazine 282 is provided with clip guides 284 and 286 shown best in FIG. 24 of the drawings and these clip guides 284 and 286 correspond with external edge shapes and features of packaging clips such as shown in U.S. Pat. No. 3,370,700. Thus the clips shown in said patent are fed between the guides 284 and 286 such that the planes of said clips are disposed vertically and they are fed contiguously in a stacked relationship as indicated by broken lines 288 in FIG. 21 of the drawings.

With reference to said U.S. Pat. No. 3,370,700 opposite edged portions 41 of the clips disclosed in said patent are engageable by peripheral helical portions 290 of four feed crews 292 which are rotatably mounted on opposite sides 294 and 295 of the magazine 282. These screws 292 are each provided with a shaft 294 which is journalled in spring loaded bearings so that each screw 292 may move outwardly away from and slip over the edges 41 of clips or parts, when the stack of clips in the magazine is full and stacked against the cam bars 278 and 280 as will be hereinafter described in detail.

Each shaft 294 as shown in FIG. 2 of the drawings is engaged by a spring loaded bearing plate 296 engaged by a compression spring 298 held on a respective screw 300. Thus each bearing plate 296 is adapted to be sprung away from the sides 294 or 295 of the magazine 282.

The clip feed screws 292 are carried on the shafts 294 and the shafts 294 journalled in bearing plates 296 which are slideably mounted on screws 300 around which compression spring 298 are supported. The springs 298 bear on the plates 296 to force the bearing plates 296 and the shafts 294 inward towards the inner opposite sides of the magazine 282 in order that the peripheral portions 290 of the clip feed screws 292 may frictionally and helically engage opposite edges 41 of the clips such as shown in U.S. Pat. No. 3,370,700. The plates 296 are each provided with two of the screws 300 projecting over opposite sides of the axes of each of the shafts 294 as shown best in FIGS. 19 and 20. It will be seen that the bearing plates 296 and their respective spring holding screws 300 are disposed on the sides 294 and 295 of the magazine assembly 282 and that there are several of these bearing plates 296 so as to properly and resiliently support the clip feed screws 292 along the entire length of the magazine 282 in order to maintain the magazine full of packaging clips in contiguous stacked relation as indicated by broken lines 288 in FIG. 21 of the drawings.

The peripheral portions of the feed screws 292 are of rubber like material and are helically disposed so as to advance the clips in the magazine 282 in a direction as indicated by an arrow 304 in FIG. 19 of the drawings and thus the clips are fed in a contiguous stack relative to each other to a position adjacent to the cam bars 278 and 280 and in adjacent relationship to the periphery of the applicator rotor 148 as shown best in FIG. 23 of the drawings.

The shafts 294 and the feed screws 292 are rotated in directions as indicated by arrows F in FIG. 20 so that peripheries of the screws 292 move upwardly and thereby tend to lift the parts on clips in the magazine while concurrently moving the clips or parts longitudinally of the screws 292.

As shown best in FIGS. 19 and 25 the magazine assembly 282 is provided with a receiving end 306 having an opening 340 therein. Adjacent to this receiving end 306 the magazine 282 carries a motor 308 having a reduction gear box 310. Extending from this reduction gear box 310 is an output shaft 314 carrying a spur gear 312 which meshes with another spur gear 316 drivingly meshed with a larger spur gear 318. In mesh with the larger spur gear 318 are gears 320, 322, 324, 326, 328, 330, 332 and 334 forming a gear train. The spur gears 326 and 334 in the train perate universal joints 336 and 338 respectively as shown in FIG. 19 of the drawings which operate a respective pair of the clip feed screws 292. Meshing with the large spare gear 318 is another gear train similar to the gear train formed by the gears 320 to 334 inclusive and this gear train is maintained on the opposite side of the magazine 282 for driving a pair of the clip feed screws 292 at said opposite side of the magazine 282. Thus all four of the clip feed screws 292 as shown in FIG. 20 of the drawings are operated rotationally by means of the motor 308 and the gear train mechanism disclosed in FIG. 25 of the drawings.

Stacks of clips such as the clips shown in U.S. Pat. No. 3,370,700 may be placed on rods such that the rods extend through the openings 20 of the clips and these stacks may be inserted either automatically or manually through the opening 340 of the magazine 282 and between the respective clip guides 284 and 286. Thus the magazine is loaded through the opening 340 so that the peripheral helical portions 302 of the resilient clip feed screws 292 may advance the clips in continuous stacked relationship in the magazine 282 and in a direction as indicated by arrow 304 in FIG. 19 of the drawings.

The magazine assembly 282 is supported at one end by means of a slide bearing 342 as shown in FIG. 19 of the drawings. This slide bering 342 is slideable longitudinally on a cantilever mounted stub shaft 344 which is provided with a cantilever base 346 which is fixed to a horizontal member 348 of the frame of the machine as shown best in FIG. 1 of the drawings.

The magazine assembly 282 is slideably movable on the stub shaft 344 in a direction toward and away from the applicator rotor 148 by means of a fluid actuated cylinder 350 which is fixed to the magazine assembly 282. This cylinder 350 is provided with an extendable and retractable plunger 352 which is fixed to a cross member 354 of the machine frame and the cross member 354 is secured to upright structures 356 of said frame all as shown best in FIG. 19 of the drawings.

Thus the clip feed assembly **266** may be moved into proper adjacent spaced relation with the periphery of the applicator rotor **148** so that the projections **150** may be moved into engagement with clips as they are actuated from the magazine assembly **282** by means of the cam bars **278** and **280** which as hereinbefore described are separately and vertically operable by means of the fluid actuated cylinder **260** and its respective plunger **262** shown in FIG. **24** of the drawings.

The cam bars **278** and **280** are opposed to each other as shown best in FIGS. **22, 23** and **24** and these cam bars **278** and **280** are similar in construction. Accordingly the cam bar **278** will e hereinafter described in detail.

This cam bar **278** as shown in FIG. **22** of the drawings is provided with a pair of spaced apart open channel portions **360** and **362** adapted to receive opposite edged portions **41** of the clips as shown in the hereinbefore described patent. When the opposite edged portions **41** of the packaging clips are disposed in the openings **360** and **362** of the cam bars **278** and **280** the clips are retained by means of retainer plate portions **366** and **368** beyond said openings **360** and **362** until cam bars **278** and **280** are reciprocated vertically as indicated by an arrow **364** and this vertical reciprocation is occasioned by retraction of the plunger **262** of the cylinder **260** in response to energization of the solenoid valve **256** by means of the hereinbefore described switch actuated by the roller **250** in engagement with one of the cam portions on the cam plate structures **230** and **231** as shown in FIG. **16.**

Below the respective openings **360** and **362** the cam bars **278** and **280** are provided with inclined cam portions **370** and **372** which decline toward the applicator roller **148** and toward the retainer portions **366** and **368** respectively

As the cam bars **278** and **280** are moved upwardly the inclined cam portions **370** and **372** corresponding with the respective retainer portions **366** and **368** move upwardly and force a clip as indicated by broken lines **374** into a position adjacent to retaining rails **376** and **378** as shown best in FIGS. **22** and **23** of the drawings. These rails **376** and **378** are portions of the guide bars **268** and **270** and are disposed adjacent to the periphery of the applicator rotor **148** so as to hold the respective clips **374** in position to be engaged with and placed on the projections **150** of the applicator rotor **148.**

It will be appreciated that each time the cam bars **278** and **280** are moved upward a clip as indicated by broken lines **374,** is moved outward on the cam surfaces **370** and **372** while the retainer portions **366** and **368** are retracted vertically allowing opposed portions **41** of the clips to be moved from a position behind the retainers **366** and **368** outward to the broken line position **374** against the rails **376** and **378** respectively as shown in FIGS. **22** and **23** of the drawings.

When the clip as indicated by broken lines **374** is in the position as shown in FIG. **22** the intermediate portion designated **17** in the aforementioned patent is disposed in position to be slightly and compressively engaged by one of the projections **150** on the applicator rotor **148** so hat as the applicator rotor **148** moves further in the direction of an arrow **380** the respective projection **150** passes into one of the openings **20** of the clip which opening **20** is designated **382** in FIG. **22** of the drawings. Thus one of the projections **150** pulls a respective clip **374** downward in the direction of an arrow **384,** as shown in FIG. **22** of the drawings, and slides the clip **374** from a position behind the rails **376** and **378** into a position as indicated by broken lines **386** adjacent to the periphery of the resilient roller **388** which finally forces the openings of the clip firmly onto the projections **150** so that the clip may be rotated into a position to be rolled onto the rims of the cans as indicated by broken lines **43** in FIG. **4** of the drawings.

It will be understood that the magazine assembly **282** may be loaded with packaging clips, such as shown in FIG. **1** of the aforementioned patent, or packaging clips constituting only half of such clip structure may be disposed in the magazine so as to apply these clips to the cans of beer or other beverages in accordance with the switch operating cams as shown in FIG. **16** of the drawings to accomplish package assemblies containing either four, six or eight containers as is desired.

In relation to the cams **240** shown in FIG. **16** of the drawings the clips will be in the form of clips shown in FIG. **2** of U.S. Pat. No. 3,357,551 and with relation to the cams **242** the same clips will be used. Thus, in order to accomplish four-pack assemblies nly one of the last mentioned clips may be used while for eight-pack assemblies three of the last mentioned clips may be used and for the six-pack assemblies in response to operation of the cams **238** the packaging clip in its form as shown in FIG. **1** of U.S. Pat. No. 3,370,700 is used. Accordingly the four and eight-pack packaging clips may be carried in a lower portion of the magazine **282** and may be engaged in substantially the same manner by the projections **150** as shown in FIGS. **22** and **23** of the drawings.

It will be appreciated by those skilled in the art that the intermediate portion of the packaging clip, indicated by broken lines **374** in FIG. **22,** may be slightly defected by the projection **150** between the areas of the retaining portions **366** and **368** of cam bars **278** and **280** as shown in FIG. **23.** It will be appreciated that as the central portion **17** of the clip **374** is deflected it allows sufficient radial movement of the respective projection **150** so as to permit it to snap into one of the openings **382** a sufficient distance to slide the respective clip longitudinally of the rails **376** and **378** and downward over the periphery of the roller **388** to firmly press the respective clip onto the respective projection **150** or a pair thereof depending upon which configuration of the packaging clip is being used.

It will be appreciated that the projections **150** on the periphery of the applicator rotor **148** may e spaced and located as desired for either or all of the functions for producing four, six or eight-pack package assemblies of cans of beer or other similar containers of beverages.

As shown in FIGS. **26, 27, 28** and **29** the machine of the invention comprises a modified clip feed mechanism designated **390** and this clip feed mechanism **390** comprises rails **392** and **394** similar to the rails **376** and **378** respectively as shown in FIG. **23** of the drawings.

Adjacent to these rails **392** and **394,** as shown in FIG. **28** of the drawings, are rotatably mounted clip feed shafts **396** and **398,** the axes of these shafts being vertical and each shaft is provided with three notches **400** therein. These vertical notches **400** extend longitudinally in the side wall portions of the shafts **396** and **398** and these notches are disposed substantially 120° apart. During a cycle of operation the notches **400** engage opposite edge portions **41** of a packaging clip as disclosed in the aforementioned patents. The notches **400** retain

packaging clips in the magazine such that the foremost packing clip is located as indicated by broken lines **402** in FIG. **28** of the drawings and with one cycle of operation of shafts **396** and **398** the respective packaging clip is moved, in said notches **400**, from the broken line position **402** to the broken line position **404** as shown in FIG. **28**. Thus the packaging clip is moved to the broken line position **404** adjacent to the rails **392** and **394** in position to be engaged by projections **150** in a manner similar to that as hereinbefore described in connection with FIG. **22** of the drawings. As shown in FIG. **27** of the drawings the roller **388** is secured to a lower portion of the magazine assembly **282** and functions as described in connection with the description related to FIG. **22** of the drawings.

Mounted on top of the magazine assembly **282** is a gear box **406** shown best in FIGS. **26, 27** and **29** of the drawings.

As shown in FIG. **26** the shafts **396** and **398** are fixed to gears **408** and **410** which are drivingly meshed at **412** such that the gear **410** drives the gear **408** and consequently the rotational operation of the shafts **396** and **398** are synchronous and in unison.

Coupled to the gear **410** at its hub portion **412** is a worm wheel **414** meshing with a worm pinion **416** carried on a shaft **418**. The shaft **418** is shown in FIG. **29** of the drawings is coupled to an intermittently sprag driven member **420** operable by a sprag clutch assembly **422** which is constantly driven by means of a shaft **424** carrying a pulley **426** engaged by a belt **428** on a pulley **430** driven in connection with a shaft **432** of a motor **434** shown best in FIGS. **26, 27** and **29** of the drawings.

The sprag clutch mechanism **422** is provided with a sprag cage **436** having an intermittent holding projection **438** intermittently restrained by a plunger **440** which may be moved out of interference with the projection **438** by means of a solenoid **442** electrically coupled to the switch mechanism hereinbefore described in connection with FIG. **16** of the drawings, namely the switch **246**. Thus the solenoid **442** is operable intermittently in a similar manner to he operation of the solenoid valve **256** hereinbefore described.

The sprag cage **436** is coupled to the sprag driven member **420** by means of a tension spring **444** so that when the plunger **440** of the solenoid **442** is retracted the projection **438** may be free to rotate and the spring **444** moves the sprag cage **436** to engage the sprags between the sprag clutch member **422** and the sprag driven member **420** to rotate the gear **416** precisely 360° until the projection **438** again engages the plunger **440**. It will be understood that during the time that the gear **416** is rotated, a single rotation, that intermittent energization of the solenoid **442** will be completed and that the spring loaded **440** will again be projected back into interfering relation with the projection **438** on the sprag cage assembly **436** so that each energization of the solenoid **442** will allow the gear **416** to be driven exactly one revolution. The ratio between the gear **416** and the gear **414** is such as to cause precisely 120° rotation of the gears **408** and **410** to rotate the respective notch portions **400**, as shown in FIG. **28**, precisely 120° to move a clip from the broken line position **402** to the broken line position **404** as hereinbefore described.

Various packaging clips, container caps and/or labels may be handled and applied to articles in accordance with the operation of the machine of the invention.

It will be obvious to those skilled in the art that other intermittent mechanisms may be used to rotate the shafts **396** and **398** precisely 120° each time the switch mechanism **246** is engaged by one of the cams as described in connection with FIG. **16** of the drawings.

It will be obvious to those skilled in the art that various modifications of the present invention may be resorted to without departing from the spirit thereof.

I claim:

1. In an article positioning and packaging machine the combination of: a frame; a first pair of spaced apart rotors having peripheral portions; said rotors rotatably mounted on said frame; a first belt having a rotor engaging surface engaging said peripheral portions of said first rotors; said first belt having recessed article pocket portions open in a direction opposite to a direction faced by said rotor engaging surfaces of said belt; a second pair of spaced apart rotors having peripheral portions and being rotatably mounted on said frame; a second belt having second rotor engaging surfaces engaging said peripheral portions of said second pair of rotors; said second belt having second recessed article pocket portions open in a direction opposite to that faced by said second rotor engaging surfaces; said second pair of rotors and said second belt disposed so that said second article pocket portions thereof are opposed to and open toward said article pocket portions of said first belt; power operated means for synchronously driving one rotor of each of said first and second pairs of rotors; said power operated means having first and second synchronized shaft means coupled respectively to one rotor of each of said first and second pairs of rotors; one of said synchronized shaft means having a pair of axially aligned shafts; and a rotatably adjustable coupling interconnecting said pair of axially aligned shafts whereby said rotatably adjustable coupling allows relative rotation of said axially aligned shafts to adjust a linear position of one of said belts relative to a linear position of the other of said belts to attain a desired precise opposed alignment of said first and second article pockets of said first and second belts relative to each other.

2. The invention as defined in claim **1** wherein; an applicator rotor is provided with a peripheral area and is rotatably mounted on said frame on an axis at an angle to axes of said first and second pairs of said rotors; first and second driving means on said first and second belts; first and second driving means on said applicator rotor; said first and second driving means on said belts engageable with said first and second driving means on said applicator rotor to synchronize linear movement of said belts and rotary movement of said applicator rotor.

3. The invention as defined in claim **2** wherein; said applicator rotor is provided with radially projecting applicator means located generally at said peripheral area thereon and adapted to carry a clip; said machine having structures comprising a station area adapted to support a plurality of adjacent moving cans close to the periphery of said applicator rotor so as to cause said plurality of cans to be clipped together by said clip as said pockets of said first and second belts and said applicator means are synchronously moved through said station area such that said clip is compressibly rolled into

clipped relation with bead portions at the end of said cans, while said plurality of cans moves synchronously in said pockets of said belt and with the peripheral portion of said applicator rotor and said applicator emans thereon.

4. In an article handling and packaging machine the combination of: a frame; a pair of spaced apart rotors having peripheral portions; said rotors rotatably mounted on said frame; a belt having a rotor engaging surface engaging said peripheral portions of said rotors; said belt having recessed article pocket portions open in a direction opposied to a direction faced by said rotor engaging surfaces of aid belt; an applicator rotor having a peripheral area and rotatably mounted on said frame on an axis at an angle to the axes of said pair of rotors; driving means operably disposed to drive said belt and said applicator rotor and to synchronize linear movement of said belt and rotary movement of said applicator rotor, said peripheral area of said applicator rotor having applicator means comprising radially projecting holders extending generally in a radial direction from said peripheral area; a magazine for holding parts, said magazine adapted to hold a plurality of generally flat parts in a generally tangential disposition relative to said peripheral area; said magazine having an outlet adjacent said peripheral area of said applicator rotor; a power operated intermittent part feed mechanism disposed at said magazine outlet and adapted intermittently to feed parts from said magazine in a direction toward said peripheral area so as t dispose one of said parts for engagement with one of said hlders on said peripheral area; cycle control means; means for driving said cycle control means in synchronism with said applicator rotor; said cycle control means coupled to said power operated intermittent part feed mechanism for synchronously operating said power operated intermittent parts feed mechanism and said applicator rotor such that said parts are intermittently fed to a position for engagement with said part holders while said applicator rotor is rotating.

5. The invention as defined in claim **2** wherein; said periphery of said applicator rotor is provided with said applicator means comprising parts holders projecting generally in a radial direction from said peripheral area; a magazine for holding parts; said magazine adapted to hold a plurality of generally flat parts in generally tangential disposition relative to said peripheral area; said magazine having an outlet adjacent said peripheral area of said applicator rotor; power operated intermittent part feed mechanism disposed at said magazine outlet and adapted intermittently to feed parts from said magazine in a direction toward said peripheral area so as to cause engagement of said parts with one of said holders on said peripheral area; switch operating mechanism; means for driving said switch operating mechanism in synchronism with said applicator rotor; an electrical switch operable by said switch operating mechanism, said electrical switch coupled to said power operated intermittent parts feed mechanism for synchronously timing operation of said power operated intermittent parts feed mechanism and said applicator rotor such that said parts are intermittently fed to a position for engagement with said parts holders while said applicator rotor is rotating.

6. In an article handling and packaging machine a combination of: a frame; a pair of spaced apart rotors having peripheral portions; said rotors rotatably mounted on said frame; a belt having a rotor engaging surface engaging said peripheral portion of said rotors; said belt having recessed article pocket portions open in a direction opposite to a direction faced by said rotor engaging surfaces of said belt; and applicator rotor having a peripheral area and rotatably mounted on said frame on an axis at an angle to the axes of said pair of rotors; means for synchronously operating said belt and said applicator rotor to coordinate linear movement of said belt and rotary movement of said applicator rotor; said peripheral area of said applicator rotor having applicator means comprising part holders at said peripheral area; a magazine for holding parts; said magazine adapted to hold a plurality of generally flat parts in generally tangential disposition relative to said peripheral area; said magazine having an outlet adjacent said peripheral area of said applicator rotor; a power operated intermittent part feed mechanism disposed at said magazine outlet and adapted intermittently to feed parts from said magazine in a direction toward said peripheral area and to a position to cause engagement of said parts with one of said holders on said peripheral area; operating means; means for driving said cycle control means in synchronism with said applicator rotor; said cycle control means disposed to activate said intermittent part feed mechanism for synchronously timing operation of said power operated intermittent part feed mechanism and said applicator rotor such that said parts are intermittently fed to a position for engagement with said part holders on said peripheral area of said applicator rotor while said applicator rotor is rotating relative to said magazine.

7. The invention as defined in claim **6** wherein; said part feed mechanism comprises a reciprocating cam structure having cam portions adapted to engage opposite edges of parts in said magazine and to project said parts to the outlet end of said magazine and toward the peripheral area of said applicator rotor for engagement of said parts with said holders on the peripheral area of the applicator rotor.

8. The invention as defined in claim **7** wherein; guide channels are disposed adjacent said cam portions for supporting said parts in substantially tangential relation to said peripheral area of said applicator rotor so as to project said parts into close proximity to said peripheral area; said guide channels extending in a substantially tangential relation relative to said peripheral area of said applicator rotor; said parts being resilient clips having openings therein and said openings being engageable by said radially projecting holders so as to slideably move said clips in said guide channels; and a stationary roller adjacent to said guide channels spaced closely relative to the periphery of said applicator rotor to cause compressive rolling application of said clips onto said peripheral area about said projecting holders as the applicator rotor passes said last mentioned roller.

9. The invention as defined in claim **6** wherein; said parts feed mechanism comprises a pair of slotted shafts having slots in the sides thereof; said shafts spaced apart at opposite sides of said magazine and said slots adapted to receive opposite edges of parts in said magazine; means for synchronizing rotation of said slotted shafts; an intermittently operable rotary means for rotating said shafts so as to cause opposite edges of a part, engaged in said slots, to be moved from the interior of said magazine toward the outlet thereof and toward said peripheral ara of said applicator rotor; said inter-

mittently operable rotary means being coupled to said cycle control means and intermittently operable thereby.

10. The invention as defined in claim **9** wherein; guide channels are disposed adjacent to said shafts having slots therein; resilient clips in said magazine; said clips being provided with opposite edges engageable in said slots in said rotary shafts; channel guides at the outlet of said magazine adjacent to wwhich said resilient clips may be moved by said rotary shafts in said slots thereof; said resilient clips being provided with openings therein adapted to be engaged by said radially projecting holders to thereby cause said holders to slide said resilient clips from said guide channels in a direction substantially tangentially relative to said peripheral area of said applicator rotor; and a stationary roller closely spaced relative to said peripheral area and adapted securely to engage a clip coupled with one of said radially projecting holders and to cause said clip to be rolled securely onto said holder as the periphery of said applicator rotor passes directly opposite last mentioned roller.

11. The invention as defined in claim **8** wherein; said magazine is provided with a plurality of resilient screw structures at opposite sides thereof; said screws having peripheral portions projected to the interior of said magazine and engageable with opposite edges of parts in said magazine helically advancing said parts longitudinally in said magazine and into contiguous stacked relation to each other; said screws being radially deflectable away from said opposite edges of said parts when said parts are stacked contiguously in said magazine so that said peripheral portions of said screws may slide over respective edges of said parts and may continue to rotate after said magazine has been stacked to full capacity.

12. The invention as defined in claim **10** wherein; said magazine is provided with a plurality of resiliently mounted helical feed screws having peripheral portions projecting into opposite areas of said magazine and engageable with opposite edges of parts therein for helically advancing said parts into contiguous stacked relationship in said magazine; said resiliently mounted screws being adapted to deflect laterally relative to their axes and slip over opposite edges of said parts when said parts are in contiguous relation with each other and when said magazine is stacked full of said parts.

13. In an article handling and packaging machine a combination of: a frame; a pair of spaced apart rotors having peripheral portions; said rotors rotatably mounted on aid frame; a belt having rotor engaging surfaces engaging said peripheral portions of said rotors; said belts having recessed article pocket portions open in a direction opposite to a direction faced by said rotor engaging surfaces of said belt; an applicator rotor having a peripheral area and rotatably mounted on said frame on an axis at an angle to those of said pair of rotors; means for driving said belt and applicator rotor synchronously to synchronize linear movement of said belt and rotary movement of said applicator rotor; part holder means on said applicator rotor; a magazine having an outlet disposed adjacent said peripheral area of said applicator rotor; parts feed mechanism for transferring parts from said outlet toward said peripheral area of said applicator rotor; and a plurality of resiliently mounted free screws on said magazine and having peripheral portions projecting into said magazine and engageable with opposite edges of parts therein, said feed screws adapted to helically move said parts in said magazine into a contiguous stacked relationship therein adjacent said outlet; the resilient mounting of said feed screws adapted to permit peripheries of said screws to slip over opposite edges of said parts in said magazine while said feed screws rotate constantly and when said parts are in contiguous relationship with each other and when said magazine is stacked full of said parts.

14. The invention as defined in claim **13** wherein; intermittent means is adapted to feed parts from said outlet in said magazine toward said peripheral area of said applicator rotor; and timing means is operated in synchronism with said applicator rotor and adapted intermittently to energize said intermittent parts feed mechanism.

15. The invention as defined in claim **4** wherein; said parts feed mechanism comprises a pair of substantially parallel spaced apart shafts having slotted ortions disposed longitudinally in the side portions thereof; intermittent mechanism for concurrently rotating said last mentioned shafts in synchronism with each other such that said slotted portions engage opposite edges of parts in said magazine and move said parts from a stacked position therein towards said outlet of said magazine.

16. The invention as defined in claim **15** wherein; guide channels are disposed adjacent said outlet in said magazine, said guide channels adapted to receive said parts from said slotted portions of said shafts, said channels being disposed in substantially tangential relation to the peripheral area of said applicator rotor whereby said radially projecting holders may engage one of said parts in said guide channels and slide said part outwardly therefrom in a substantially tangential relationship relative to the periphery of the applicator rotor.

17. In an article handling and packaging machine a combination of an applicator rotor; said applicator rotor having a peripheral portion provided with part holders thereon; a magazine having an outlet disposed adjacent to said peripheral portion of said applicator rotor, said magazine adapted to hold parts therein adjacent to said outlet; means for moving parts in said magazine in adjacent relationship to each other and towards said outlet; part feed mechanism adapted to feed parts from said magazine toward said peripheral area of said rotor for engagement thereon; a compression roller is disposed adjacent said magazine and said peripheral area of said applicator rotor whereby parts projected from said magazine on said holders on the peripheral area of said applicator rotor are passed between the periphery of said applicator rotor and said compression roller so that the parts are firmly pressed on the holders on the peripheral area of said applicator rotor.

18. In an article handling and packaging machine a combination of an applicator rotor; said applicator rotor having a peripheral portion provided with part holders thereon; a magazine having an outlet disposed adjacent to said peripheral portion of sad applicator rotor, said magazine adapted to hold parts therein adjacent to said outlet; means for moving parts in said magazine in adjacent relationship to each other and towards said outlet; part feed mechanism adapted to

feed parts from said magazine toward said peripheral area of said rotor for engagement thereon; elec-trical switch means is operated in synchronism with said applica-tor rotor, said part feed mechanism being energized by said switch means.

19. In an article handling and packaging machine, the combination of: an applicator rotor; said applicator rotor having a peripheral portion provided with part holders thereon; a magazine having an outlet disposed adjacent to said peripheral portion of said applicator rotor, said magazine adapted to hold part therein adjacent to said outlets; means for moving parts in said magazine in adjacent relationship to each other and towards said outlet; part feed mechanism adapted to feed parts from said magazine toward said peripheral area of said rotor for engagement thereon; electrical switch means is operated in synchronism with said applicator rotor, said part feed mechanism being energized by said switch means; operating mechanism switch means comprising a plurality of concentric rows of cams; said swich means being operable in engagement with the cams of anyone of said rows; means for mounting said switch means to move radially relative to said rows of cams for alignment with anyone of said rows of cams; whereby said parts may be placed on said holders of said applicator rotor as various positions; said parts being packaging clips and thereby adapted to be placed on said peripheral area of said applicator rotor and said holders in positions to package pluralities of containers wherein different packages contain different numbers of containers.

20. The invention as defined in Claim **6** wherein; said magazine and part feed mechanism are moveably mounted on said frame to move toward and away from said applicator rotor.

21. In an article handling and packaging machine, a combination of: an applicator rotor: said applicator rotor having a peripheral portion provided with part holders thereon; a magazine having an outlet disposed adjacent to said peripheral portion of said applicator rotor, said magazine adapted to hold parts therein adjacent to said outlet; means for moving parts in said magazine in adjacent relationship to each other and towards said outlet; part feed mechanism adapted to feed parts from said magazine towards said peripheral area of said rotor for engagement thereon; said magazine is provided with a plurality of helical feed screws having shaft portions; bearings resiliently mounting said shaft portions on opposite sides of said magazine so that said screws may deflect laterally relative to said magazine; peripheral portions of said screws projecting through said magazine and engageable with opposite edges of parts in said magazine; and means for rotatably driving said screws in synchronized relation with each other so that they may advance parts in said magazine to a contiguous stacked relationship therein whereupon said screws and resilient mountings of said bearings permits the screws to move laterally relative to opposite edges of said parts and to slip thereover when the parts are contiguous to each other and the magazine is filled therewith.

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