May 26, 1953 J. P. MURDOCH ET AL 2,639,567

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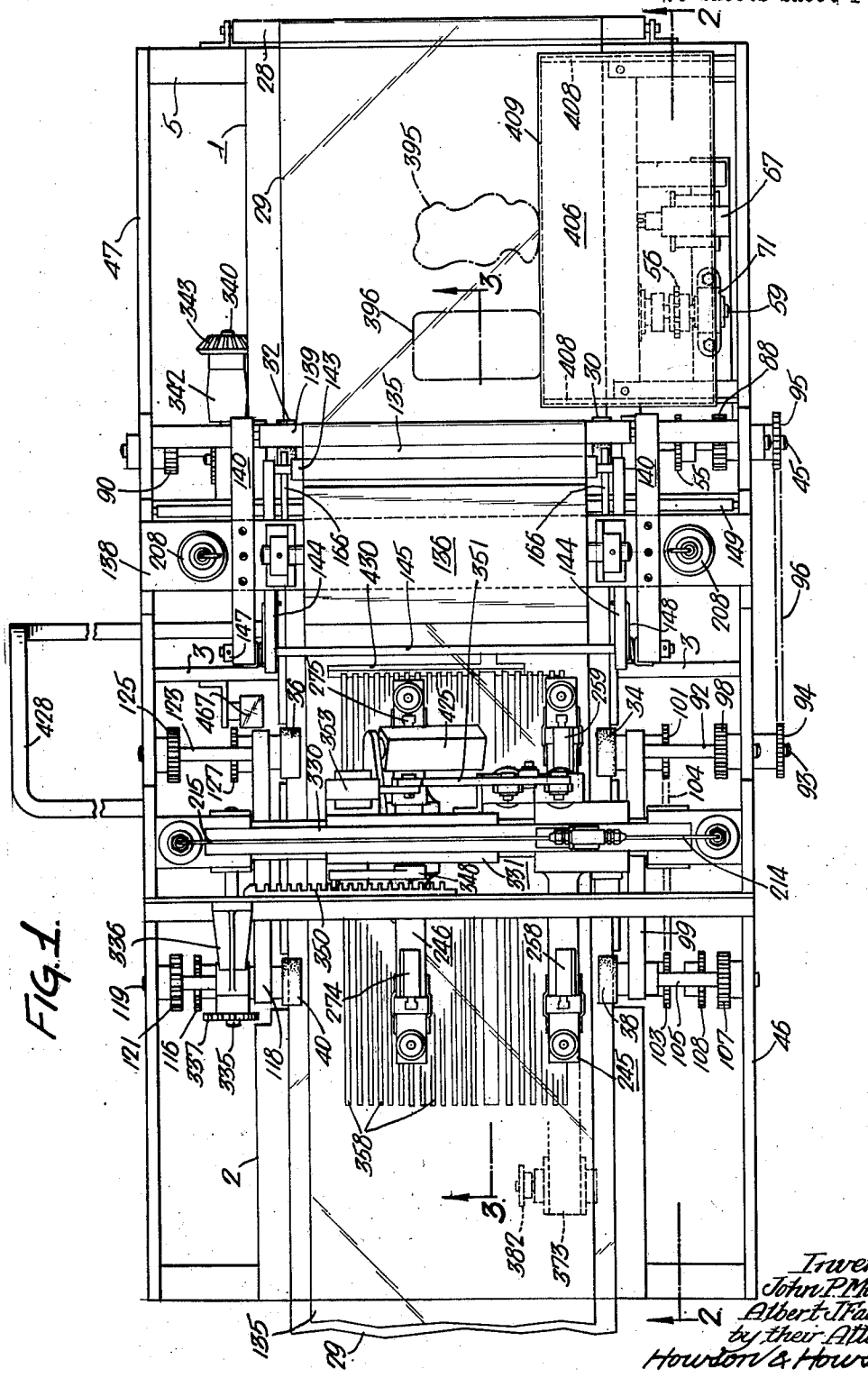


FIG. 1.

Inventors
John P. Murdoch
Albert J. Fauthaber
by their Attorneys
Howson & Howson

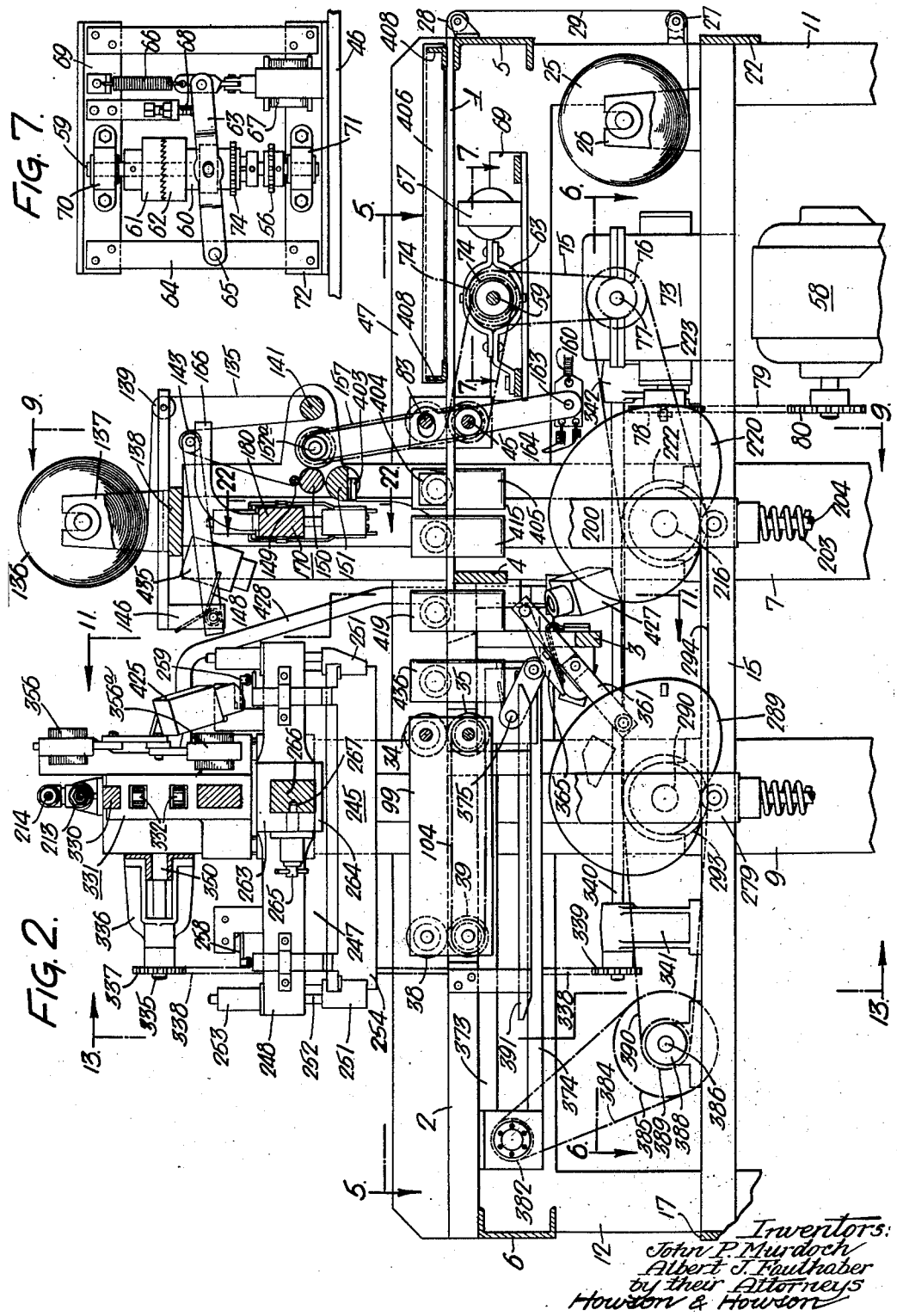
May 26, 1953 J. P. MURDOCH ET AL 2,639,567

UNIVERSAL PACKAGING MACHINE

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FIG. 7.

FIG. 2.



Inventors:
John P. Murdoch
Albert J. Fouthaber
by their Attorneys
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FIG. 4.

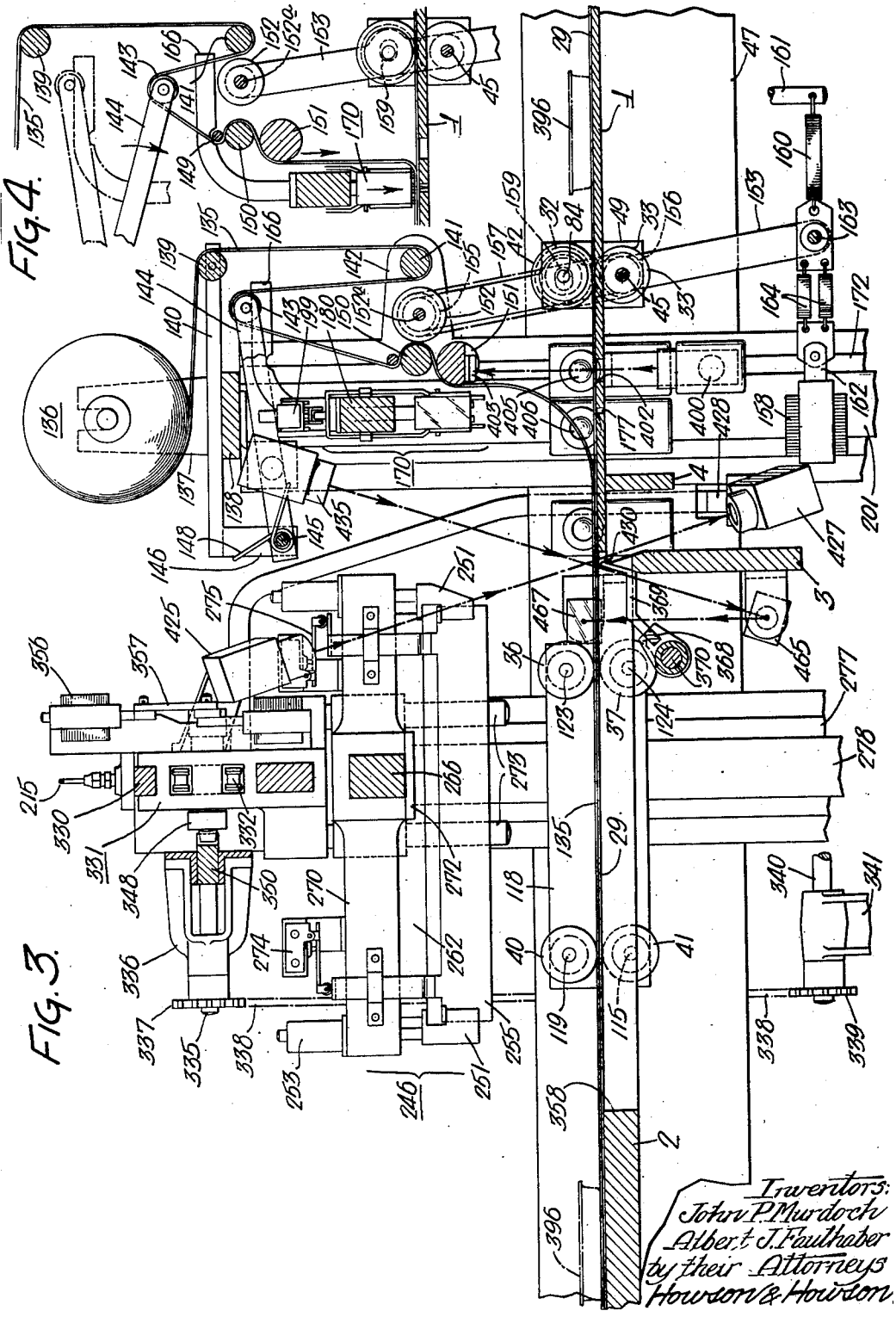


FIG. 3.

Inventors:
John P. Murdoch
Albert J. Faulhaber
by their Attorneys
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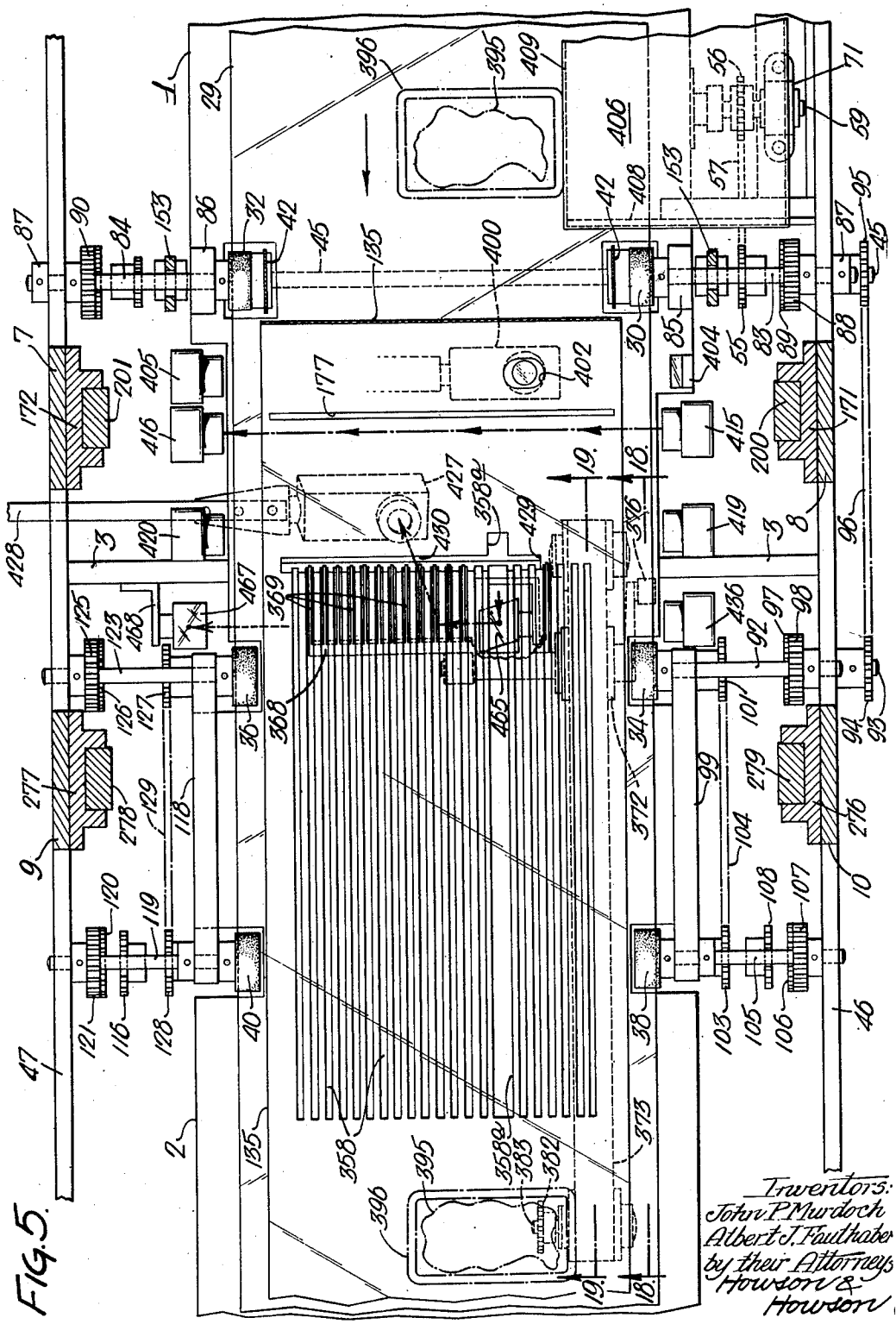


FIG. 5.

Inventors:
John P. Murdoch
Albert J. Faulhaber
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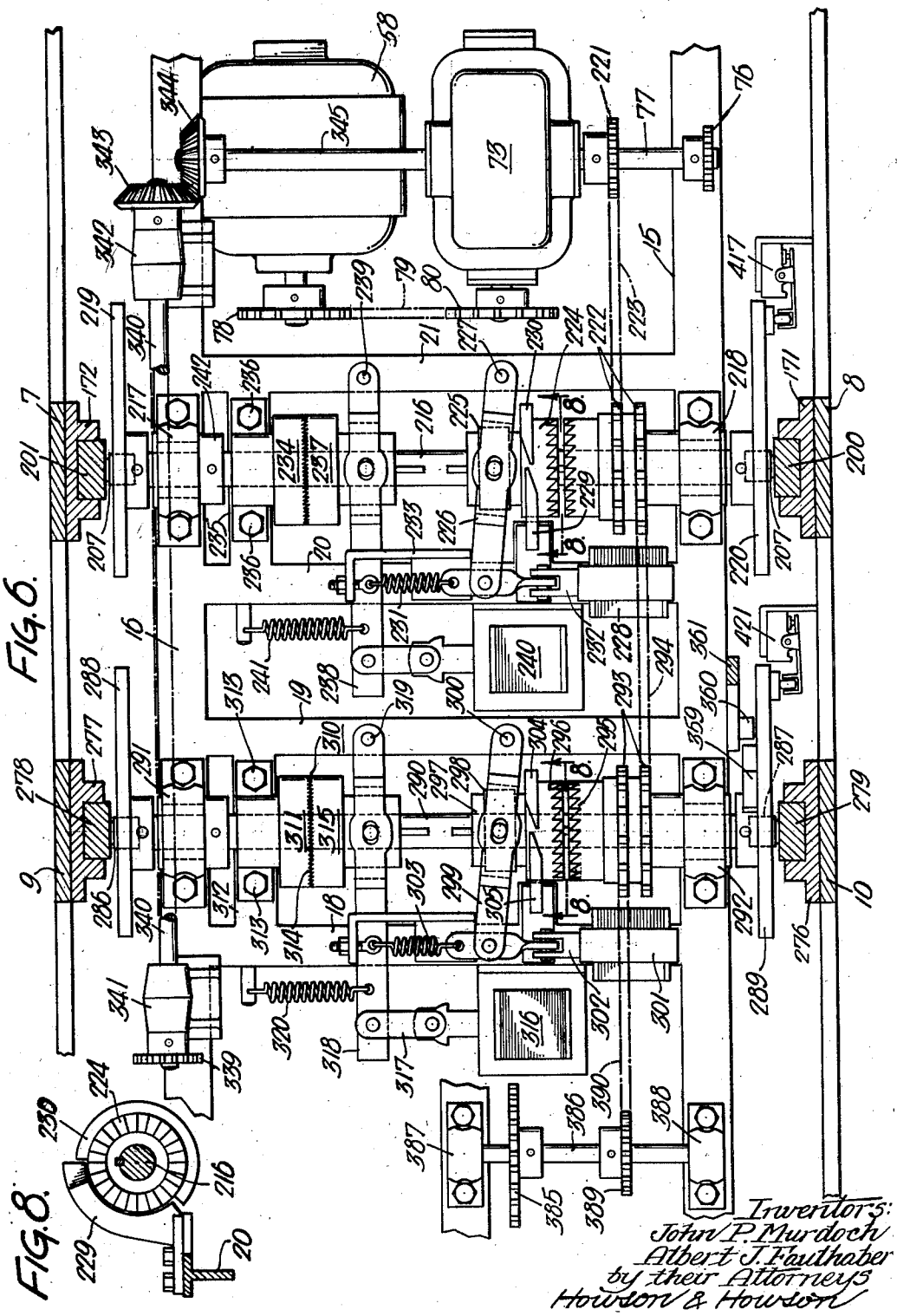


FIG. 6.

FIG. 8.

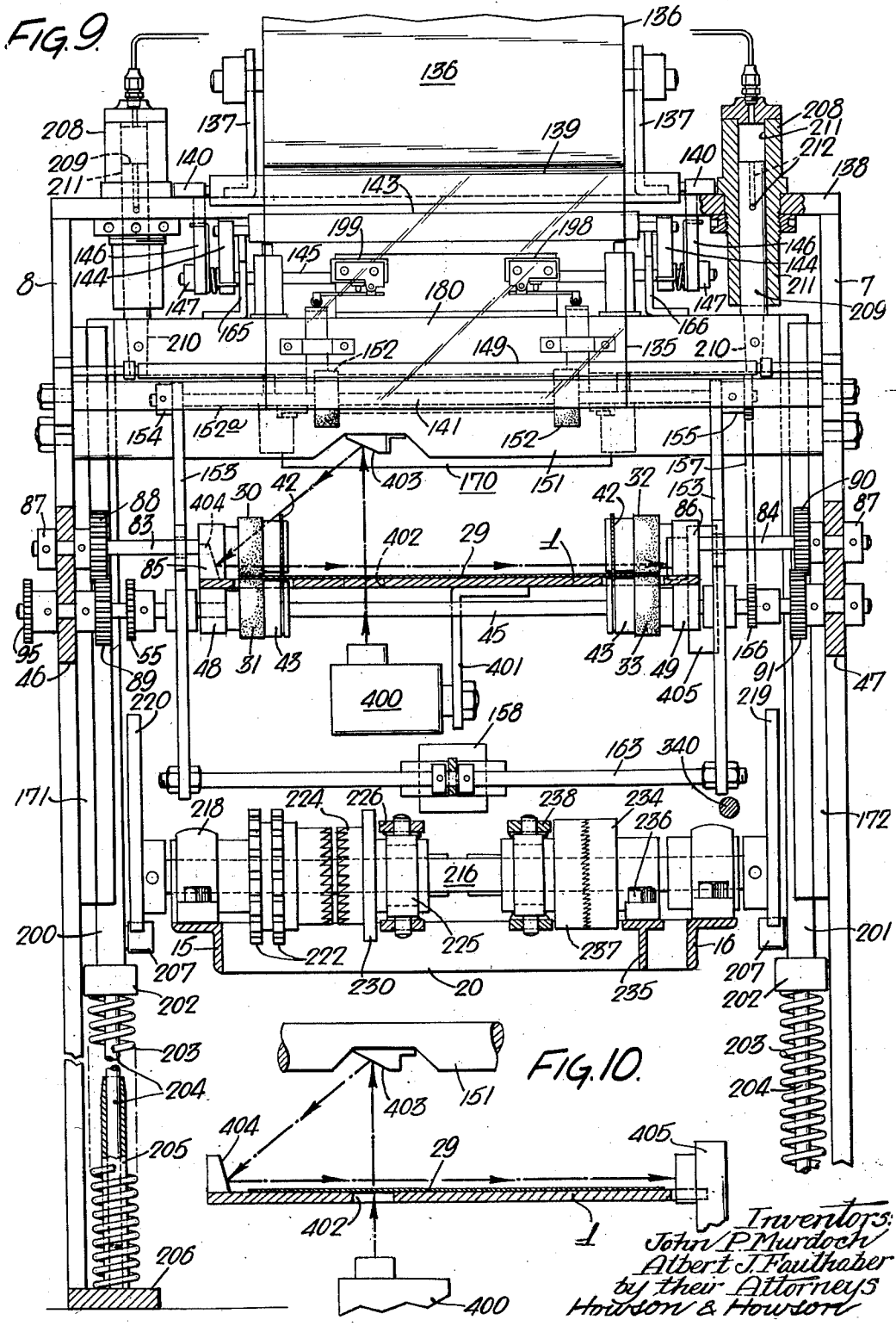
Inventors:
John P. Murdoch
Albert J. Faulhaber
by their Attorneys
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FIG. 9.



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FIG. 11.

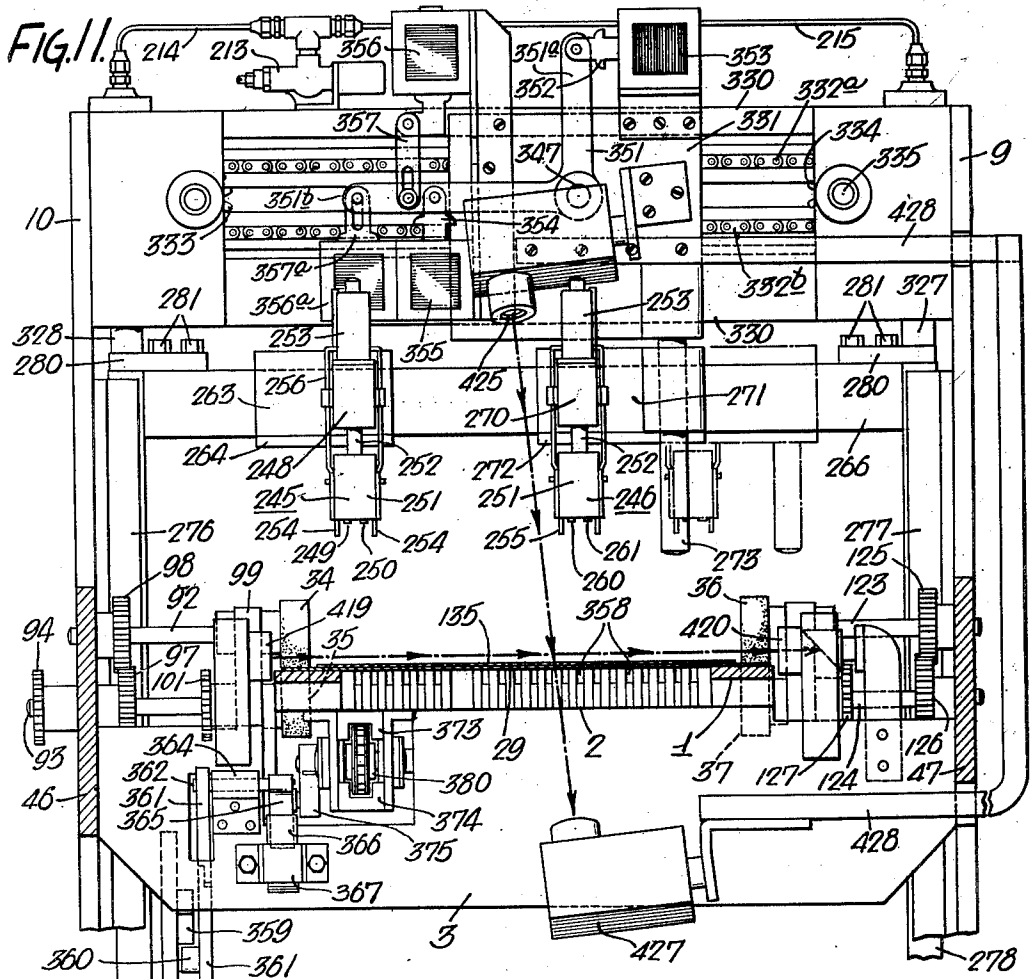
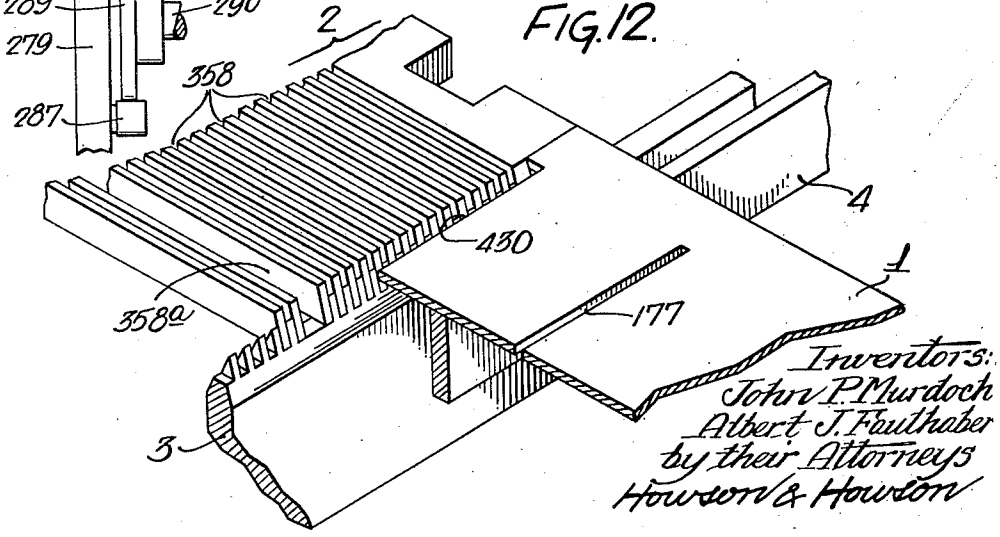


FIG. 12.



Inventors:
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FIG. 13.

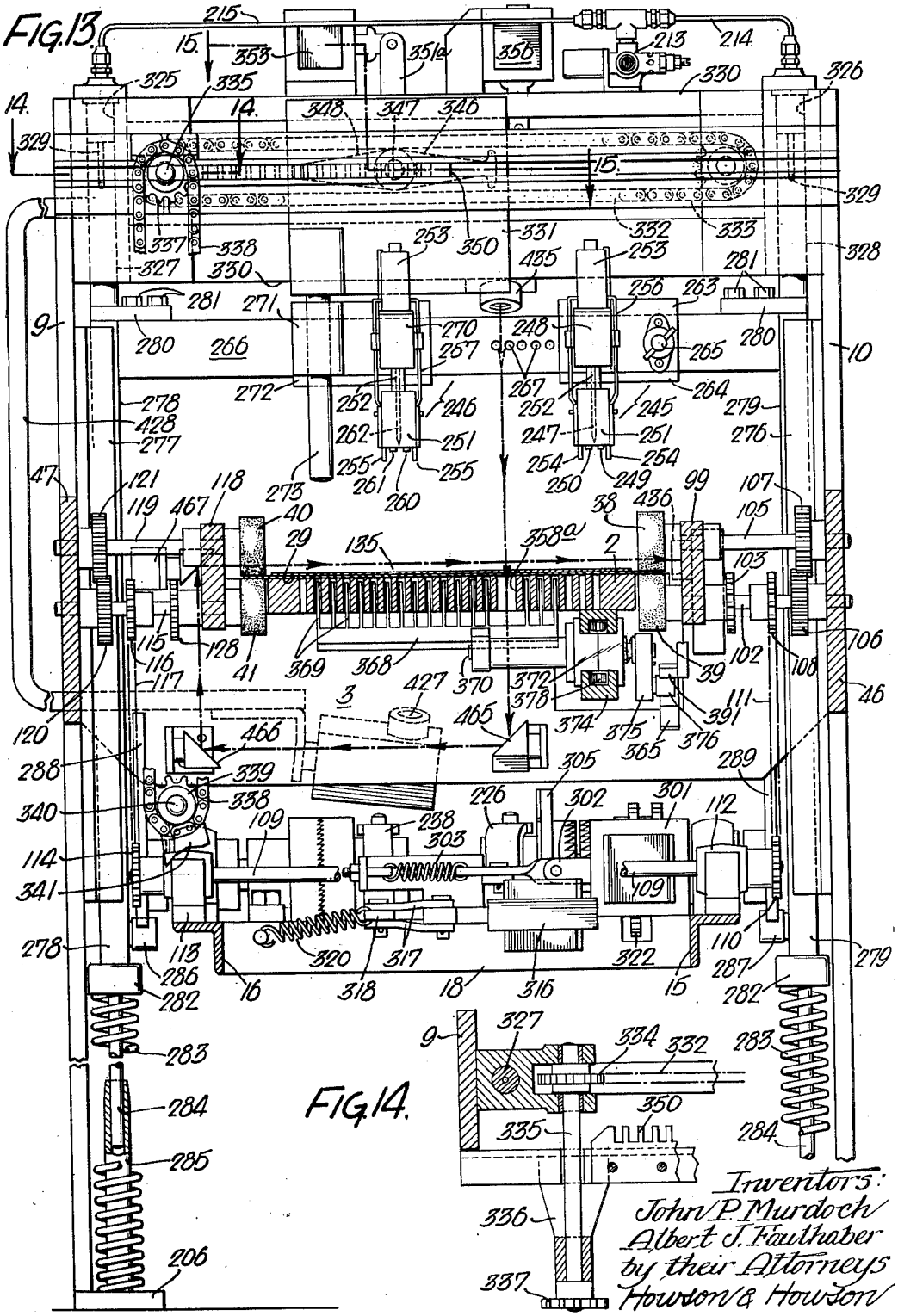


FIG. 14.

Inventors:
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Albert J. Faulhaber
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FIG. 15.

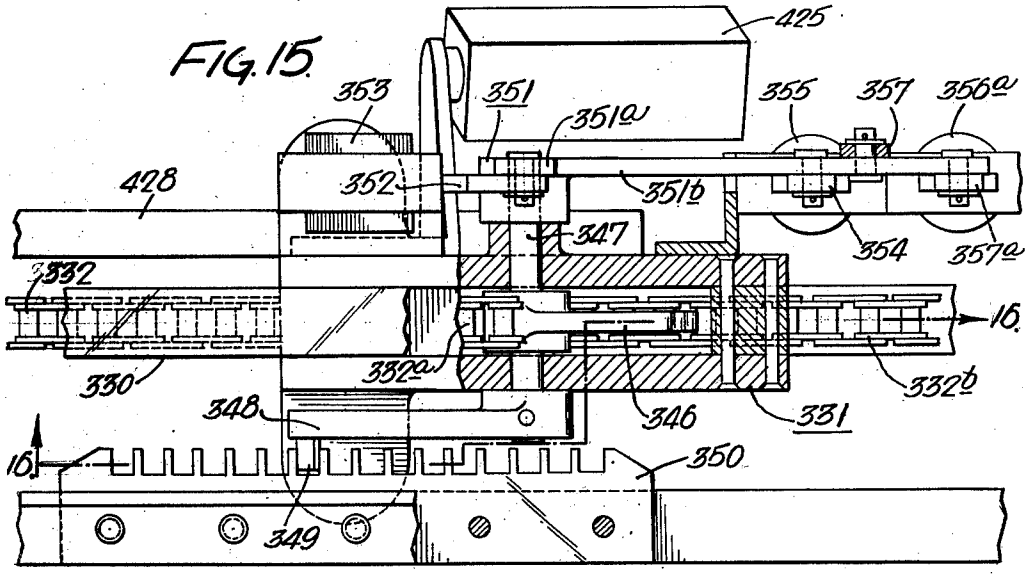


FIG. 16.

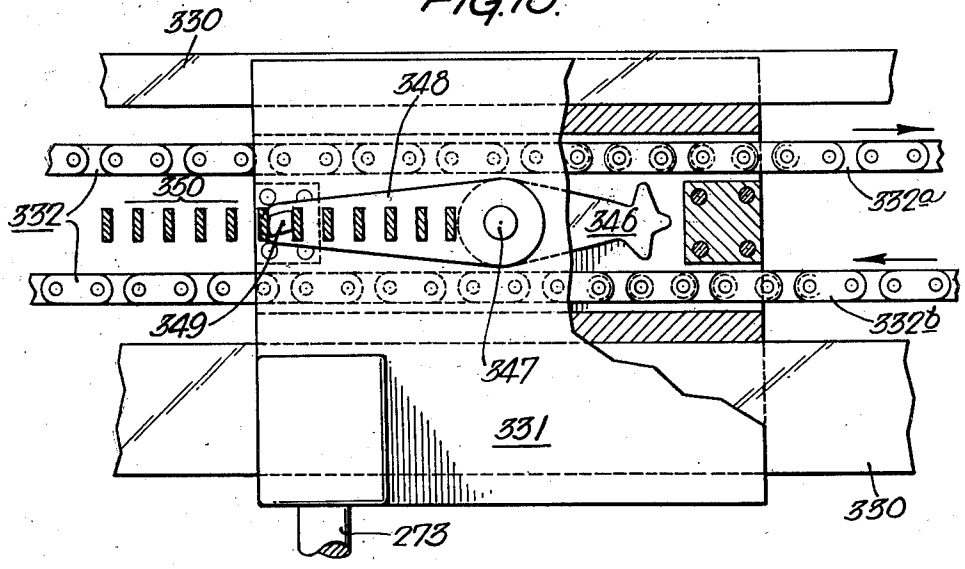
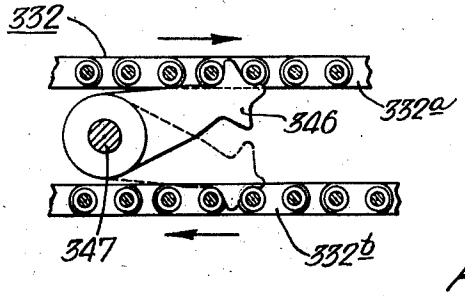


FIG. 17.



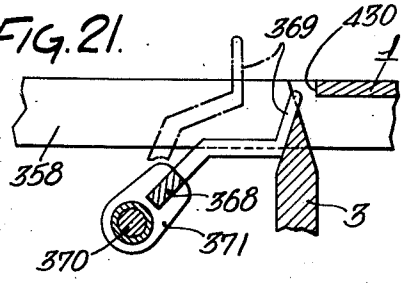
Inventors:
John P. Murdoch
Albert J. Fauthaber
by their Attorneys
Howson & Howson

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FIG. 21.



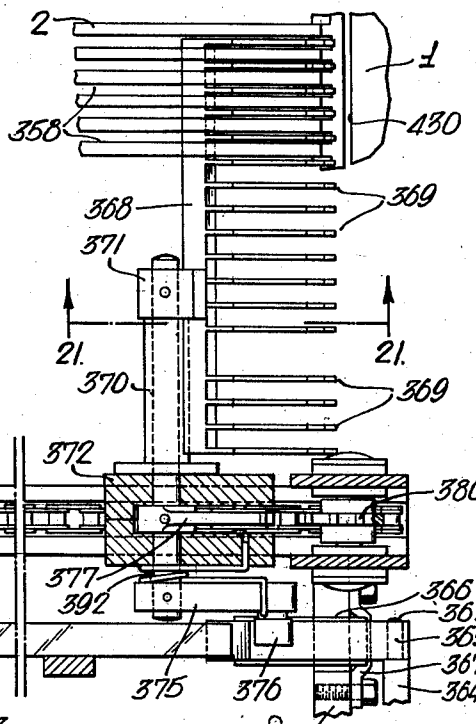


FIG. 20.

FIG. 18.

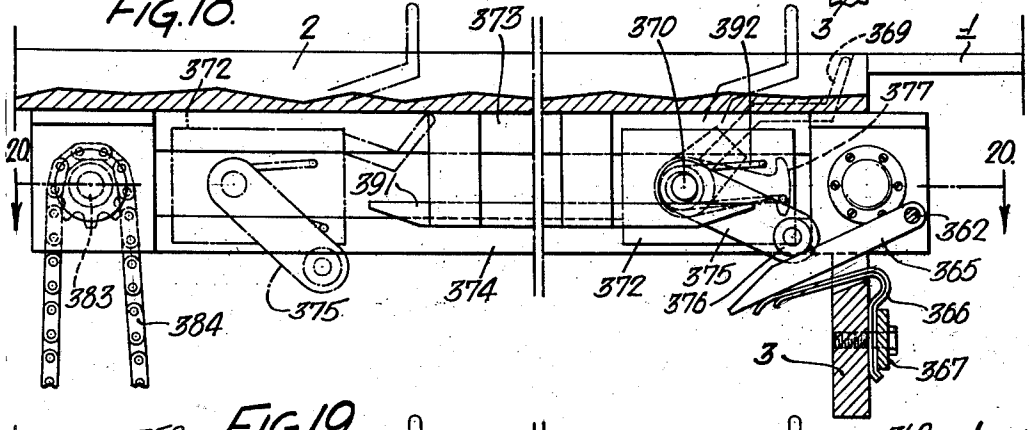
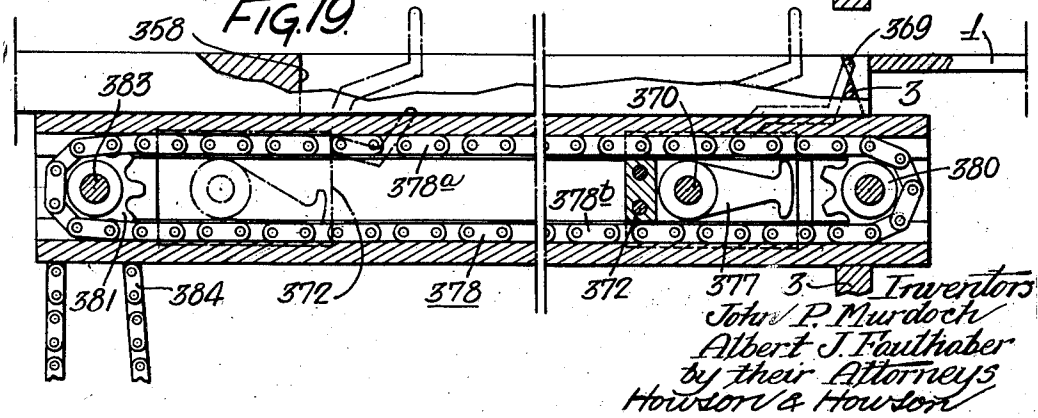


FIG. 19.



Inventors
John P. Murdoch
Albert J. Faulhaber
by their Attorneys
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May 26, 1953 J. P. MURDOCH ET AL 2,639,567

UNIVERSAL PACKAGING MACHINE

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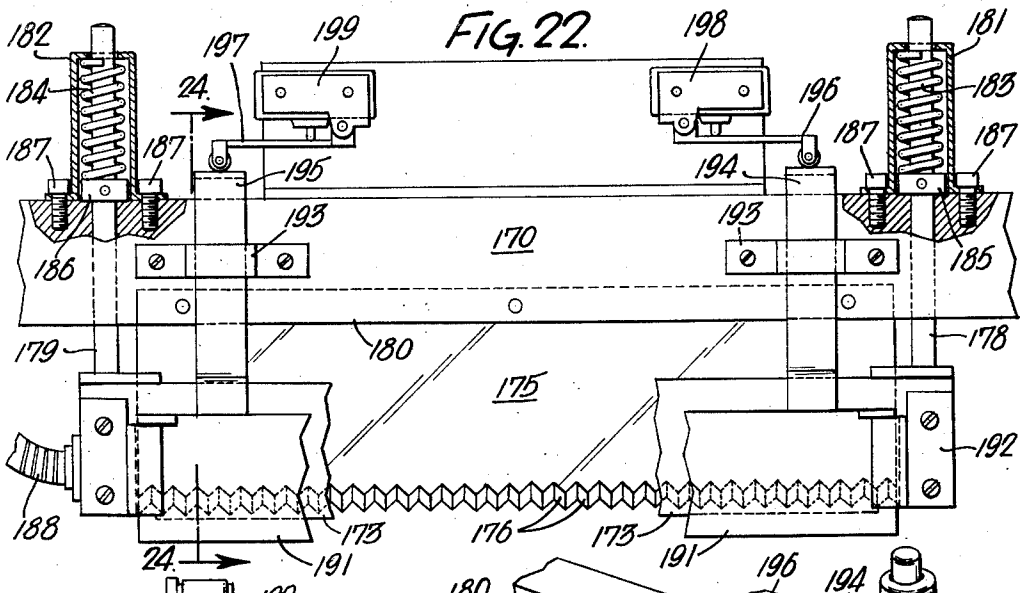


FIG. 22.

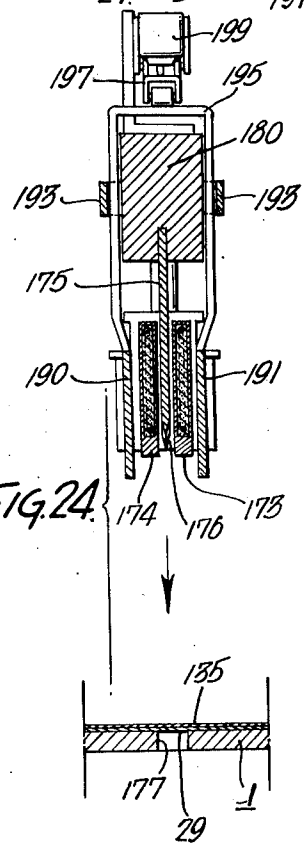


FIG. 24.

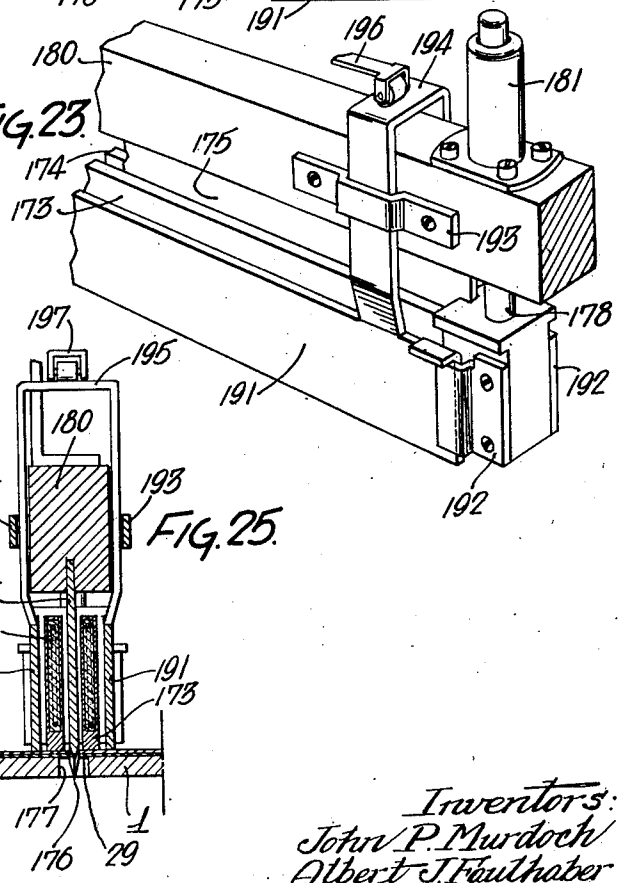


FIG. 23.

FIG. 25.

Inventors:
John P. Murdoch
Albert J. Faulhaber
by their Attorneys
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May 26, 1953 J. P. MURDOCH ET AL 2,639,567

UNIVERSAL PACKAGING MACHINE

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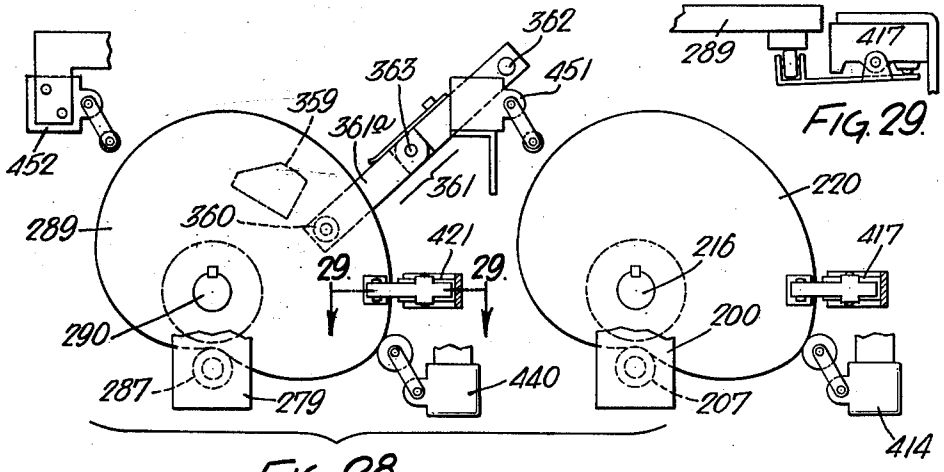


FIG. 28.

FIG. 29.

FIG. 26.

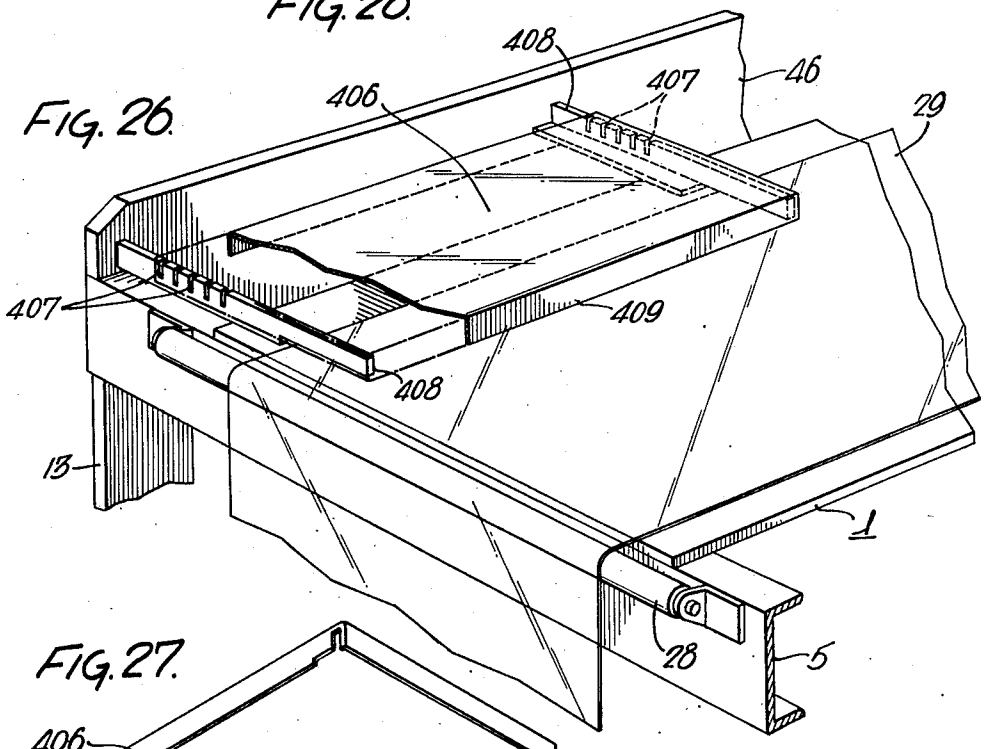
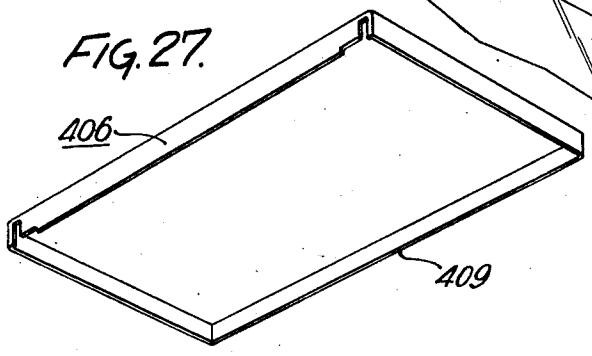


FIG. 27.



Inventors:
John P. Murdoch
Albert J. Faulhaber
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Howson & Howson

May 26, 1953 J. P. MURDOCH ET AL 2,639,567

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FIG. 31.

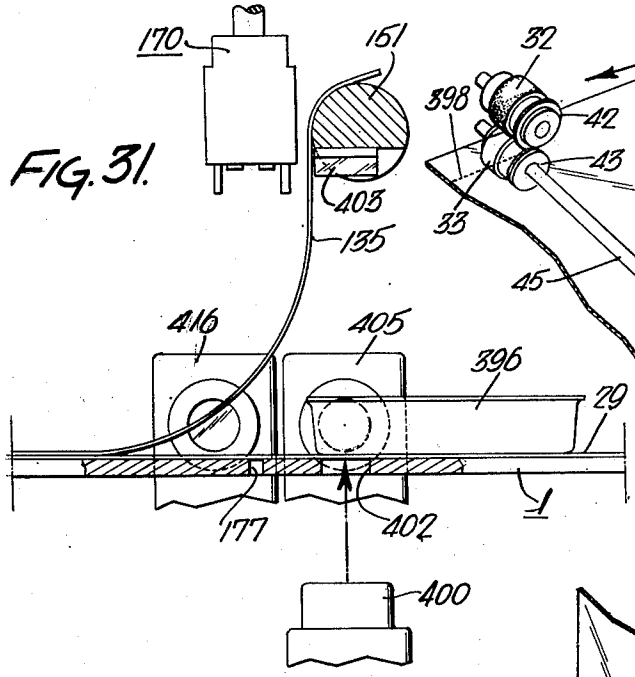


FIG. 30.

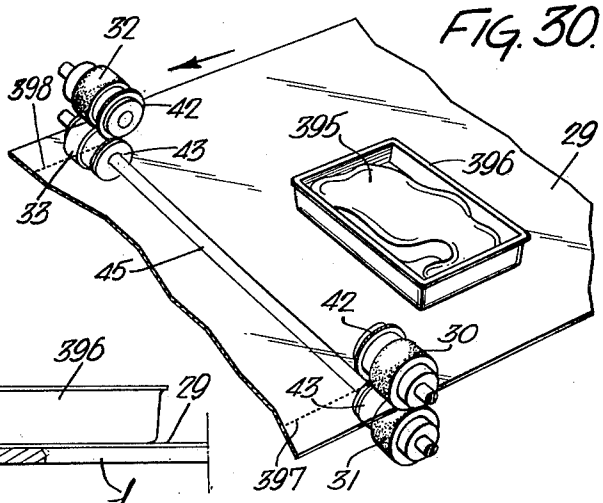


FIG. 33.

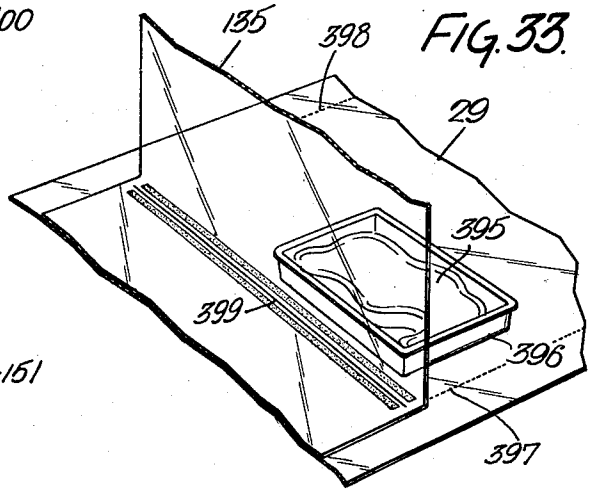
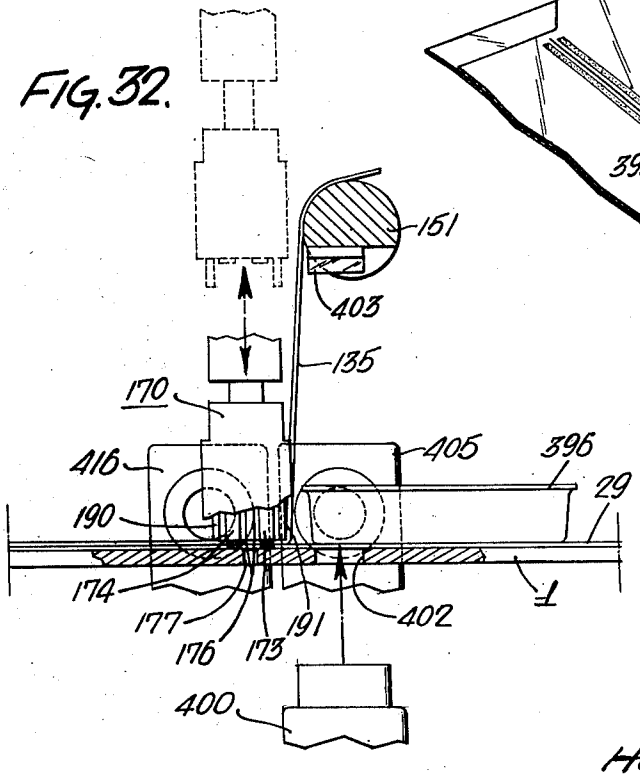


FIG. 32.

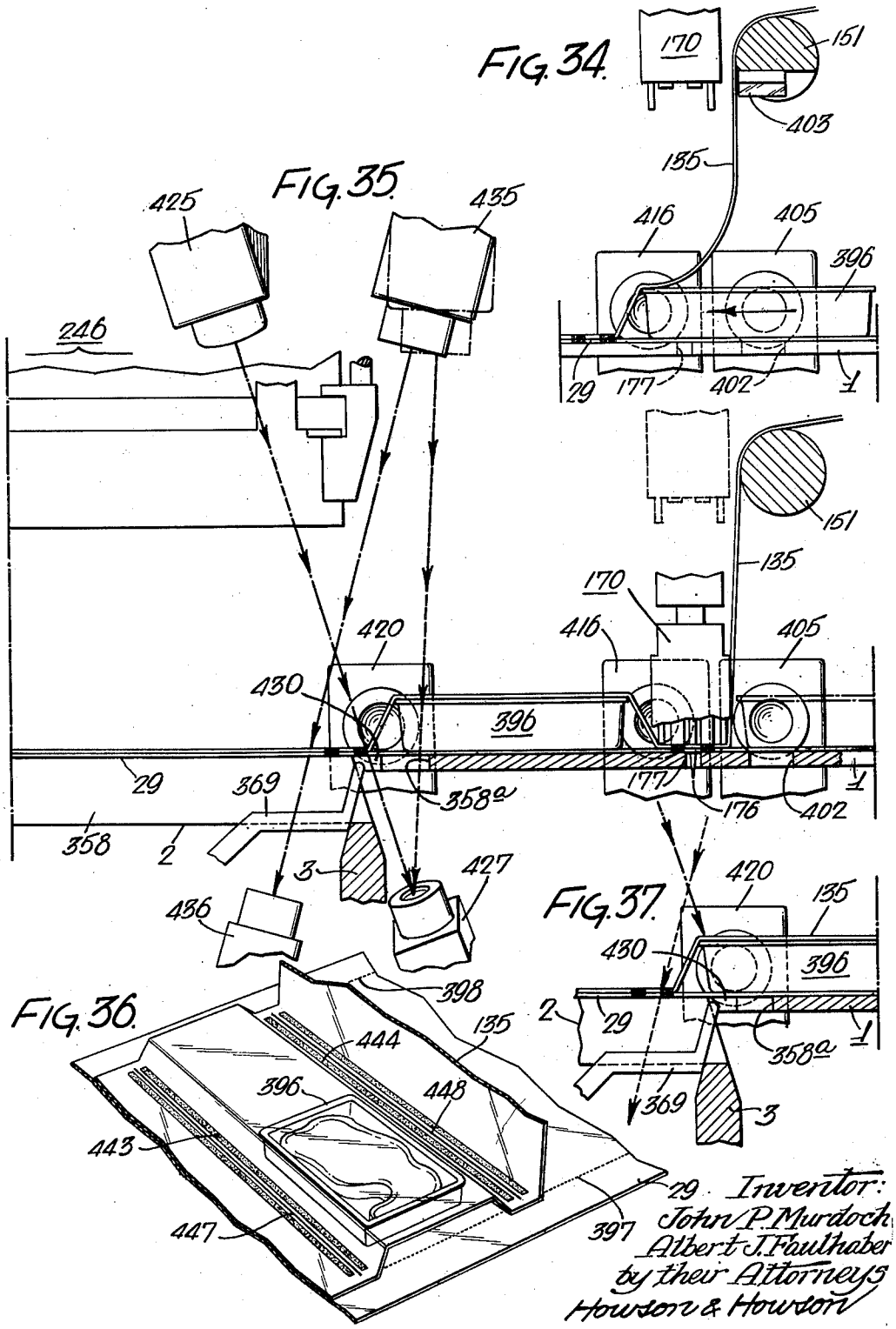


Inventor:
John P. Murdoch
Albert J. Fauthaber
by their Attorneys
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May 26, 1953 J. P. MURDOCH ET AL 2,639,567

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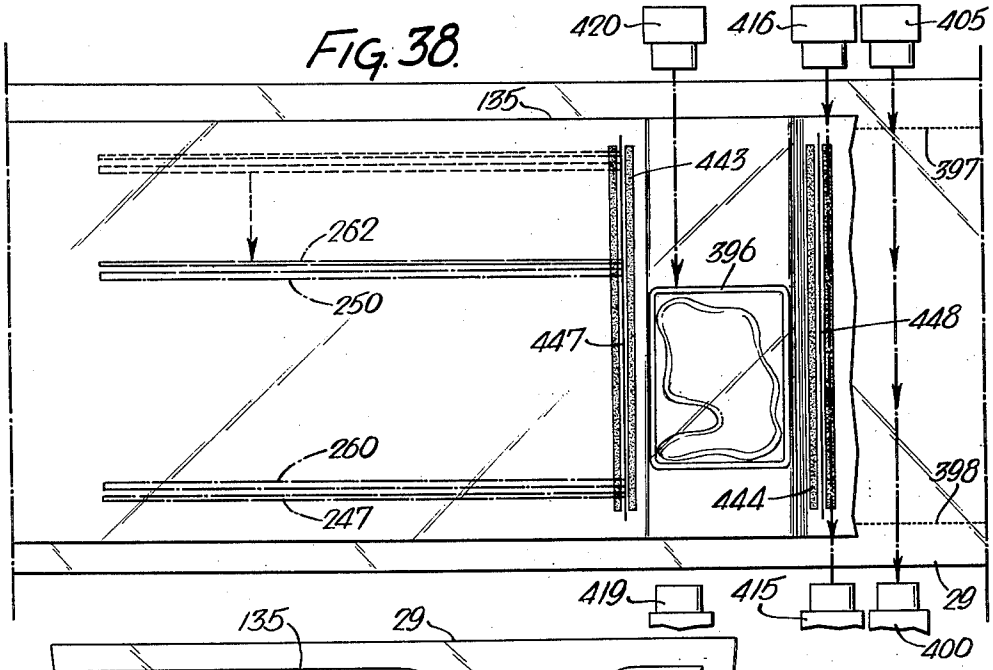
Inventor:
John P. Murdoch
Albert J. Faulhaber
by their Attorneys
Howson & Howson

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FIG. 38.



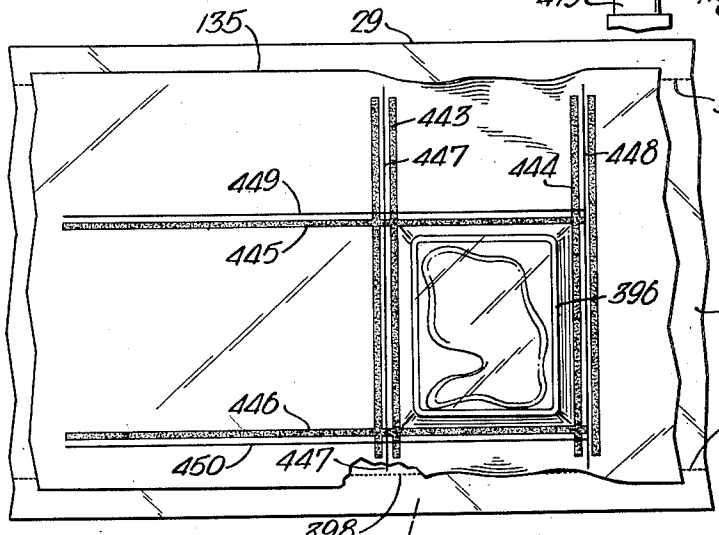
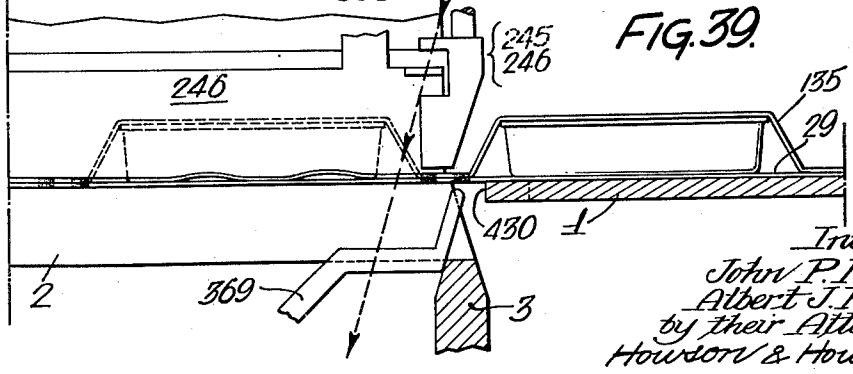


FIG. 40.

FIG. 39.



Inventors:
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FIG. 41.

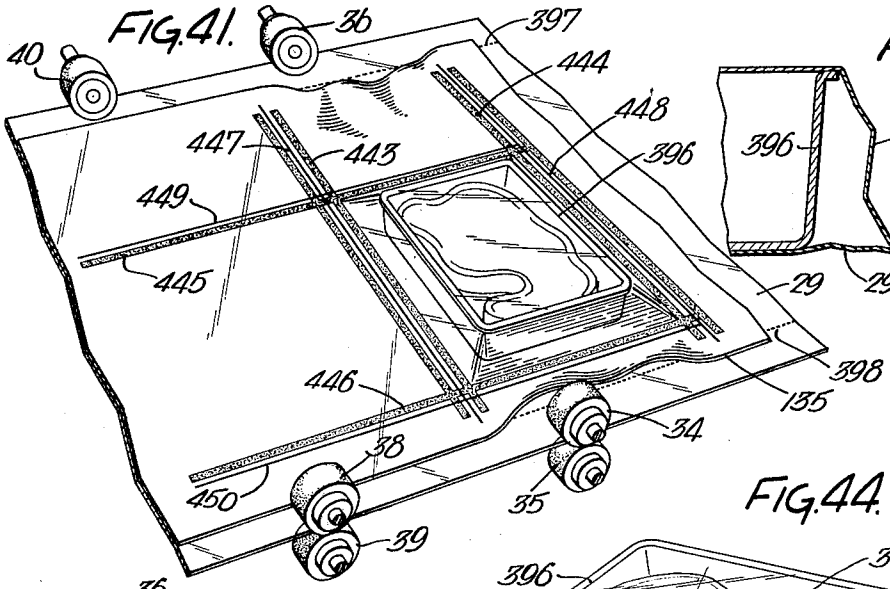
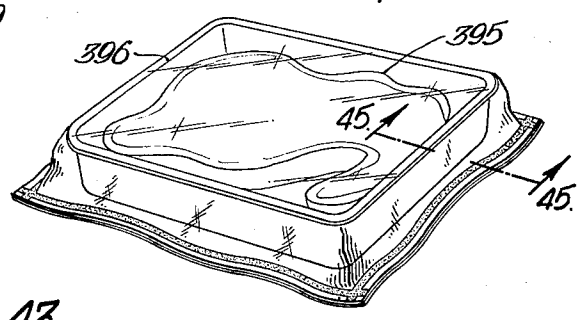


FIG. 45.

FIG. 44.



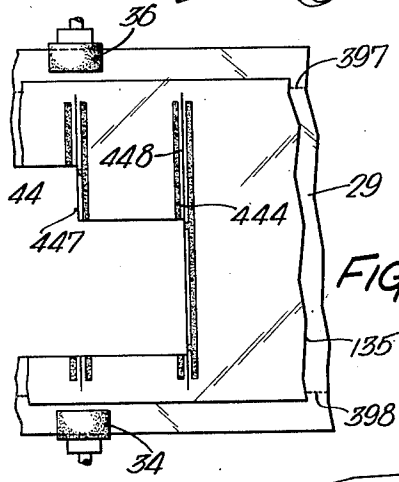


FIG. 43.

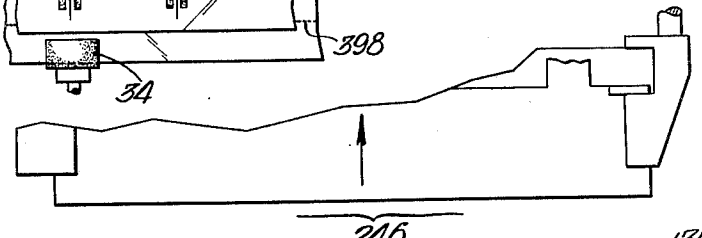
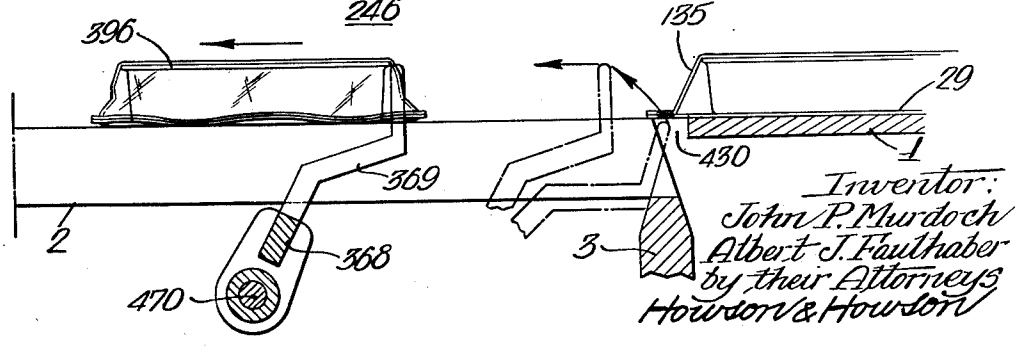


FIG. 42.



Inventor:
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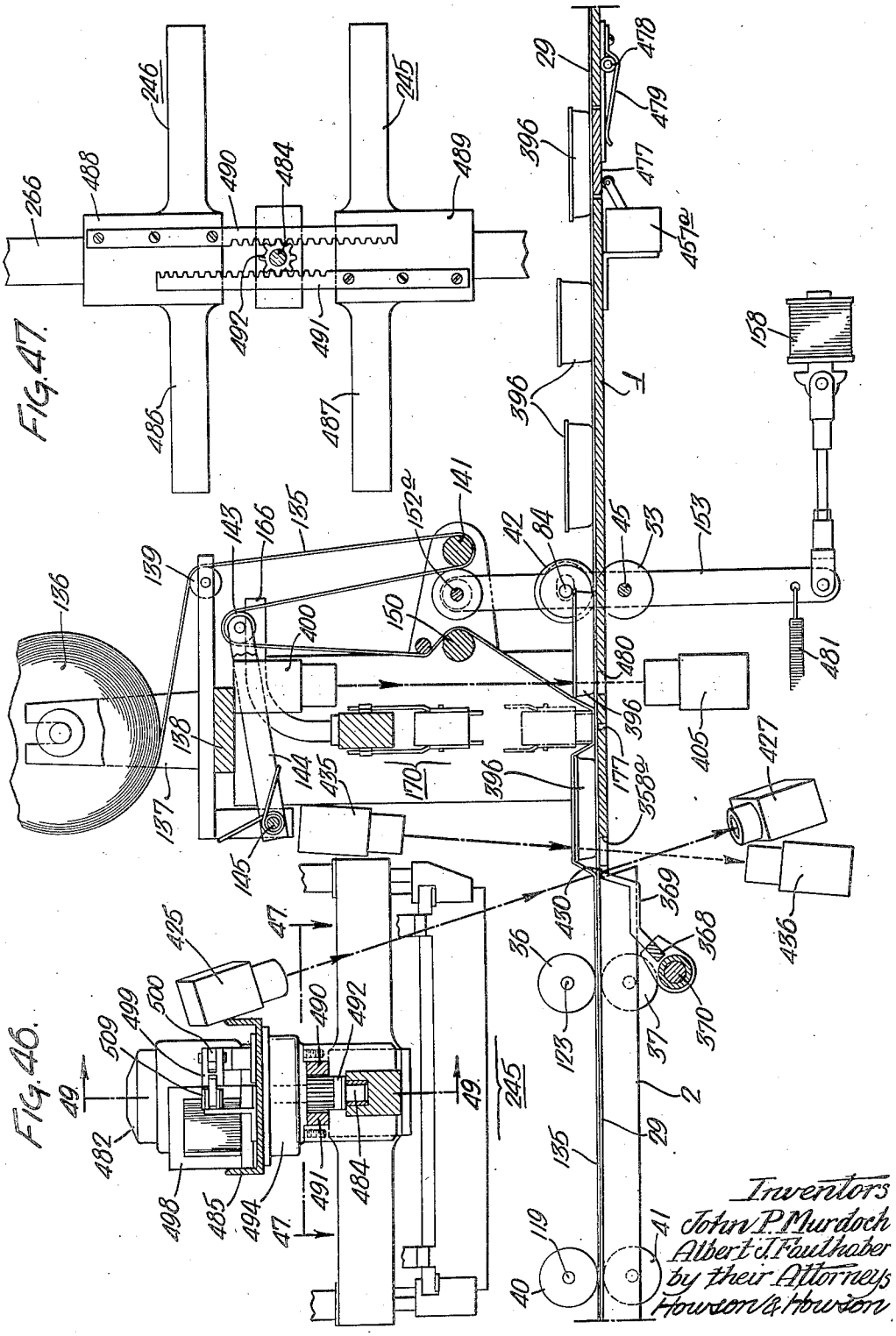


FIG. 47.

FIG. 46.

Inventors
John P. Murdoch
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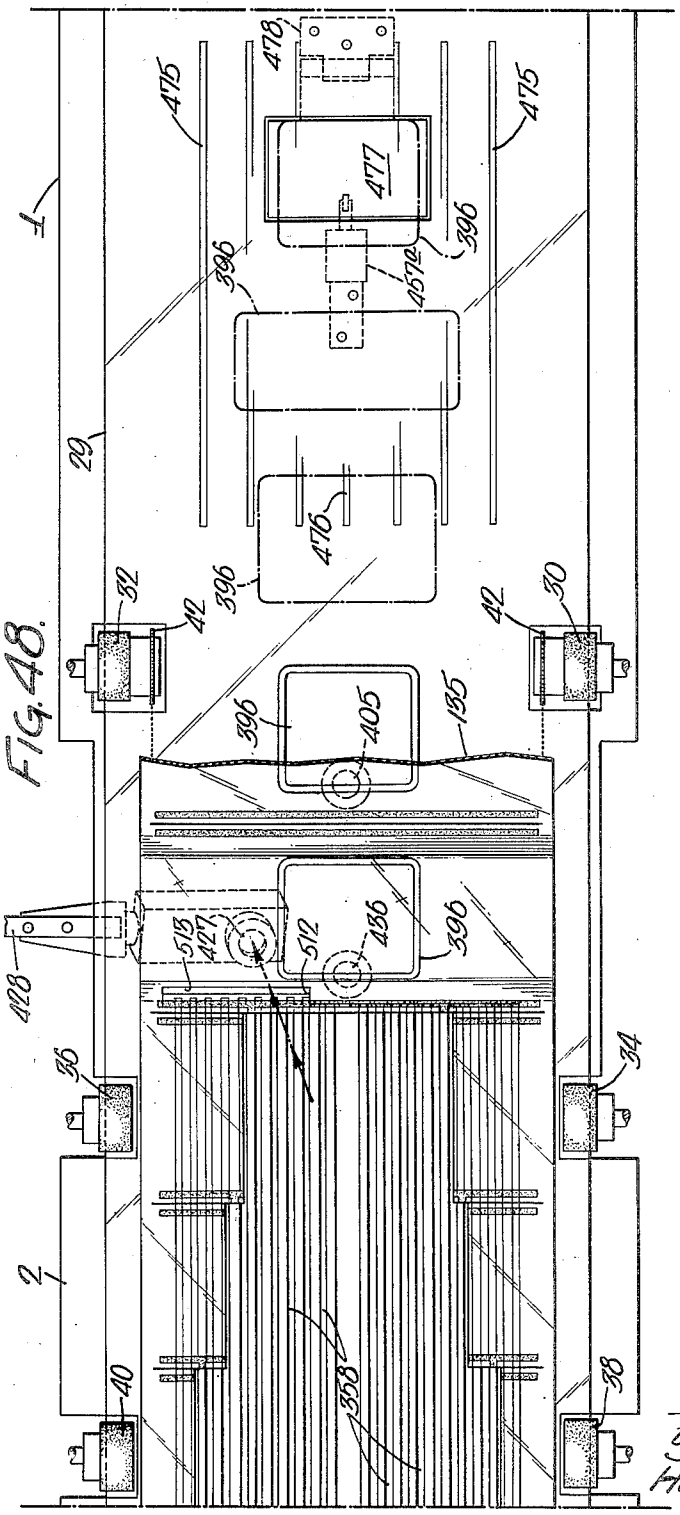


FIG. 48.

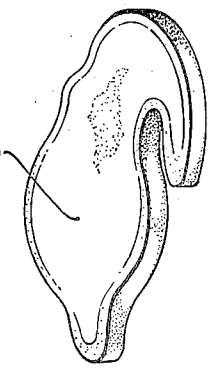


FIG. 53.

Inventors:
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Albert J. Faulhaber
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FIG. 50.

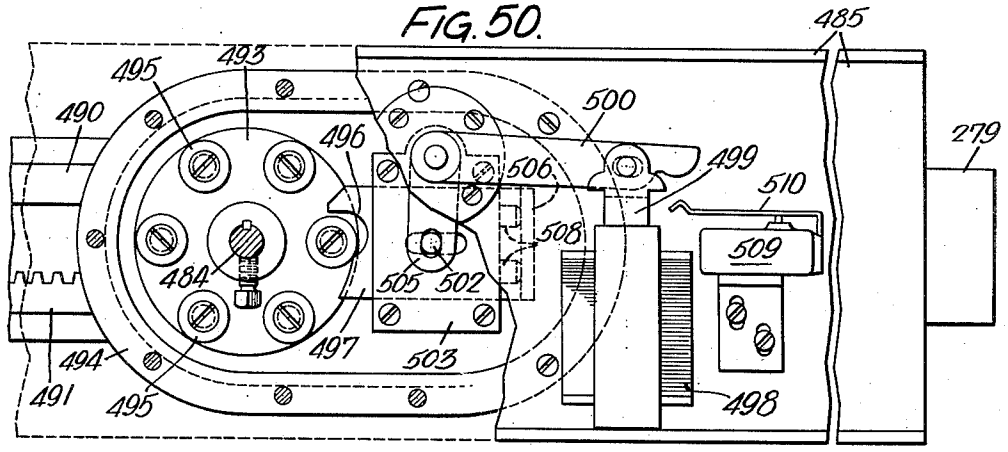


FIG. 49.

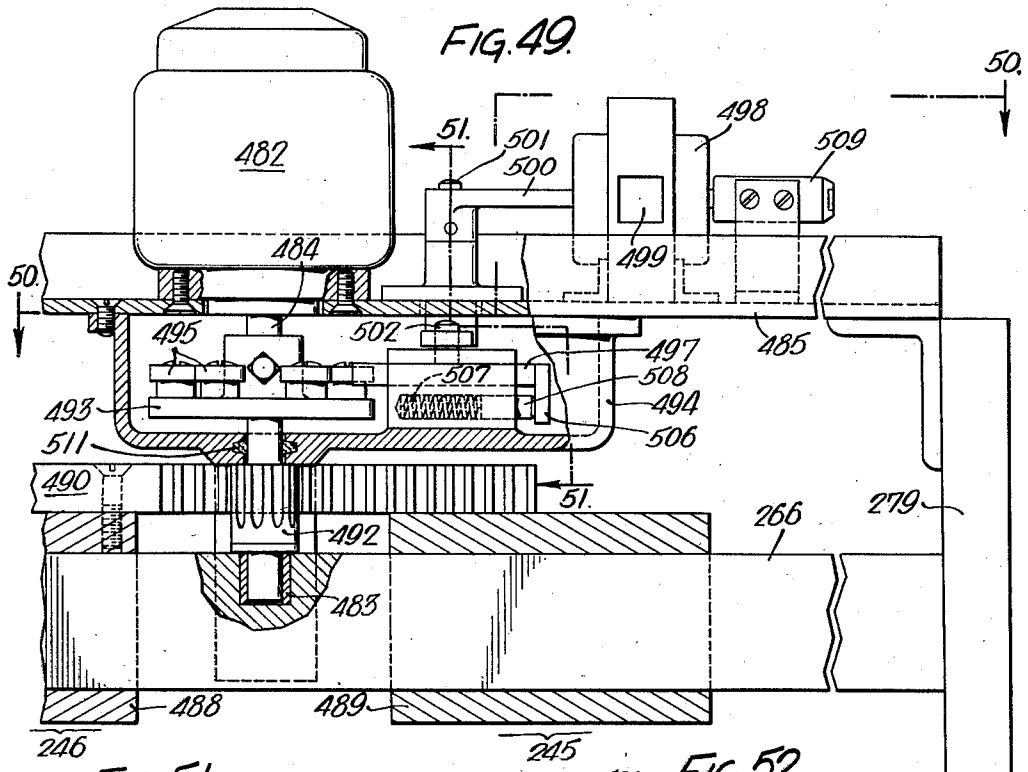


FIG. 51.

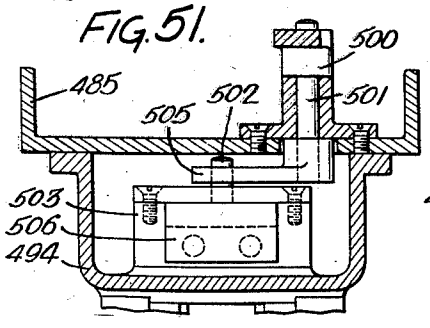
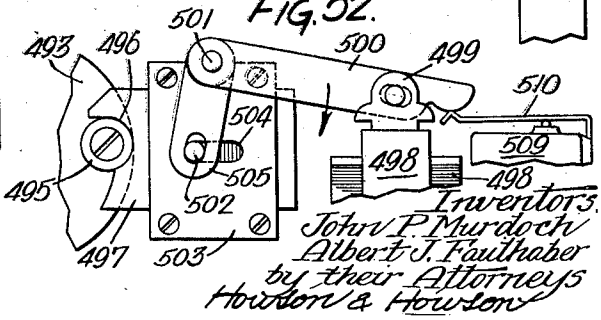


FIG. 52.



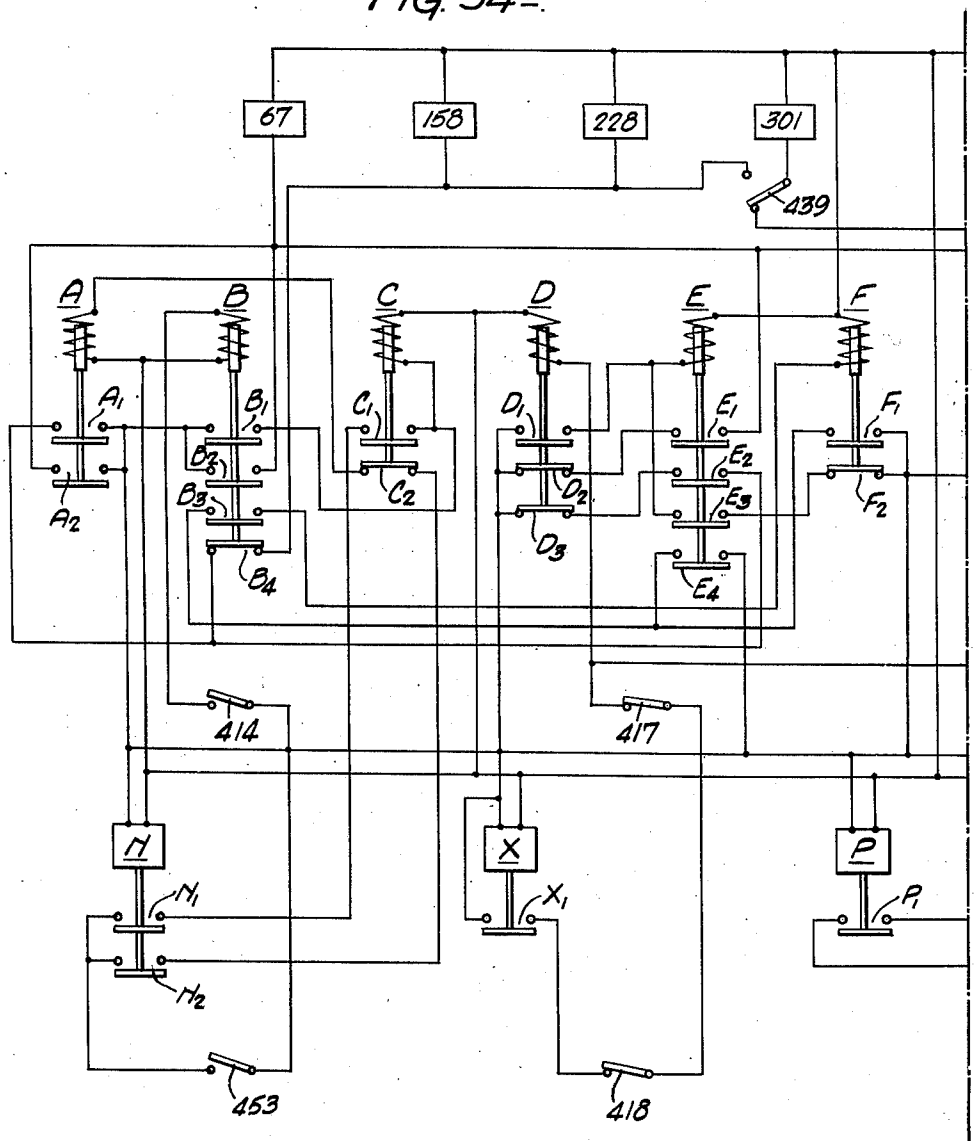
Inventors:
John P. Murdoch
Albert J. Faulhaber
by their Attorneys
Howson & Howson

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FIG. 54a



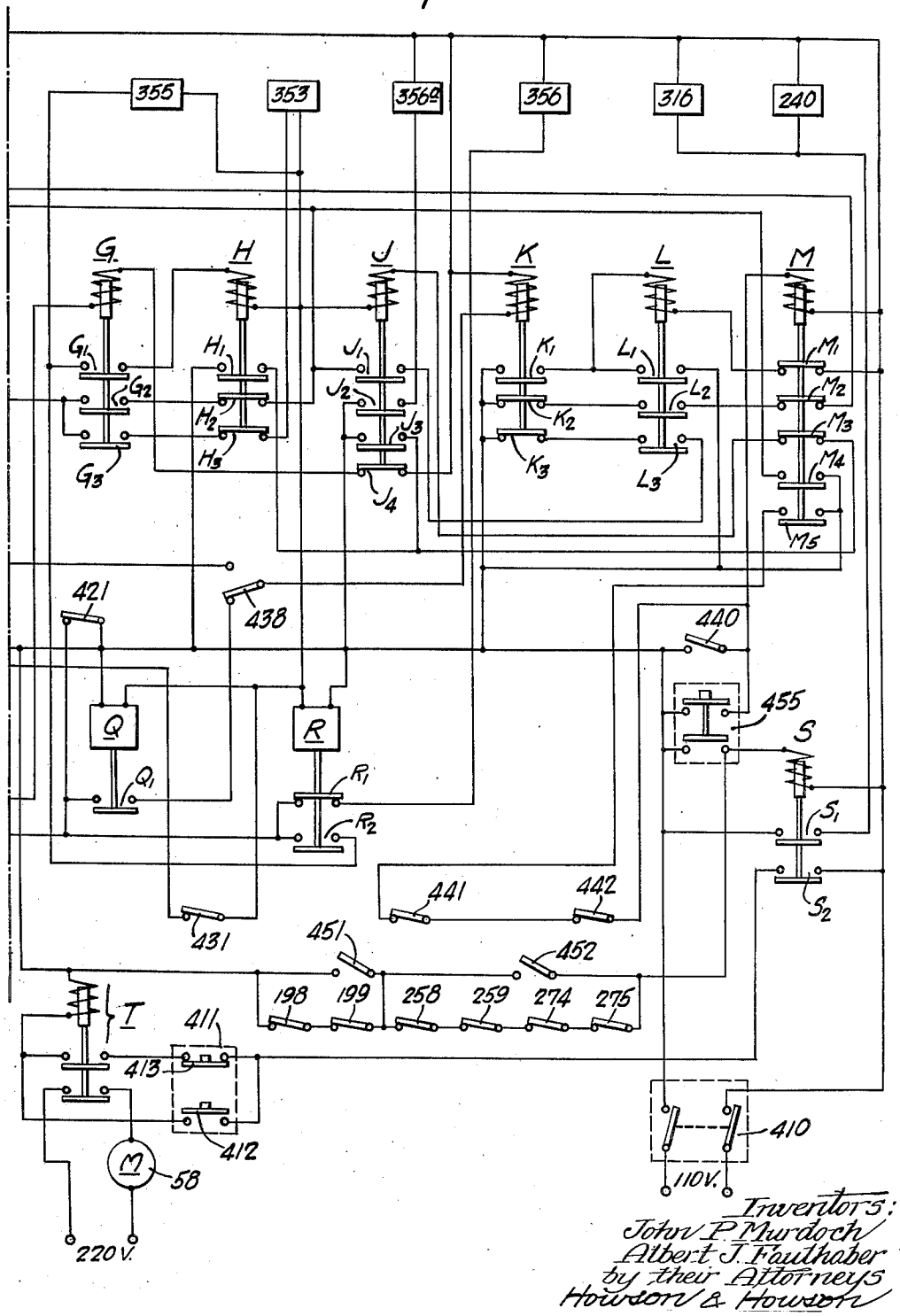
Inventor:
John P. Murdoch
Albert J. Fauthaber
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FIG. 54b.



Inventors:
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Albert J. Faulhaber
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Howson & Howson

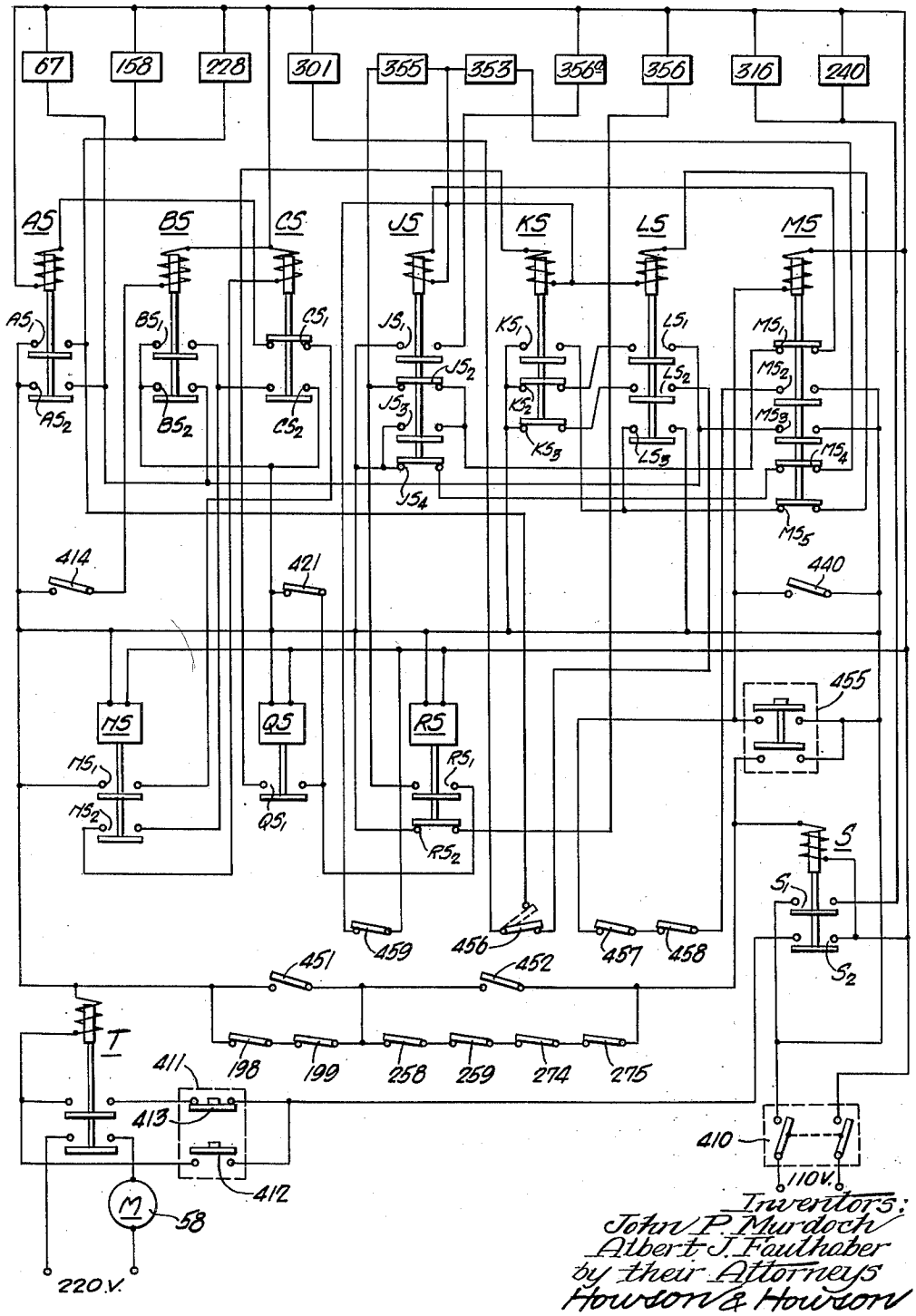
May 26, 1953 J. P. MURDOCH ET AL 2,639,567

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FIG. 55.



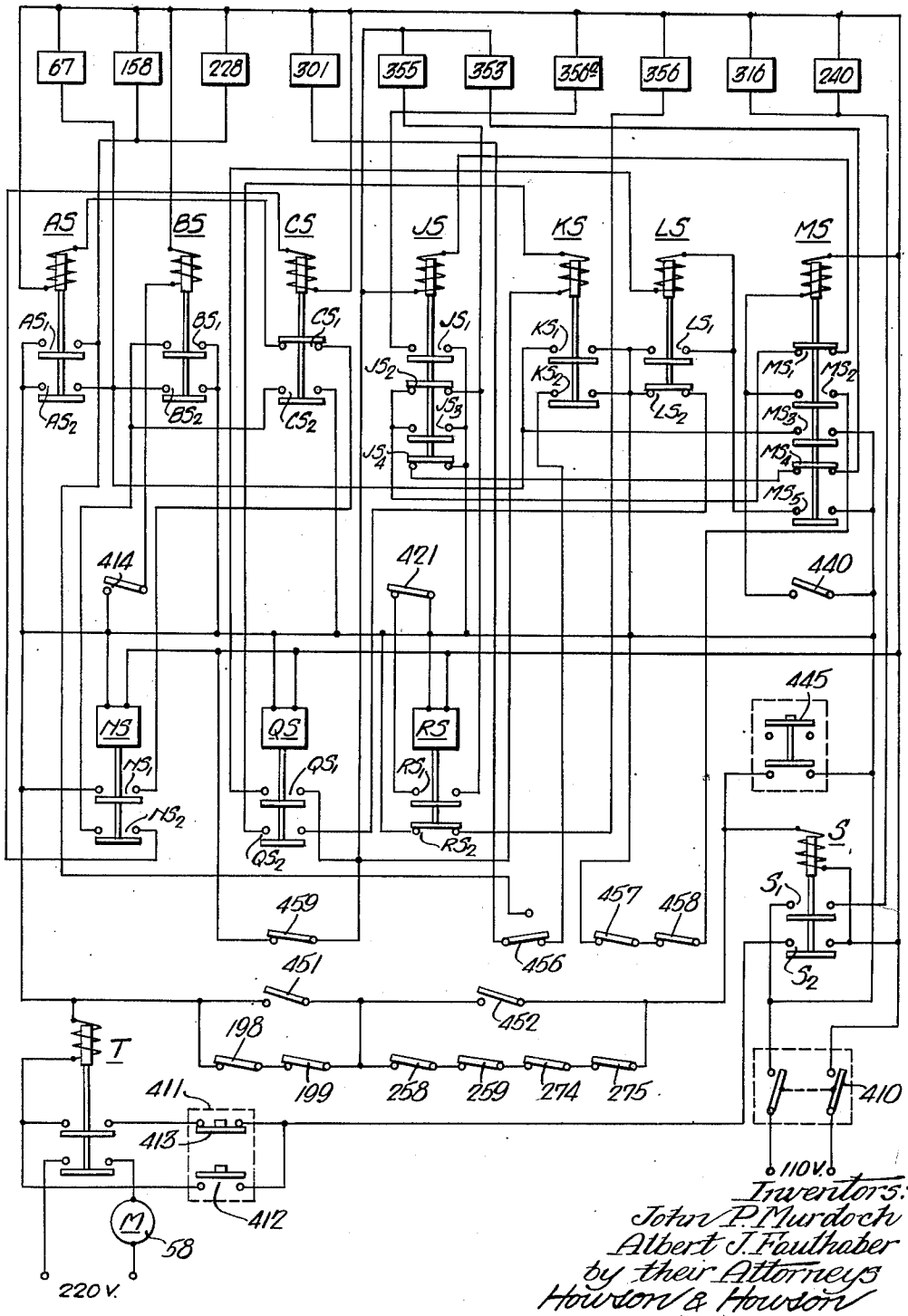
Inventors:
John P. Murdoch
Albert J. Faulhaber
by their Attorneys
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FIG. 56.



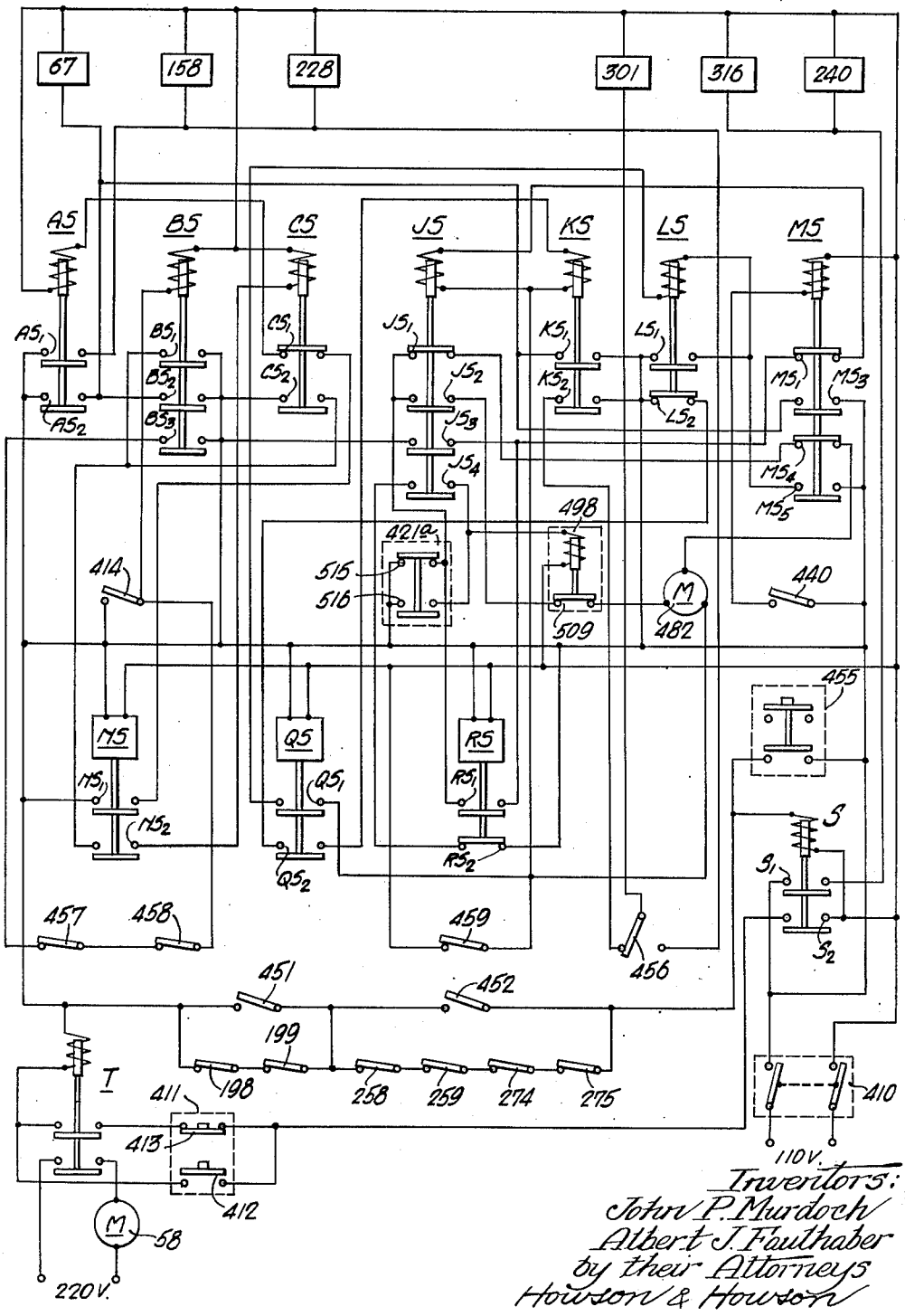
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May 26, 1953 J. P. MURDOCH ET AL 2,639,567

UNIVERSAL PACKAGING MACHINE

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FIG. 57.



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UNIVERSAL PACKAGING MACHINE

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Ardmore, Pa.

Application March 13, 1950, Serial No. 149,356

45 Claims. (Cl. 53—40)

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This invention relates to automatic packaging machinery and more particularly to apparatus for joining two plies of wrapping material around articles of various shapes and sizes. An important feature of the invention resides in the provision of automatic means for actuating, adjusting and timing the various sealing and cutting members in accordance with the shape and size of the article to be wrapped.

The present machine is characterized by a platform or table on which a sheet or web of wrapping material is intermittently moved from end to end. This web serves as a conveyer for the objects to be packaged which are placed on the web by an operator. The conveyer or lower ply of sheet wrapping material carries the articles across the table and under another ply or web of wrapping material which forms the top sheet of the packages. The articles are then carried along the table to a series of stations at which the presence of the leading edge of the article, or in some cases the trailing edge of the article, is detected by suitable means. Electrical circuits connected to the detecting means arrest the conveyer and actuate a transverse sealing and cutting member which in the present instance reciprocates vertically above the table. Other detecting means serve to condition suitable electrical circuits as well as to position one or two longitudinal sealing members transversely across the table. The final detector serves to actuate the transverse sealers which provide a complete seal around all sides of the article and which also sever the sealed article from the sheet wrapping material. After the article has thus been sealed and cut, suitable ejecting means are actuated to quickly remove the wrapped packages from the table.

The apparatus described herein has been designed particularly to wrap meat products such as chops, steaks, etc. which are irregular in shape and vary widely but within generally known limits. In some cases the articles may be placed in the conventional papier mâché trays having uniform dimensions. In this event, the electrical circuits may be so arranged that the individual articles do not have to be scanned in order to position the sealing element accurately for the correct width. In addition, the electrical circuits described herein are designed to employ light-sensitive photo-electric cells as a means for detecting the presence or absence of the article at any given station along the table. Such cells have been found to be very satisfactory for this purpose but it will be understood that another suitable detecting means may be employed.

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The material in which the packages are wrapped is preferably a thermoplastic sheet so that the sealing elements, comprising electrically heated strips, press the upper and lower plies of material against the table to form the seal. The sealing elements are associated with suitable cutting knives and slots in the table so that the packaged articles may be detached from the sheet material by the stripper mechanism.

It will be understood that many changes and modifications may be made in the device herein disclosed within the scope of the invention and that it is not essential to use light-sensitive cells, thermoplastic sheet material or articles of food to be wrapped.

A primary object of the invention therefore, is to provide an automatic wrapping machine for continuously packaging articles of various sizes and shapes.

Another object of the present invention is to provide a continuous automatic wrapping machine having suitable means for actuating the sealing elements thereof, said means being responsive to the presence or absence of the articles at a plurality of stations.

A further object of the invention is to provide a relatively simple and compact continuous automatic packaging machine.

A further object of the invention is to provide automatic wrapping machinery adapted to heat seal layers of sheet material around irregular objects.

A further object of the invention is to provide in a machine of the class described a plurality of light-sensitive cells which control the sealing members in accordance with the position of the article to be wrapped.

A further object of the invention is to provide improved electrical control and safety circuits for an automatic package wrapping machine.

A further object of the invention is to provide in article packaging machinery a first vertically movable sealing head actuated by means of a light-sensitive cell, and a pair of vertically and horizontally movable sealing and cutting heads, both the vertical and horizontal movements thereof being controlled by light-sensitive cells.

A further object of the invention is to provide in article packaging machinery a first vertically movable sealing head actuated by means of a light-sensitive cell, a pair of vertically and horizontally movable sealing heads; and a plurality of light-sensitive cells so positioned that the sealing heads may be actuated separately or in unison, and they may be controlled by the leading edge or the trailing edge of the articles.

A further object of the invention is to provide means for automatically scanning at least one dimension of an article to be wrapped, to position a sealing member.

A still further object of the invention is to provide an improved means and control for feeding sheet material into an article wrapping machine.

A still further object is to provide an improved ejecting mechanism for an article wrapping machine.

Further objects will be apparent from the specification and drawings in which:

Fig. 1 is a top view of a packaging machine constructed in accordance with the invention;

Fig. 2 is a longitudinal section as seen at 2—2 of Fig. 1;

Fig. 3 is a longitudinal section on an enlarged scale as seen at 3—3 of Fig. 1;

Fig. 4 is a fragmentary sectional detail of the top sheet feeding mechanism shown in a moved position;

Fig. 5 is a longitudinal section on an enlarged scale as seen at 5—5 of Fig. 2;

Fig. 6 is a longitudinal section on an enlarged scale as seen at 6—6 of Fig. 2;

Fig. 7 is a detail top view as seen at 7—7 of Fig. 2;

Fig. 8 is a fragmentary detail as seen at 8—8 of Fig. 6;

Fig. 9 is a transverse section on an enlarged scale as seen at 9—9 of Fig. 2;

Fig. 10 is a fragmentary detail showing the arrangement of the photo-electric cell and its associated structure as seen in Fig. 9;

Fig. 11 is a transverse section on an enlarged scale as seen at 11—11 of Fig. 2;

Fig. 12 is a fragmentary perspective showing a portion of the packaging tables and the frame;

Fig. 13 is a transverse section on an enlarged scale as seen at 13—13 of Fig. 2;

Fig. 14 is a fragmentary sectional detail as seen at 14—14 of Fig. 13;

Fig. 15 is an enlarged sectional top view as seen at 15—15 of Fig. 13;

Fig. 16 is a fragmentary side view partly sectioned as seen at 16—16 of Fig. 15;

Fig. 17 is a fragmentary detail of a part of the structure of Fig. 16;

Fig. 18 is an enlarged side view as seen at 18—18 of Fig. 5;

Fig. 19 is an enlarged side view similar to Fig. 18 as seen at 19—19 of Fig. 5;

Fig. 20 is a sectional detail as seen at 20—20 of Fig. 18;

Fig. 21 is a fragmentary sectional detail as seen at 21—21 of Fig. 20;

Fig. 22 is an enlarged sectional view as seen at 22—22 of Fig. 2;

Fig. 23 is a fragmentary perspective of one end of the structure of Fig. 22;

Fig. 24 is a fragmentary sectional view as seen at 24—24 of Fig. 22, together with a section of the table;

Fig. 25 shows the structure of Fig. 24 in a moved position;

Fig. 26 is a fragmentary perspective of a portion of the feed table;

Fig. 27 is a perspective of the supplementary positioning table as shown in Fig. 26;

Fig. 28 is a schematic detail showing the main cams of Fig. 2 and their associated structure;

Fig. 29 is a fragmentary sectional detail as seen at 29—29 of Fig. 28;

Fig. 30 is a fragmentary perspective showing an object to be wrapped positioned on the lower web;

Fig. 31 is an enlarged schematic detail showing the position of the feed structure at the time the first photo-electric cell beam is interrupted;

Fig. 32 shows the structure of Fig. 31 in a moved position;

Fig. 33 is a fragmentary perspective showing the upper and lower webs as sealed by the operation of Fig. 32;

Fig. 34 is an enlarged schematic detail similar to Fig. 31 with the package at a subsequent station on the table;

Fig. 35 is an enlarged schematic detail showing the completion of the rear seal on the package;

Fig. 36 is a fragmentary perspective of the sealed package corresponding to Fig. 35;

Fig. 37 is an enlarged schematic detail showing the package at a subsequent station on the table, preparatory to the application of the side or longitudinal sealers;

Fig. 38 is a schematic top view showing the relative positions of the longitudinal sealing elements and knives just prior to application of the longitudinal seals;

Fig. 39 is an enlarged schematic detail showing one of the longitudinal sealers;

Fig. 40 is a schematic top view of the package and webs corresponding to Fig. 39 with the sealing elements removed;

Fig. 41 is a fragmentary perspective corresponding to Fig. 40;

Fig. 42 is an enlarged schematic view showing the action of the stripper;

Fig. 43 is a fragmentary top view showing the webs after the stripper has ejected the sealed package;

Fig. 44 is a perspective of the sealed package;

Fig. 45 is a sectional detail as seen at 45—45 of Fig. 44;

Fig. 46 is a schematic view corresponding to Fig. 3 but showing a modified structure;

Fig. 47 is a transverse sectional view as seen at 47—47 of Fig. 46;

Fig. 48 is a schematic view corresponding to Fig. 5 but showing the modified form of Fig. 46;

Fig. 49 is an enlarged sectional detail as seen at 49—49 of Fig. 46;

Fig. 50 is a fragmentary sectional view as seen at 50—50 of Fig. 49;

Fig. 51 is a fragmentary sectional detail as seen at 51—51 of Fig. 49;

Fig. 52 is a fragmentary top view of a part of the structure of Fig. 50 in a moved position;

Fig. 53 is a perspective of an irregular object which may be sealed by the present invention;

Figs. 54*a* and 54*b* together show a wiring diagram for a packaging machine employing five light-sensitive cells for controlling the sealing and cutting elements of the machine;

Fig. 55 is a wiring diagram showing modified control circuits using only three light-sensitive cells;

Fig. 56 is a simplified circuit similar to Fig. 55 but utilizing the leading edge of the following article to actuate the side sealing heads; and

Fig. 57 is a wiring diagram of the modified form shown in Figs. 46–52.

Automatic wrapping machinery of the type adapted to heat seal objects and especially food products, is notable for the excessive floor space required, its cost, and the inability to continuously wrap articles of different size. While some wrapping machines are large enough to accom-

modate objects of various sizes and shapes, it is in all cases necessary to stop the machine in order to make required adjustments for size and shape variations. The machine can then handle only articles of the size to which it has been adjusted. If the articles are smaller, the package is too large, thus detracting from its appearance and also wasting wrapping material. If the articles are too large, then the machine cannot completely wrap them until it is further adjusted. It will be apparent that such a machine requires sorting all the objects to be wrapped into uniform sizes and in many cases it does not pay to wrap only a small quantity of any one size.

The present invention on the other hand, provides an automatic machine which will continuously adjust itself to any specific size or shape of object that may be fed to the machine within predetermined limits.

My invention comprises essentially the provision of a horizontal table over which a sheet or web of transparent wrapping material is fed. This web is a thermoplastic sheet material capable of being heat sealed, well known examples of which are rubber hydrochloride commonly marketed under the name of "Pliofilm" and regenerated cellulose. The articles to be wrapped are placed on the lower sheet or web in front of the feeding table and the web conveys the article to the first station on the table. At or before the article reaches this first station, an upper sheet or web of similar material is fed over the article so that the leading edge of the article is in position to be fed between the upper and lower sheets when the article reaches the first sealing station. At this point, the leading edge of the article interrupts a horizontal and/or vertical light beam directed into the path of the article across or upon the table so that the feeding mechanism for both the upper and lower webs is arrested and a heat sealing head is depressed vertically to seal the upper web to the lower web transversely in front of the article and in spaced relation thereto. At the same time, both webs are slit by a knife carried between two parallel heating elements on the sealing head.

As the transverse sealing head is raised on its return stroke, suitable electrical controls are activated whereby the web feeding mechanism is restarted so that the article progresses to the second station, whereupon a beam from a second photoelectric cell assists in retaining the transverse sealing head in a raised position to prevent its returning on a downward stroke until the trailing edge of the article clears the second beam regardless of the length of the article. When this occurs however, the sealing head is caused to lower again to make a second seal after the trailing edge of the article and in predetermined spaced relation thereo.

When the article intercepts the next sequential light beam, the circuits controlling the positioning of the longitudinal sealing members are conditioned and in one form of the device, a transverse carriage carrying one of the longitudinal sealing members as well as another photoelectric cell, is moved laterally toward the object. As soon as the beam on the lateral carriage is intercepted by the side of the article, the carriage stops and after a predetermined overtravel, it reverses its direction to move away from the article. As the beam reaches the side of the article again, it is no longer interrupted and such energization of the photo-electric cell stops

the carriage to position the lateral movement of the longitudinal sealing element. This reversed lateral movement of the carriage is repeated so that the carriage moves outwardly in successive increments as the width of the article may increase during its travel along the table. When the trailing edge of the article clears another light beam, the actuating mechanism for the longitudinal sealing elements is energized so that the longitudinal seals are made in accordance with the maximum width of the article.

As soon as the longitudinal seals have been effected, a stripper device is actuated to eject the wrapped article from the table.

The number of photo-electric detecting means required and the controlling circuits, may be varied in accordance with the particular conditions encountered. For example, if the articles are of uniform width, the automatic scanning device may be retained in a fixed position. If the operator is capable of placing the objects on the table at constant intervals, then a slightly modified circuit may be employed. Likewise, the mechanism may be continuously in motion so that the operator merely has to place the articles in the lower web or the feeding elements may be so arranged that the machine is put in motion only when the article is placed on the web at a given station.

One form of the wrapping machine which will be initially described, utilizes one relatively fixed longitudinal sealing element, in which case all variations in width are accommodated by lateral movement of the other longitudinal sealing element. A modified form however, permits increased efficiency by moving both longitudinal sealing members simultaneously, either to or from the centerline of the table. In this form, it is desirable that the articles be centered on the table so that a minimum of wrapping material be used.

Referring now more particularly to the drawings, the article wrapping machine constructed in accordance with the present invention comprises a front table 1 which is in line with a rear table section 2. The table sections are supported by central cross members 3 and 4 and end cross members 5 and 6 (Fig. 2). The tables and their associated cross members are in turn supported by central posts 7, 8, 9 and 10 as well as four corner legs, two of which are shown at 11 and 12 in Fig. 2, and one at 13 in Fig. 26. The corner legs also support a subframe assembly comprising longitudinal frame members 15 and 16 which are integrally secured to six cross members 17, 18, 19, 20, 21 and 22 (Figs. 6 and 3).

Lower web feeding mechanism

A supply roll 25 of sheet wrapping material is rotatably supported on subframe members 15 and 16 by means of brackets 26 and the web of sheet material is fed from roll 25 over small rollers 27 and 28 to the top of first table section 1. As the web 29 of wrapping material progresses across tables 1 and 2, its position and rate of feed are controlled by a plurality of driven rolls 30, 31; 32, 33; 34, 35; 36, 37; 38, 39; and 40, 41 mounted in cooperating pairs. The initial pairs of feed rolls 30, 31 and 32, 33 are provided with suitable perforating means 42, 42 on the upper rolls 30 and 32, and cooperating backing surfaces 43, 43 on the cooperating lower rolls 31 and 33. Lower rolls 31 and 33 are mounted on a cross shaft 45 which is journaled in longitudinal frame members 46 and 47, and also in bearings 48 and 49 mounted

under platform 1. Shaft 45 is driven through sprockets 55, 56 and chain 57 by the main motor 58 (Figs. 5, 6 and 7). Sprocket 56 is mounted on shaft 59 to which it is rigidly secured (Fig. 7). Shaft 59 also carries a rotatable and slidable sleeve 60 and a driving clutch element 61. Sleeve 60 is provided with a driven clutch element 62 having teeth which cooperate with driving element 61. The driven element 62 is integral with sleeve 60 and may be axially moved on shaft 59 by means of a yoke and lever assembly 63 pivoted to frame member 64 at 65. Clutch lever 63 is urged into engaging position by means of spring 66 and may be disengaged by a solenoid 67. An adjustable limit stop 68 for lever 63 is mounted on frame member 69. Shaft 59 is journaled in brackets 70 and 71 which are mounted on frame members 69 and 72 respectively and a driving connection from the shaft 59 to a gear reduction box 73 is made through a sprocket 74 on sleeve 60, chain 75 (Fig. 2) and sprocket 76 on shaft 77 of the reduction box. Drive between motor 58 and the reduction box 73 is through sprocket 78 on the motor, chain 79 and sprocket 80 on the reduction box (Fig. 6).

Referring now to Fig. 5, the top rolls 30 and 32 which cooperate with bottom rolls 31 and 33 respectively, are mounted on stub shafts 83 and 84 which are in turn journaled on table 1 in bearings 85, 86 and in frame members 46 and 47. Both stub shafts 83, 84 and cross shaft 45 are retained axially by means of collars 87, 87. Stub shafts 83 and 84 are driven from cross shaft 45 through two pairs of meshing spur gears 88, 89 and 90, 91. Rolls 34, 35 are also mounted on stub shafts 92 and 93 respectively, and shaft 93 is driven from shaft 45 through sprocket 94 on shaft 93, sprocket 95 on shaft 45, and chain 96. Shafts 92 and 93 are interconnectingly driven through spur gears 97, 98 and the shafts are journaled in frame 46 at one end and in bearing block 99 at the opposite end. Shaft 93 carries a sprocket 101 which drives stub shaft 102 through sprocket 103 on shaft 102, and chain 104. Stub shaft 105 which carries roll 38, is journaled in bearing 99 and frame member 46, and is driven from shaft 102 through intermeshing gears 106 and 107. Roll 39 is carried by shaft 102 and cooperates with roll 38 to grip one edge of the web 29 in the same manner as do rolls 34, 35 and rolls 30, 31. Shaft 102 also carries a sprocket 108 which drives a cross shaft 109 through sprocket 110 and chain 111 (Fig. 13). Shaft 109 is journaled in bearings 112 and 113 on longitudinal frame members 15 and 16 respectively. Shaft 109 also carries a sprocket 114 at its opposite end which drives stub shaft 115 through sprocket 116 on shaft 115 and chain 117. Stub shaft 115 is positioned transversely across the web 29 from shafts 102 and 105 and is journaled in frame member 47 and bearing block 118 secured to table 2. Shaft 115 carries roll 41 and drives stub shaft 119 through gears 120 and 121. Shaft 119 which carries roll 40, is likewise journaled in frame member 47 and bearing 118.

Intermediate rolls 36 and 37 which are mounted on shafts 123 and 124 respectively, are driven in the same way through gears 125, 126, sprocket 127 on shaft 124, sprocket 128 on shaft 115, and chain 129. This completes the driving connections for the web feed rolls on either side of the tables 1 and 2. It will be understood from the above that all of the rolls for feeding the web along the tables are positively driven from shaft 45 which is in turn controlled by the action of clutch members 61 and 62. In this way the electrical circuit to solenoid 67 automatically stops or starts the web moving along the tables. Furthermore, when solenoid 67 is deenergized, the clutch is engaged, thus turning all the feed rolls; but when solenoid 67 is energized, the clutch is disengaged, thus stopping the rolls and the web 29.

Upper web feeding mechanism

Having thus described the feeding mechanism and the control mechanism for the lower web 29, the feeding mechanism for the upper web 135 will now be described in detail. A storage roll 136 of sheet or web material similar to web 29 but slightly narrower, is mounted in brackets 137, 137 which in turn are supported on cross member 138 attached to posts 7 and 8 (Figs. 2–4 and 9). The web 135 is fed from roll 136 over idler roller 139 mounted on arms 140, 140 to a roller 141 journaled in brackets 142, 142 and thence over a third idler roller 143 journaled in pivoted arms 144, 144.

Roller 143 serves as a tensioning and slack roll due to its pivotal action. Arms 144, 144 are secured to bar 145 which is journaled in brackets 146, 146 and retained therein by means of collars 147, 147. Roller 143 as well as arms 144 are spring-loaded upwardly by means of fly springs 148, 148. From takeup roller 143, the web 135 passes around and underneath a small fixed bar 149, thence downwardly and around a larger idler roller 150 and around a still larger stationary bar 151 which serves as a drag for the web feed. From bar 151, the web passes downwardly to the top of table 1 where it meets and is fed with the lower web 19, as will be explained more fully hereinafter.

The timed drive and control for the upper web 135 is achieved by means of positively driven rolls 152, 152 on roll shaft 152*a* journaled in pivoting arms 153, 153 and retained thereon at one end by collar 154 and at the other by a sprocket 155. Sprocket 155 is drivingly connected with sprocket 156 on shaft 45 by means of chain 157 so that drive roll 152 turns at all times when shaft 45 turns and is therefore likewise under the control of solenoid 67. Nevertheless, the contact between drive roll 152 and idler roll 150, regardless of whether roll 152 is moving or stationary, is provided by pivoting arms 153, 153 on shaft 45 by means of solenoid 158 (Fig. 3). Arms 153 are slotted at 159 to permit limited pivoting thereof without interfering with upper stub shafts 83 and 84, as shown in Figs. 3, 4 and 5. Spring 160 which is anchored to frame member 161, urges arms 153 to pivot counterclockwise as seen in Fig. 3, thus causing engagement between driving roll 152 and idler roll 150. The armature 162 for solenoid 158 is connected to a cross shaft 163 which connects the lower extremities of arm 153 through tension springs 164, 164. It will be apparent that when solenoid 158 is deenergized, spring 160 urges roll 152 into close engagement with roll 150 to feed web 35 around roll 150 and bar 151. When solenoid 158 is energized however, arms 153 pivot to the position shown in Fig. 4 to discontinue positive feed of the web 135. It will thus be understood that solenoid 158 controls the contact between the drive roll 152 and the web 135, whereas solenoid 67 controls the turning of the roll 152. Fig. 4 illustrates the manner in which the tensioning roll 143 functions when drive roll 152 is retracted from contact with idler roll 150; as web 135 is

drawn over bar 151, roll 150 and roll 149, arms 144 are depressed, thus permitting the web to feed around the above rolls under controlled tension of springs 148, 148. Upward movement of arms 144 thereafter draws a fresh supply of web 135 from storage roll 136, thus avoiding overtravel of roll 136 and at the same time maintaining substantially constant tension on the web. Arms 144 are returned to their upward position (as seen in Fig. 4) by means of brackets 165, 166 which are mounted on the first sealing mechanism which will be described more fully hereinafter.

Transverse or end sealing head assembly

The transverse sealing head assembly 170 is adapted to reciprocate vertically in ways 171 and 172 on posts 8 and 7 which are secured to frame members 46 and 47. The function of sealing head 170 is to press a pair of transverse heat sealing elements 173 and 174 against the overlapped webs 135 and 29. Sealing elements 173, 174 are positioned at opposite sides of a knife 175 also mounted in the sealing head 170. It is the function of the sealing element 174 to make the second transverse seal along the trailing edge of a packaged article, whereas sealing element 173 makes the first seal for the following article. Knife 175 which has saw teeth 176, severs the webs between the two consecutive packages and is received by a transverse slot 177 in table 1. The knife 175 is somewhat shorter than the width of web 135 so that sufficient web material remains intact after severing to permit the webs to continue their travel along the tables under control of the rolls 30–41.

The heating elements 173 and 174 are mounted on a pair of vertically movable spring-loaded plungers 178 and 179 (Fig. 22) which extend upwardly through the sealing head cross member 180. Plungers 178 and 179 extend through the partially closed upper end of spring chambers 181 and 182 and are urged downwardly by means of helical compression springs 183 and 184 which abut collars 185 and 186, secured respectively to shafts 178 and 179. Chambers 181 and 182 are mounted on and attached to the top of cross member 180 by means of cap screws 187. Knife 175 however, is fixed in bar 180 so that when the sealing head 170 descends, the sealing elements 173 and 174 will be displaced upwardly with respect to cross bar 180 and at the same time be urged against webs 135, 29 and table 1 under the pressure of springs 183 and 184 as shown in Fig. 25. In this position, knife 175 will be forced through the webs to sever them partially across their width. The heating elements are connected to a suitable source of electric current through conduit 188 and may be of any standard construction.

Sealing head 170 also carries a safety device comprising a pair of guards 190 and 191. These extend lengthwise of the sealing head and are slidably held in brackets 192, 192 and 193, 193. Brackets 192 are mounted on the bottoms of plungers 178 and 179, whereas brackets 193 are secured to cross bar 180. The guards 190 and 191 are interconnected by means of inverted U-shaped clips 194, 195 which extend upwardly through brackets 193, 193 and cooperate with levers 196, 197 which actuate switches 198 and 199 respectively. The function of guards 190 and 191 is to positively stop the machine in the event any obstruction such as an operator's hand should become caught between the table and the sealing head 170. As will be described more fully hereinafter, suitable electrical circuits render the switches 198, 199 inoperative for this purpose when the bottom edges of guards 190, 191 come to within about ⅛" from the top of table 1. This feature prevents stopping the machine during the standard sealing cycle.

Cross bar 180 is secured integrally to vertical slides 200 and 201 which reciprocate in ways 171 and 172, and the bottom of each slide 200 and 201 is provided with a shoulder 202, 202 which serves as an abutment for helical compression springs 203, 203. Guide rods 204, 204 on each slide 200 and 201 extend downwardly within springs 203, 203 and reciprocate within guide sleeves 205, 205. Springs 203 are compressed between shoulders 202, 202 and the bottom frame members 206, 206 so that the entire sealing head assembly 170 may be caused to reciprocate vertically by means of cam followers 207, 207 which are secured to slides 200 and 201.

A pair of pneumatic dash pots 208, 208 are mounted on the frame cross member 138 and are operatively associated with cross bar 180 by means of pistons 209, 209 and plugs 210, 210. When the sealing head is at the bottom of its stroke, the cylinders 211, 211 of dash pots 208 are vented through orifices 212, 212 and as the sealing head is urged to return to the top of its stroke by means of springs 203, 203, vents 212 are automatically cut off by the walls of cylinders 211, 211 and the pressure which is built up within the cylinders is controllably exhausted through a suitable relief valve (not shown) similar to valve 213, and fluid connections 214 and 215 (Fig. 13).

Actuating mechanism for transverse sealing head assembly

The actuating mechanism for the sealing head 170 is illustrated in Figs. 6 and 9 and comprises a countershaft 216 journaled on longitudinal subframe members 15 and 16 by bearings 217 and 218. Shaft 216 carries a pair of identical cams 219, 220 at either end thereof and these cams cooperate with cam followers 207, 207 on slides 200 and 201 as described above. A driving connection for the shaft 216 is provided from reduction gear box 73 through a sprocket 221 on shaft 77 on the gear box, sprocket 222 rotatably mounted on shaft 216, and chain 223. The hub of sprocket 222 is provided with a plurality of ratcheting teeth which may be caused to mate with the teeth on sliding collar 224 which is slidably keyed or splined to shaft 216. A clutch yoke 225 serves to engage and disengage sprocket 222 and collar 224 when lever 226, which is pivoted to frame member 21 at 227, is actuated by means of solenoid 228. When solenoid 228 is energized, lever 226 causes the clutch to become engaged but the teeth on collar 224 and sprocket 222 remain in engagement for one revolution only, due to the locking action of segment 229 which engages ring 230 on collar 224 and holds it in the locked position (Fig. 8). When collar 224 has made a complete revolution, and in the event solenoid 228 is deenergized, automatic disengagement of the clutch takes place by means of spring 231 which is connected to the armature 232 of the solenoid and to bracket 233.

For the purpose of providing a quick-acting positive brake for the sealing head 170, shaft 216 at its opposite end carries a fixed clutch member 234 which is non-rotatably secured to the subframe member 235 by means of bolts 236, 236. A

toothed collar 237 is slidably keyed or splined to shaft 216 and is axially movable by means of lever 238 pivoted to frame member 21 at 239. Lever 238 is in turn controlled by the action of solenoid 240 and spring 241 so that when solenoid 240 is energized, the brake is disengaged and shaft 216 is free to turn. In the event that solenoid 240 becomes deenergized, spring 241 instantly engages the brake, thus locking shaft 216 from further turning. Axial movement of shaft 216 is controlled by means of collar 242 adjacent bearing 217. It will thus be understood that whenever solenoid 228 is energized, shaft 216 will make one revolution only, provided solenoid 240 is likewise energized to release the brake. This in turn lowers sealing head 170 to complete a transverse seal between webs 135 and 29 as previously described.

Longitudinal or side sealing head assembly

Referring now to Figs. 1, 3 and 13, the longitudinal sealing of webs 135 and 29 is accomplished by means of a relatively fixed sealing head assembly 245 and a movable sealing head assembly 246. The construction of both sealing heads 245 and 246 is substantially similar to sealing head 170 except that it is only necessary to heat a single sealing element in the longitudinal heads because in these heads it is only necessary to seal along the inside of the slit or cut made by the knife, whereas the cut made by the transverse sealing head 170 may serve either at the same time or separately as the terminus for the leading edge of the package as well as the trailing edge. This requires a seal to be made on either side of the cut.

The fixed longitudinal sealing head 245 is provided with a knife 247 which is anchored in cross arm 248 in the same manner as shown in conjunction with Figs. 22–25 but this sealing head likewise carries one dummy or disconnected heat sealing element 249 as well as a "hot" sealing element 250 supported on rectangular extensions 251, 251 of shafts 252, 252. Shafts 252, 252 are spring-mounted by means of springs in housings 253, 253 as shown in conjunction with sealing head 170 (Figs. 22–25). The sealing heads 245, 246 are provided respectively with emergency guard assemblies 254 and 255 which are slidably retained by clips 256, 256 and 257, 257. The guard assembly 254 on sealing head 245 actuates either or both switches 258 and 259 mounted on cross arm 248, which function in the same manner as switches 198 and 199. The construction of both sealing heads 245 and 246 with regard to the guards, heat sealing element 260, dummy element 261, element mounting means, and knife 262, is similar to that of sealing head 170 (Figs. 22–25). Cross arm 248 however, of sealing head 245 is provided with a cutout portion which is surrounded by a sleeve 263 enclosed by cap 264. Sleeve 263 carries a spring-loaded pin 265 which may be retracted to position the sealing head 245 laterally along the cross member 266 of the longitudinal sealing head carriage assembly. Member 266 is provided with suitable notches 267, 267 in which pin 265 may be located to retain the sealing head 245 in its proper lateral adjustment.

Sealing head 246 has a cross bar 270 likewise having a sleevelike central extension 271 which is enclosed by a cap 272. Extension 271 carries a pair of vertical apertures which extend on either side of member 266 and are adapted to slidably receive shafts 273, 273 which automatically position sealing head 246 on member 266 in a manner to be described more fully hereinafter. Cross bar 270 likewise carries a pair of switches 274 and 275 which are actuated by the guards on sealing head 246 in the same manner that has been previously described in conjunction with sealing heads 170 and 245.

Actuating mechanism for longitudinal sealing head assembly

Vertical movement for sealing heads 245 and 246 takes place when the carriage on which they are mounted is caused to reciprocate vertically in ways 276 and 277 secured to posts 9 and 10 as shown in Figs. 11 and 13. Cross arm 266 is secured to the tops of slides 278 and 279 by means of plates 280, 280 and cap screws 281, 281. Slides 278 and 279 terminate at their lower ends in shoulders 282, 282 which abut helical compression springs 283, 283 acting against frame members 206, 206. Slides 278 and 279 are guided by extensions 284, 284 which reciprocate within sleeves 285, 285 as previously described in conjunction with Fig. 9. Slides 278 and 279 are likewise provided with cam followers 286 and 287 respectively, which cooperate with identical cams 288 and 289. Cams 288 and 289 are rigidly mounted on countershaft 290 which is journaled in bearings 291 and 292, mounted on subframe members 15 and 16 (Fig. 6). Shaft 290 is selectively driven through a rotatable dual sprocket 293 which is drivingly connected with sprocket 222 through chain 294. The hub of sprocket 293 is provided at one end with ratchet teeth 295 which are adapted to mesh with teeth 296 on slidable clutch member 297. Clutch member 297 is non-rotatably but axially slidable on shaft 290 in the same manner that has been previously described in conjunction with shaft 216. Engagement between member 297 and member 293 is provided through a clutch yoke 298 which is actuated by means of a lever 299 pivoted to frame member 19 at 300. Solenoid 301 controls lever 299 through armature 302 and spring 303 in exactly the same manner that solenoid 228 controls the transverse sealing shaft. Clutch 297 is also provided with a one-revolution lock 304 which engages ring 305 in the same manner that has been described in conjunction with ring 229. Fig. 8 illustrates the detail of the locking device for both clutches 297 and 225. The opposite end of shaft 290 is provided with a braking device 310 similar to that described for shaft 216. This comprises a rigid stationary sleeve 311 secured to frame member 312 by bolts 313, 313 and having teeth 314 adapted to engage with axially slidable keyed or splined brake member 315. Brake 310 is controlled by solenoid 316 through link 317, lever 318 pivoted to frame member 19 at 319, and spring 320. When solenoid 316 is energized, lever 318 is pivoted to disengage teeth 314, thus releasing the brake. When however, the energizing circuit to solenoid 316 and to solenoid 240 is broken, springs 320 and 241 instantly set the brakes to lock shafts 290 and 216 against further rotation.

The longitudinal sealing carriage is also provided with suitable dash pot mechanism comprising cylinders 325 and 326 to which air conduits 214 and 215 are connected. Pistons 327 and 328 are attached to brackets 280 and are suitably vented at 329, 329 to permit cylinders 325 and 326 to fill with air when the carriage is in its lowered position. As the carriage returns on its upward travel under pressure of

springs 283, 283, a certain volume of air is entrapped in cylinders 325 and 326 so that the carriage returns to its upper position without excessive jarring due to the controlled release of air from the cylinders through bleed valve 213. It will be understood that the identical dash pot arrangement may be used in conjunction with the transverse sealing head 170.

Scanning mechanism

The automatic positioning mechanism for movable sealing head 246 will now be described in detail. Posts 9 and 10 are connected at their tops by cross members 330, 330 on which a carriage 331 is controllably reciprocated transversely of the feeding table 2. A chain 332 is contained within cross member 330 and connects idler sprocket 333 and driven sprocket 334. Driving connections for chain 332 are provided through shaft 335 journaled in bracket 336 (Fig. 14), sprocket 337 on shaft 335, chain 338, and sprocket 339 mounted on longitudinal drive shaft 340 (Figs. 2, 6 and 13). Shaft 340 is journaled in bearings 341 and 342 mounted on subframe member 16 and carries at its opposite end a mitre gear 343 which meshes with mitre gear 344 on shaft 345 from reduction gear box 73 (Fig. 6). It will thus be understood that chain 332 moves at all times when motor 48 is turned on since there is no clutch or other disconnecting mechanism between the chain and the motor.

Referring now to Figs. 15–17, carriage 331 has a dog 345 pivotally mounted in the carriage on shaft 347. Shaft 347 extends beyond the carriage 331 and at one end carries a registering lever 348 provided with a tapered teat 349 which may be selectively engaged in the various notches of a rack 350 secured to one side of lower cross member 330. The opposite end of shaft 347 carries a bell crank (Fig. 11) having one arm 351*a* extending in a substantially vertical direction and a second arm 351*b* extending in a substantially horizontal direction. Arm 351*a* is pivotally connected to the armature 352 of solenoid 353, and arm 351*b* is pivotally connected to the armature 354 of solenoid 355. Retracting solenoids 356 and 356*a* are oppositely connected to arm 351*b* by means of slotted link armatures 357 and 357*a* respectively. Since chain 332 is traveling at all times, it will be understood that if either solenoid 353 or solenoid 355 is energized, shaft 347 will be turned to engage dog 346 with either the upper or lower flight of chain 332 as the case may be. When solenoid 353 is energized to turn shaft 347 in a clockwise direction as seen in Fig. 11 (counterclockwise as seen in Fig. 16), dog 346 will become engaged by the upper chain flight 332*a* of chain 332 as shown in full lines in Fig. 17, thus causing carriage 331 to move to the right (as seen in Figs. 13, 15 and 16) with upper chain flight 332*a*. On the other hand, when solenoid 355 is energized, shaft 347 turns in the opposite direction so that dog 346 engages the lower flight 332*b* of chain 332 as shown in broken lines in Fig. 17. Solenoids 356 and 356*a* are holding solenoids which retract arm 351*b* to a substantially horizontal neutral position and thus hold dog 346 midway between the upper and lower chain flights.

Referring now to Figs. 12 and 25, it will be understood that the knives 247 and 262 of sealing heads 245 and 246 are pressed through the webs 135 and 29 as shown in Fig. 25, so that the teeth of the knives extend below the top of table 2. It is therefore important to provide slots 358, 358 in the table 2 to receive knives 247 and 262 in order to effect complete slitting of the webs. To insure that the knives 247 and 262 always register with a slot 358, holes 267 in cross bar 266 are so spaced that knife 247 in sealing head 245 registers with one of the slots 358. However, since sealing head 246 traverses cross bar 266 in accordance with the engagement of dog 346 and chain 332, a registering means for the moving sealing head is provided. This is accomplished by rack 350 and it will be noted in referring to Figs. 15 and 16 that whenever dog 346 is in the disengaged position of Fig. 16 so that the carriage 331 is stationary, the teat 349 on lever 348 must engage in one of the notches of rack 350. These notches are so positioned with respect to slots 358 that as long as teat 349 is between two teeth of the rack, knife 262 on sealing head 246 always registers with one of the slots 358, 358.

The driving connection between carriage 331 and sealing head 246 is accomplished through shafts 273, 273 which depend downwardly from the carriage 331 and are sufficiently long to permit constant yet slidable engagement with sleeve 271 on the sealing head 246. Thus, movement of carriage 331 transversely of the platform carries with it the sealing head 246 which is in turn free to drop vertically when the shaft 290 is driven as described above.

Package stripper or ejecting mechanism

Referring now to Figs. 18–21, the mechanism for ejecting the sealed and severed articles from the top of table 2 will now be described. Cam 289 carries a raised surface 359 (Fig. 28) which is adapted to strike a roller 360 mounted on an articulated arm 361 pivoted on shaft 362. If for any reason cam 289 should reverse its direction, the lower part 361*a* of the arm will pivot at 363 to prevent damage to the stripping device.

Shaft 362 is journaled in a bracket 364 secured to transverse frame member 3 and carries at its opposite end a finger 365 (Fig. 18). In the normal inactive position shown in full lines in Figs. 18 and 28, finger 365 rests upon a spring 366 extending through a slot in the frame member 3 and secured thereon by means of clamp and bolt 367. The ejecting mechanism proper comprises a rake assembly 368 consisting of a plurality of fingers 369, 369 adapted to extend from bottom to top through slots 358 and to move longitudinally in the slots. Rake 368 is secured to shaft 370 by means of bracket 371, and shaft 370 is pivotally journaled in carriage 372 which is slidable on ways 373 and 374. The shaft 370 extends through carriage 372 and is provided with an arm 375 carrying a roller 376 at its opposite end. Within the carriage, the shaft 370 carries a dog 377 which is adapted to selectively engage either the upper flight 378*a* or the lower flight 378*b* of chain 378. When arm 375 is in the raised position shown in broken lines in Fig. 18, dog 377 engages upper flight 378*a* of chain 378 so that the rake 368 is pivoted to raise the tips of fingers 369 upwardly through slots 358 and simultaneously to move the entire rake and carriage longitudinally of table 2 so that an article is quickly removed from the table. It is important that the rake and carriage operate at a relatively high speed so that even small articles are removed from the table as soon as the longitudinal seals and cuts have been made. This completely clears the table 2 before the next actuation of the longitudinal sealing heads. The action of the fingers in this respect is shown in Fig. 42. Chain 378 is

mounted on idler sprocket 380 and driving sprocket 381 which is connected to sprocket 382 by shaft 383. Figs. 2 and 6 show the driving connections for sprocket 382 which are through chain 384 and sprocket 385 connected to shaft 386. Shaft 386 is in turn journaled in bearings 387 and 388 on the frame and carries a sprocket 389 to duel sprocket 293 by chain 390 providing a direct and continuous drive through chains 294 and 223 to the reduction gear box 73.

Referring now to Figs. 18–20, when finger 365 is raised due to turning of shaft 362, it will turn clockwise from the neutral to a substantially horizontal position shown in broken lines in Fig. 18, to raise arm 375 and cause dog 377 to engage upper flight 378*a* of chain 378. Finger 365 is in line with track 391 and when raised, serves as an extension for the track. As soon as dog 377 engages chain 378, the carriage 372 together with rake 368 and arm 375, is rapidly moved on ways 373 and 374. As soon as roller 376 passes from finger 365 it is engaged by track 391 to retain dog 377 in engagement with upper chain flight 378*a*. When carriage 372 reaches the broken-line position as shown to the left in Figs. 18 and 20, roller 376 drops off the end of track 391 and, under the tension of spring 392, dog 377 disengages from upper flight 378*a* and instantly engages with lower flight 378*b* of chain 378. This causes rake 368 to pivot clockwise and retract fingers 369 below the top of table 2 and within the confines of slots 358. Simultaneously with the engagement of dog 377 with the lower or return flight 378*b* of chain 378, the carriage 372 and rake 368 move rapidly back to their initial starting position. However, before carriage 372 has fully returned, cam 289 has also turned sufficiently to permit arm 361 to resume its normal position (as shown in Fig. 28) and this drops finger 365 to the downward position of Fig. 18. As the carriage 372 continues its travel to the right, finger 365 picks up roller 376 and pivots arm 375 upwardly to disengage dog 377 from lower flight 378*b* and retain it in a neutral position in which the tops of fingers 369 are just below the top of table 2 and the dog is entirely disengaged from chain 378.

Electrical control system

From the above detailed description, it will be understood that the general method of operation of the present wrapping machine is such that articles to be packaged (such as a chop 395) which may if desired be placed in a tray 396 (Figs. 30 and 33) are placed on web 29 as it traverses table 1. From thence, the web which acts as a conveyer, carries the articles under the upper web 135. Thereupon the sealing head 170 is actuated to provide a transverse seal and slit partially across webs 29 and 135. It will be noted in this connection that web 135 is at no time controlled by the various drive rolls 30–41 since it is substantially narrower than the lower web 29. As the first article 395 progresses across table 1, the next article is placed upon web 29 and sealing head 170 is again lowered after the first article has progressed sufficiently to clear the head. This second lowering of sealing head 170 provides the rear transverse seal and cut for the article and may in some cases provide the forward transverse seal for the second article. When sealing head 170 is raised, the webs are started again until the first article reaches table 2. At this point, the scanning mechanism automatically determines the maximum width of the article, whereupon the longitudinal sealing heads 245 and 246 are lowered to provide seals and cuts on opposite longitudinal sides of the article. This second sealing operation then completes the sealing of the article and substantially severs the sealed web portions from the web portions under control of rolls 30–41. As soon as the longitudinal sealing heads 245 and 246 have raised sufficiently, the rake 368 is raised as described above, to eject the wrapped article from the top of table 2.

It will be understood that Figs. 38–41 show the webs as they would appear when the first article 396 is being run through the packaging machine. Figs. 43 and 48 on the other hand, illustrate the nature of the web after preceding articles of various widths have been sealed and ejected from the table.

When a comparatively high article is positioned under the longitudinal sealing heads, it may be that the corner areas of the webs near the outer termini of the rear transverse seal may be under considerable tension as the longitudinal sealing heads descend to draw the upper web around the article. Since the longitudinal cuts have not been made, this tension might be sufficient to rupture the lower web completely, thus destroying the continuity of control with regard to the last pairs of rolls. Therefore, in order to prevent such undesired rupture of the edges of the web 29 before they have passed between rolls 38, 39 and 40, 41, web 29 is perforated or otherwise weakened by the perforating elements 42, 42 on rolls 30 and 32. These weakened scores or lines 397 and 398 (Figs. 38, 40, 41, 43) are located at or slightly inside the transverse edges of web 135. The slits made by knife 175 do not extend transversely the full distance between scores 397 and 398 so that there is always a sufficient amount of material in web 29 to prevent tearing of the web during its progress across tables 1 and 2 (Fig. 40). The ends of the slits are, however, sufficiently close to scores 397 and 398 to insure that the web always ruptures along the scores 397, 398 if there is sufficient tension in the webs before the longitudinal cuts are made. This permits the unused portion of both webs 135 and 29 to be retained under control of rolls 38–41 and thence removed from table 2.

The automatic actuation of the sealing heads and the scanning device as well as the stripper, is controlled by one or more photo-electric cells positioned at various points along platforms 1 and 2 and also on carriage 331. The first photo-electric cell 400 is mounted underneath table 1 by means of bracket 401 and has a light beam directed upwardly through an aperture 402 in table 1 to a mirror 403 in cross bar 151, and from thence to second mirror 404 located at one side of table 1, and from thence to a light-sensitive photo-electric cell relay 405 (Figs. 5, 9 and 10). It will be noted that the lateral position of the light beam 400 and light cell 405 is just in advance of the sealing head 170 and its cooperating slot 177 in platform 1. Furthermore, the vertical and horizontal direction of light travel insures that the light beam from light source 400 will be intercepted by the leading edge of any size or shape article which traverses the platform past the location of the cell 405.

In the form shown in Figs. 1–40, the articles to be packaged are placed against the edge of a platform 406 (Figs. 1, 26 and 27) which may be adjustably positioned in slots 407, 407 of arms

408, 408 secured to frame member 46 and extending transversely over web 29, as shown clearly in Fig. 26. The outer edge 409 of platform 406 then acts as a stop or reference point from which the transverse positioning of the articles on web 29 is measured. The correct setting for fixed sealing head 245 on cross arm 266 is made in accordance with the distance that edge 409 of tray 406 extends beyond the edge of web 29. In this way, all adjustment for variations in article width are made by sealing head 246, since the operator always positions the article along outer platform edge 429, thus maintaining a constant distance between one edge of web 29 and the article.

Five cell electrical control circuit

Referring now to Figs. 1, 3, 5 and 54, the progress of an article across tables 1 and 2 during the wrapping operation will be described in conjunction with the control system therein illustrated. Reference herein to Fig. 54 will be understood to include both Figs. 54a and 54b which together comprise a single wiring diagram. When the operator starts the machine, he closes the main switch 410 which in turn closes the circuit to relay S through normally closed switches 198, 199, 258, 259, 274, and 275. Energization of relay S closes contacts S1 which immediately energizes solenoids 316 and 240 to release the brakes on shafts 216 and 290. Contacts S2 of relay S are also closed to condition the circuit to motor starting switch 411 which, when properly actuated by means of button 412, energizes relay T to start motor 58. When energized, relay T holds itself after starting button 412 is released so that the motor 58 may be stopped at any time by pressing the stop button 413. Closing of switch 410 automatically causes rolls 30–41 to feed the lower web 29, which has been threaded between rolls 30–41 as described previously, across the tables since all circuits are initially opened to solenoid 67, and clutch 62 is therefore engaged to complete the drive between the motor and the rolls. With the brakes released and web 29 traveling across table 1, the operator then closes manual switch 453 and places an article to be wrapped against the edge 409 of platform 406 so that the article is carried across table 1 on web 29 until the leading edge of the article intercepts the beam of light from light source 400 to cell 405. This energizes relay N to close contacts N1 and N2. This in turn energizes relay A through normally closed contacts C2 of relay C. Energization of relay A stops the webs by energizing solenoid 67 through contacts A2 of relay A. Sealing head 170 is then started on its downward travel due to energization of solenoid 228 through contacts A1 of relay A and normally closed contacts B4 of relay B. This likewise disengages paper-feed roll 152 through energization of solenoid 158 which is connected in parallel with solenoid 228. When the sealing head 170 is substantially at the bottom of its downward travel to make the front seal for the article, switch 414 on cam 220 is closed, thus energizing relay B. Energization of relay B energizes relay C through contacts B1 of relay B, thus breaking the circuit to relay A through contacts C2 of relay C and deenergizing relay A. However, the web 29 remains stationary because solenoid 67 is held energized through contacts B2 of relay B after relay A is deenergized. The circuit to solenoid 228 is broken through contacts B4 but the collar 224 for the sealing head is held mechanically as described above. Solenoid 158 is deenergized to permit contact between feed roll 152 and roll 150.

As the sealing head 170 returns to a point at or near the top of its stroke, switch 414 is opened, thus deenergizing relay B. When relay B is deenergized at the return of sealing head 170, the web 29 starts since the circuit to solenoid 67 is broken through contacts B2 of relay B. Relay C is nevertheless held through contacts C1 of relay C and contacts N1 of relay N. As the article advances along the web, its trailing edge will pass beyond the light beam from light source 400, thus permitting relay N to become deenergized and opening contacts N1 and N2 thereof. This in turn deenergizes relay C due to opening of contacts N1. This completes the actuating cycle for sealing head 170 under control of photo-electric cell 405 and its associated relay N.

With the web 29 still moving, the article continues its travel until the light beam from light source 415, which is directed at photo-sensitive cell 416, is broken. This is turn energizes relay X, closing contacts X1, and energizes relay D provided switches 417 and 418 are closed. The purpose of switch 417 is to prevent a repetition of the cycle until sealing head 170 is fully retracted and also to prevent interrupting the light beam to cell 416 when the sealing head 170 is lowered. Energization of relay D energizes relay E through contacts D1 of relay D, and relay E is held through contacts E3 thereof and through normally closed contacts F2 of relay F.

When the trailing edge of the object clears the beam to cell 416, relay X is deenergized to open contacts X1, thus deenergizing relay D. Relay E however, is held as described above. The rear seal for the object is then made with sealing head 170 which is actuated in the same manner as described previously. In this case however, the deenergization of relay D stops the web 29 by energizing the solenoid 67 through contacts D2 of relay D and closed contacts E1 of relay E. Solenoids 228 and 158 are likewise energized through contacts D3 of relay D, contacts E2 of relay E, and contacts B4 of relay B. This starts the sealing cycle and likewise moves the driven feed roll 152 to an inoperative position. At or near the bottom of the sealing carriage stroke, switch 414 is closed as before, thus energizing relay B. This completes a holding circuit to solenoid 67 through contacts B2 of relay B so that relay B is held. Relay C is also energized but no circuit is closed because relay N is, or may be, open.

Solenoid 228 is deenergized by breaking of contact B4 of relay B but this does not stop the sealing head travel until it has completed one revolution, as described above. Likewise, solenoid 158 is deenergized, permitting feed roll 152 to return to its feeding position. Energization of relay F through contacts B3 deenergizes relay E by opening contacts F2 of relay F. Relay F is held however, through closed contacts F1 and B3 which supplant contacts E4. The web 29 remains stationary because solenoid 67 is held by contacts B2.

As head 170 nears the top of its return stroke, switch 414 opens, thus deenergizing relay B. This starts the webs by breaking contacts B2 and deenergizing solenoid 67. Relay F is likewise deenergized by breaking of contacts B3. This completes the second cycle which provides the transverse seal at the trailing edge of the article.

As the web progresses across the table, the

article interrupts the light beam from light source 419 which is directed to photo-sensitive cell 420, which in turn energizes its associated relay P. This closes contacts P1, thereby energizing relay G provided switch 421 on cam 289 is closed through normally closed contacts J4. If relay R is deenergized, then the web stops due to energization of solenoid 67 through contacts G2 and normally closed contacts H2. Solenoid 353 is likewise energized through contacts G3 and normally closed contacts H3. Energization of solenoid 353 engages dog 346 with upper chain flight 332a to cause carriage 331 to move towards fixed sealing head 245 (to the left in Fig. 11). Carriage 331 continues to move towards fixed sealing head 245 until interruption of the beam from light source 425 which is mounted on bracket 426 attached to carriage 331 and which impinges on photo-sensitive cell 427 carried by carriage 331 through bracket 428. The light beam to cell 427 is interrupted by the edge of the article to be wrapped and this light beam is directed through slot 430 located at the rear edge of table 1 (Figs. 5 and 12) to permit the light beam from source 425 to impinge upon cell 427 which is transversely movable underneath the table. In the present circuit, the light beam to cell 427 will be interrupted only by an article moving along the table. However, with another circuit the length of slot 430 may be so controlled that in the event the light source 425 has previously been turned on and there is no article on the table to interrupt the beam, the end 429 of the slot 430 will interrupt the beam to stop transverse movement of the sealing head. When the beam of light to cell 427 is interrupted, either by the article or stop 429, relay R which is associated with cell 427, is energized. This in turn energizes relay H through normally closed switch 421, contacts R2, contacts G1, and switch 431.

If relay R had previously been energized, then contacts H2 and H3 would have been opened when relay G was energized to prevent the energization of solenoids 67 and 353 described above. When relay H is energized, solenoid 353 is deenergized or remains deenergized (as the case may be) by breaking contacts H3; this stops the travel of carriage 331. Likewise, the webs 29 and 135 start due to the deenergization of solenoid 67 through breaking of contacts H2 and/or G2. Relay J is energized through contacts H1, normally closed contacts M3 of relay M, and switch 431. Relay J is held through contacts J3 and M3, and relay G is deenergized by opening of contacts J4. Relay H is likewise deenergized by breaking of contacts G1. Deenergization of relay H does not deenergize relay J since it is held as previously noted. Solenoid 356a is energized through contacts J2.

Referring back now to relay R, solenoid 356 which is normally enerized through normally closed contacts R1, is deenergized when relay R is energized by breaking of contacts R1. Closing of contacts R2 also energizes solenoid 355 through switch 431. Energization of solenoid 355 causes carriage 331 to reverse its travel and move to the right as seen in Fig. 11. With the webs still moving, the light beam from source 425 at some time passes beyond the edge of the article so that it will no longer be interrupted. At this time, solenoid R is deenergized to open contacts R2 and close contacts R1. This deenergizes solenoid 355, thus arresting the rightward travel of the carriage. Closing of contacts R1 energizes solenoid 356 to complete the stopping of the carriage. As the article progresses with the webs still moving, a further increase in width of the article will again interrupt the beam from source 425, thus energizing relay R to deenergize solenoid 356 and energizing relay 355 to cause the carriage to travel to the right in repeated increments in accordance with the successive increase in width of the article (Fig. 11). Naturally there is no reason for further leftward travel of the carriage because the carriage must be set to the maximum width of the article in order to completely seal the article.

During the time that the article has progressed with the webs to position the longitudinal sealing head as described above, and shortly after the beam directed to cell 420 was interrupted, a fifth beam of light from light source 435 directed to a photo-electric cell 436 is broken. This energizes relay Q which is associated with cell 436. Closing of contacts Q1 of relay Q energizes relay K through switches 421 and 438. Energization of relay K in turn energizes relay L through contacts K1 and normally closed contacts M1. Relay L is held through contacts L1 and normally closed contacts M1. When the trailing edge of the article clears the beam of light directed to cell 436, relay Q is deenergized, thus opening contacts Q1. This deenergizes relay K and stops the webs by energizing solenoid 67 through contacts K3 of relay K, held contacts L3 of relay L, and contacts J1 of relay J. The longitudinal sealing heads 245 and 246 drop due to energization of solenoid 301 through contacts K2, L2, M2 and switch 439. As the longitudinal sealing head is at or near the bottom of its stroke, switch 440 is closed, thus energizing relay M. Relay L is deenergized through opening of contacts M1. Solenoid 301 is deenergized through opening of contacts M2. Solenoid 67 continues to be energized to hold the webs stationary through contacts M4. A holding circuit for relay M is completed through contacts M5 and switches 441 and 442. Relay J is deenergized when contacts M3 are broken. Deenergization of relay J does not start the webs through opening of contacts J1 because solenoid 67 is held through contacts M4 of relay M. Solenoid 356a is deenergized by breaking of contacts J2.

As the longitudinal sealing heads near the top of their return stroke, switch 440 is opened. Relay M however, is not deenergized because it is held through contacts M5 and switches 441 and 442. In this arrangement, the webs do not automatically start since this must be done manually by breaking the holding circuit for relay M. Switch 441 serves this purpose and when this switch is open, the webs will resume their travel.

After the sealing heads 245 and 246 have returned to their initial raised position, or have been raised sufficiently to clear the article, the rake 368 quickly strips the completely sealed article from the edges of the webs and removes it from the table. Fig. 38 illustrates the position of the article just after the transverse seals have been made and the light beam to cell 420 broken. Fig. 39 shows the sealing heads 245 and 246 in the lowered position making the longitudinal seals and just after the beam directed to cell 433 has been cleared. Fig. 40 shows the completely sealed article between webs 29 and 135 just as the rake 368 operates to strip the article from the unused web portions. It will be noted from Fig. 40 that the article is provided with seals 443, 444 running transversely of the webs, and longitudinal seals 445 and 446 which overlap seals 443 and 444. The webs have been slit transversely at 447 and 448

outside of seals 443 and 444, and longitudinally at 449 and 450 outside of seals 445 and 446 so that the sealed article is completely severed from the webs. As previously mentioned, the sealing heads 170, 245 and 246 are provided with a safety mechanism which stops the entire machine in the event that any obstruction is met in the downward travel of the sealing heads.

Referring to the wiring diagram (Fig. 54), it will be noted that safety switches 198, 199 are shunted by switch 451, and switches 248, 259 and 274, 275 are shunted by switch 452. Switches 451 and 452 are controlled by cams 220 and 289 respectively (Fig. 28). In the event any of the switches 198, 199, 258, 259, 274, 275 are open, solenoid S is instantly deenergized, thus opening contacts S1 and S2 to set the brakes through deenergization of solenoids 316, 240 and also to stop motor 58. When switches 198 and 199 are shunted by switch 451, and switches 258, 259 and 274, 275 are shunted by switch 452 which occurs near the bottom of the sealing head strokes, the brakes will not be set as just described.

Electrical circuit for uniform size articles

The circuits described in detail heretofore may be varied in the event that the articles are all of uniform width and length. In this event, the operator opens switch 416 and throws switch 439 to disconnect relay M and to connect solenoid 301 in parallel with solenoids 158 and 228. Switch 453 remains closed and switch 438 remains in position to connect relay Q with relay K. In this event, when the leading edge of the article interrupts the light beam directed to cell 405, relay N is energized to close contacts N1 and N2. This in turn energizes relay A through contacts N2 and normally closed contacts C2 of relay C. Solenoid 67 is energized to stop the webs through contacts A2 of relay A. The transverse sealing head is started on its downward travel through energization of solenoid 228 through contacts A1 of relay A and normally closed contacts B4 of relay B. Likewise, solenoid 158 is energized to retract the feed roll 152. Due to the fact that switch 439 connects solenoid 301 in parallel with solenoids 158 and 228, it is also energized together with the former two. This starts sealing heads 245, 246 and 170 on their downward travel. As the transverse sealing head travels downwardly, switch 414 is closed, thus energizing relay B. This holds the webs stationary through contacts B2 of relay B and solenoids 158, 228 and 301 are all deenergized by breaking of contacts B4. Relay C is energized through closing of contacts B1 and is held by contacts C1 and N1. However, opening of contacts C2 deenergizes relay A. The webs remain stationary since solenoid 67 is held. Simultaneously, the downward travel of the longitudinal sealing head closes switch 440 which energizes relay M. This in turn closes a second holding circuit to solenoid 67 through contacts M4 and closes a holding circuit for relay M through switches 441, 442 and contacts M5. When the transverse sealing head is near the end of its return stroke, switch 414 is opened, thus deenergizing relay B. Both relays C and solenoid 67 are held as noted above. Likewise, when the longitudinal sealing head is near the end of its return stroke, switch 440 is opened but relay M is not deenergized because it is held as noted above. Therefore, webs 29, 138 remain stationary until the holding circuit to relay M is broken by opening either switch 441 or switch 442. When this has been done and the webs started, relay N will be deenergized when the article clears the light beam directed to cell 405. It will thus be understood that the scanning mechanism which is designed to accommodate articles of various widths has been rendered inoperative and since the articles are all of uniform width, the transverse sealing head can be made to perform the seal at each end of each package. In this way, cell 405 simultaneously controls both the transverse and longitudinal sealing for the objects.

An alternate method of controlling the sealing mechanism employs the second photo-electric cell only and this may be used when the articles are of uniform width. In this event, switches 453 and 431 are opened and switch 438 is thrown to connect the windings of relays K and D. Switch 418 however, is closed and switch 439 is thrown to connect solenoid 301 with contact M2 of relay M. When the beam of light to cell 416 is interrupted, relay X is energized to close contacts X1. This in turn energizes relay D through closed switches 417 and 418. Energization of relay D in turn energizes relay E through contacts D1, and relay E is held through contacts E3 and normally closed contacts F2 of relay F. Closing of contacts X1 likewise energizes relay K through switch 438. This in turn energizes relay L through contacts K1 of relay K and normally closed contacts M1 of relay M. Relay L is held through contacts L1 thereof.

With the webs still moving, the article clears the beam directed to cell 416 so that relay X is deenergized, opening contacts X1. This deenergizes relay D and closes contacts D2 to stop the webs by energizing solenoid 67 through contacts E1. Likewise, solenoids 158 and 228 are energized by closing of contacts D3 which completes the circuit through contacts E2 and normally closed contacts B4 of relay B. Opening of contacts X1 also deenergizes relay K but relay L is held even though relay K is deenergized. Longitudinal sealing heads 245 and 246 are activated by energization of solenoid 301 through switch 439, normally closed contacts M2 of relay M, contacts L2 of energized relay L, and contacts K2 of relay K. Since solenoid 228 has been energized as noted above, the transverse sealing head 170 drops, closing switch 414. This energizes relay B which in turn energizes relay C through contacts B1 but relay C performs no function at this time. The webs are held stationary and relay 67 is held through contacts B2. Solenoids 158 and 228 are deenergized by opening of contacts B4. Relay F is energized through closing of contacts B3 and relay F is held through contacts F1 and B3. This deenergizes relay E by opening contacts F2 to break the holding circuit through contacts E3 of relay E. Solenoid 67 is held through contacts B2 and relay F is likewise held through contacts F1.

Simultaneously with the deenergization of relay K noted above, the longitudinal sealing heads drop due to completion of the circuit to solenoid 301 through contacts K2 of relay K, contacts L2 of relay L, normally closed contacts M2 of relay M, and switch 439. As the longitudinal sealing heads are at or near the bottom of their stroke, switch 440 is closed, thus energizing relay M. Relay L is deenergized when contacts M1 are opened. Likewise, solenoid 301 is deenergized when contacts M2 are opened. Solenoid 67 is held both by contacts B2 of relay B, and M4 of relay M to retain the webs stationary. Relay M is held through contacts M5 and switches

441, 442. As the transverse sealing head returns to the end of its stroke, switch 414 is opened, thereby deenergizing relay B and likewise deenergizing relay C by opening contacts B1. Solenoid 67 is still held by relay M and relay F is deenergized by opening of contacts B3. As the longitudinal sealing heads near the end of their return stroke, switch 440 is opened and the webs may be started when the holding circuit for relay M is broken by manually opening either switch 441 or switch 442.

In the event that the machine has been stopped due to the action of the guards on any one of the sealing heads 170, 245, 246, it will necessary to release the brakes 237 and 315. In the event that brake 315 is the one that has been applied, merely releasing this brake does not permit completion of the cycle because cam 289 may not have turned sufficiently far to close switch 440 which energizes relay M. For this reason, a double-pole reset switch 455 is connected across switch 440 so that relay M may be manually energized. Operation of switch 455 simultaneously energizes relay S to release both brakes 315 and 237 through solenoids 316 and 240.

Simplified control circuits using three photo-electric cells

Referring now to Fig. 55, a simplified control circuit which employs only three photo-electric cells—namely; cells 405, 427 and 436, will be described. In the simplified circuit described hereinafter, sealing head 170 is used to separately seal the trailing edge of one article and another downward travel (instead of the same one) seals the front of the succeeding article. When the article interrupts the beam of light to cell 405, its associated relay NS will be energized to close contacts NS1 and NS2. This energizes relay AS through contacts NS1 and normally closed contacts CS1 of relay CS. Energization of relays AS stops the web 29 by energizing solenoid 67 through contacts AS2, and likewise retracts feed roll 152 by energizing relay 158. Sealing head 170 is started on its downward travel by energization of relay 228 through contacts AS1. When cam 220 has turned sufficiently to close switch 414, relay BS will be energized, which closes a holding circuit to solenoid 67 through contacts BS2 and energizes relay CS through contacts BS1 and closed contacts NS2 of relay NS. Energization of relay CS closes a holding circuit to itself through contacts CS2 and deenergizes relay AS by breaking contacts CS1. This deenergizes relays 158 and 228 by opening contacts AS1 to re-position feed roll 152. Web 29 is held stationary by means of the continued energization of solenoid 67 through contacts BS2. As the sealing head 170 reaches substantially the top of its return stroke, switch 414 is opened to deenergize relay BS. This deenergizes solenoid 67 to start web 29 but does not deenergize relay CS since this relay is held through contact CS2. When the light beam to cell 405 is cleared by the article, relay NS is deenergized to open contacts NS2, thereby deenergizing relay CS. This completes the operating cycle for the transverse sealing head 170 under control of cell 405.

When the main switch 410 is closed, it may be assumed that the beam of light to cell 427 on carriage 331 is unbroken. This being the case, solenoid 353 is immediately energized through normally closed contacts MS4 of relay MS and JS4 of relay JS. This causes sealing head 246 to travel towards sealing head 245 by engaging dog 346 in upper chain flight 332*a* in the manner described above. Carriage 331 continues to travel in the direction of upper flight 332*a* until the light beam to cell 427 is broken either by an article traveling across the table or by edge 429 of slot 430. Ordinarily, it is only before the first piece of any sequence that the edge of slot 430 serves to interrupt the light beam; otherwise, this will be interrupted by the articles. In either case, when this light beam through slot 430 is interrupted, relay RS is energized, closing contacts RS1 and opening contacts RS2. Closing of contacts RS1 energizes relay JS through normally closed switch 421, normally closed contacts JS2 of relay JS, and normally closed contacts MS1 of relay MS. Relay JS holds itself through contacts JS3 and MS1 and solenoid 353 is deenergized by opening of normally closed contacts JS4 to stop the travel of carriage 331. Retracting relay 356*a* is also energized through contacts JS1 to hold dog 346 in a neutral position. Simultaneously, relay 355 is energized through contacts RS1 and switch 421 to engage dog 346 in the lower chain flight 332*b* to initiate travel of carriage 331 in the opposite direction so that sealing head 246 moves away from sealing head 245. Also, solenoid 356 is deenergized when contact RS2 of relay RS is opened.

When carriage 331 travels to the right (as seen in Fig. 11) a sufficient distance for the beam from light source 425 to clear the edge of an article, relay RS will be deenergized, thus opening contacts RS1 and deenergizing solenoid 355 and simultaneously closing contacts RS2 which energizes solenoid 356. This in turn stops further travel of carriage 331. However, in the event that a wider portion of the article subsequently interrupts the light beam from source 425, the above rightward movement will be repeated. To summarize, it will be seen that carriage 331 initially moves to the left in Fig. 11 until the light beam is broken, then it immediately and automatically reverses its travel until the light beam clears the object and it continues to travel to the right in increments as the beam is subsequently broken.

Shortly after the beam of light from source 425 was first interrupted and during the above scanning of the article, the light beam from source 435 directed to cell 436 was interrupted by the article (Figs. 35 and 37). This energizes relay QS to close contacts QS1 and likewise energize relay KS through switch 421, which in turn energizes relay LS through contacts KS1 and normally closed contacts MS5. Relay LS is held through contacts LS3 and MS5. Switch 421 like switch 417, serves to open the circuit to relay KS to prevent undesired interruption of the beam by the sealing head. When the beam of light to cell 436 is cleared, relay QS is deenergized, thus deenergizing relay KS through open contacts QS1. Relay LS is held however, as noted above. Web 29 stops by reason of the energization of solenoid 67 through closed contacts KS2 and contacts LS1. Sealing heads 245 and 246 are lowered when solenoid 301 is energized through closed switch 456, contacts LS2 and normally closed contacts KS3 of relay KS. As cam 289 turns, switch 440 is closed, thus energizing relay MS and deenergizing relay JS by opening contacts MS1. This deenergizes solenoid 356*a* by opening contacts JS1. Relay MS holds itself through contacts MS2, switches 457 and 458 so that solenoid 67 is held energized through contacts MS3. Solenoid LS is also deenergized when contacts MS5 of relay MS

are opened and solenoid 301 is deenergized when contacts LS2 of relay LS are opened. As the sealing heads 245 and 246 return on their upward travel, switch 440 opens but relay MS is not deenergized however, since it is held through contacts MS2 as noted above. The web 29 will not start until the holding circuit to relay MS is broken by opening either switch 457 or 458 manually. In the event that continuous operation is desired, switch 458 may be left open so that there will be no holding circuit for relay MS.

Uniform size with simplified control circuits

In much the same manner that has been described for the uniform size operation of the packaging machine in conjunction with Fig. 54, the simplified circuits using only three photoelectric cells may likewise be set in the same way. Referring to Fig. 55, switch 459 is opened and switch 456 is thrown to its alternate position to connect solenoid 301 between contacts AS1 of relay AS and solenoids 228 and 158. It will be noted that switch 456 of Fig. 55 corresponds to switch 439 of Fig. 54. With switches 456 and 459 set as above, it will be apparent that the longitudinal sealing heads 245 and 246 operate simultaneously with the transverse sealing head 170 since solenoid 301 is energized whenever solenoid 228 is energized. In other respects, the operation of the controls is substantially the same as previously described in conjunction with Fig. 55. It will also be noted that the uniform size setting for the simplified controls applies in the same way to Fig. 56 since the function of switches 456 and 459 is merely to operate the longitudinal sealing heads simultaneously with the transverse sealing head and to render the automatic scanning circuits inoperative.

Due to the fact that a certain amount of overtravel occurs whenever a controlling light beam is interrupted, it will be understood that when the first beam to cell 405 is broken, web 29 continues to move a slight distance before it stops. Therefore, the position of cell 405 with respect to sealing head 170 must be such that this overtravel will not bring the leading edge of the article beneath the guards or sealing elements of head 170. Likewise, a similar condition exists with respect to the beam of light from cell 435 which controls sealing heads 245 and 246.

Also, it will be understood that when the web is stopped by either cell, it is stopped throughout its entire length so that the overtravel incident to stopping by one cell may be all or partially canceled by the action of a second cell. For example, the relative timing due to interruption of light from cell 435 may nullify or cancel the calculated overtravel with regard to sealing head 170 so that the article may not clear sealing head 170 or if approaching the sealing head for its first seal, there may be waste web material. Conversely, the overtravel incident to stopping the webs by breaking of the light beam from cell 405 may cancel the normal overtravel due to cell 435 so that the transverse seal and cut made by head 170 will not have advanced far enough along the table to meet the longitudinal cuts. The proper adjustment for the relative positions of the transverse and longitudinal sealing heads must therefore be made in accordance with the minimum length article to be wrapped so that the overtravel described above may be utilized as much as possible to bring the articles close to the transverse sealing head, thereby reducing waste web material to a minimum.

Control of longitudinal sealing heads by leading edge

In the control circuits described previously, the spacing between the articles must be maintained fairly constant by the operator to avoid undesired waste of web material and also to insure that the articles are in proper sealing position with respect to both the transverse and longitudinal sealing heads. In order to render accurate spacing between the articles along the table less critical, the longitudinal seals may be controlled by the leading edge of the immediately following article. This varied control may be readily accomplished by re-directing the light beam from source 435. Figs. 3 and 13 show one positioning for the light source 435 which is mounted on cross member 138 in such a manner that the beam of light emanating from this light source is directed downwardly through a slot 358a in table 2 (Fig. 13) to strike mirror 465 mounted on frame member 3. From thence, the light beam is directed horizontally across to mirror 466, thence upwardly to mirror 467 which directs the beam of light horizontally across the top of table 2 to cell 436. In this way, any object traversing table 2 regardless of its shape, controls cell 436 either by its most advanced position or by its rearmost position. Fig. 3 shows the angle of the light beam from source 435 intersecting the light beam from source 425 just above the web 29.

Figs. 35, 46 and their associated wiring diagram Fig. 56, illustrate the control by the leading edge of the succeeding article. For this purpose, slot 358a is extended into the rearward edge of table 1, as shown in Fig. 35, and light source 435 is pivoted so that the beam is directed forwardly of the beam from cell 425. Also, the cell 436 may be located beneath either table 1 or table 2 (as shown in Fig. 46) if horizontal scanning of the table is not required. In this case, it will be understood that the spacing between successive articles is much less critical than with previously described circuits. Consequently, little or no skill on the part of the operator is required. The circuits are then modified so that clearing of the beam from cell 435 by the article to be longitudinally sealed does not actuate the longitudinal sealing heads.

Referring now to Fig. 56, the actuation of relays NS, AS, BS and CS functions in exactly the way that has been described in connection with Fig. 55. However, as the article to be longitudinally sealed reaches its proper position on table 2, the leading edge of the succeeding article interrupts the beam of light from source 435 (as shown by the moved beam path in Fig. 35). During the operation of the preceding cycle for sealing head 170, relay JS has been energized by means of energization of relay RS controlled by cell 427. When this occurs, relay QS is energized, closing contacts QS1 and QS2. This energizes relay KS through normally closed contacts LS2 of relay LS. This in turn stops the web 29 by energizing solenoid 67 and initiates the downward travel of sealing heads 245 and 246 by energizing solenoid 301 when switch 456 is thrown to connect contact KS2 and solenoid 301.

As sealing heads 245 and 246 reach the bottom of their downward travel, switch 440 is closed, energizing relay MS. This in turn deenergizes relay JS by opening contacts MS1 and solenoid 356a is therefore deenergized when contacts JS1 are open. Relay MS is held through switches 457, 458 and contacts MS2, and relay LS is energized through contacts MS5. Energization of relay LS deenergizes relay KS when contacts LS2

are broken and relay LS is held through contacts LS1. Opening of contacts KS2 deenergizes solenoid 301 but web 29 remains stationary because solenoid 67 is held energized through contacts MS3 of relay MS. As the sealing heads 245 and 246 return to the top of their stroke, switch 440 is opened but relay MS is not deenergized because it is held through contacts MS2 as noted above. The web 29 may be started by breaking the holding circuit through contacts MS2 when either switch 457 or switch 458 is opened. This deenergizes solenoid 67 to start the web. In the event continuous operation is desired, either switch 457 or 458 may be held open so that the web automatically starts.

It will be understood from the above that many modifications and variations may be made in the electrical circuits to accomplish any result desired. The relative locations of the light sources and their associated cells may be adjusted so that the timing of the operations is in accordance with the nature of the articles being packaged. Furthermore, it is not essential that all of the position-detecting devices be of the light-sensitive variety. In the machine described heretofore, it is intended that a transparent wrapping material such as Pliofilm or cellophane be used, through which the light beams from the various sources can be satisfactorily projected. This permits locating one or more of the cells beneath the table. In the event however, that an opaque wrapping material is used, the same result may be achieved by means of contrasting colors for the articles and/or the wrapper, or the light sources and cells may all be located on the same side of the wrapper or the position of the articles may be detected mechanically by means of suitable fingers, in which event the same relays may be employed but they will be energized through the fingers rather than by means of the light-sensitive cells.

Referring now to Figs. 46–52, a modified form incorporating center positioning of the articles to be wrapped, will be described. In this event, there is no change with regard to the structure of the transverse sealing head 170 and its associated mechanism. However, platform 406 is removed entirely and instead table 1 is provided with a plurality of graduations 475, 475 which are equi-distant from the centerline 476 of table 1 so that the operator is enabled to register the center of the articles substantially on centerline 476. In this form as well as in the form of Fig. 1, table 1 may be provided with a platform 477 which is resiliently hinged at 478 and urged upwardly by spring 479. When an article to be wrapped is placed on platform 477 by the operator, it is depressed sufficiently to open switch 457*a* so that the holding circuit to start the web 29 is automatically broken whenever an article is placed on the platform 477. In this connection, switch 457*a* may be the same as switch 457 or it may, if desired, be foot or hand operated. It will also be noted that switches 457 and 458 of Fig. 55 correspond generally to switches 441 and 442 of Fig. 54.

As the articles progress along table 1 (as shown in Fig. 48), the leading edge of the article interrupts the light beam from source 400 which in this case has been relocated so that the beam is directed downwardly through an aperture 480 in the center of platform 1. Light source 400 is mounted on cross member 140 and its associated cell 405 may be mounted directly under table 1 on bracket 401 which may be moved to one side for this purpose. Fig. 46 also illustrates an alternative location for solenoid 158 which is just the reverse of the actuation for roller 152 shown in Fig. 3. As modified, energization of solenoid 158 engages feed roll 152 with roll 150 instead of disengaging it, and spring 481 serves to retract roll 152 when solenoid 158 is de-energized.

The longitudinal sealing head structure of Figs. 46–52 employs a separate electric motor 482 to simultaneously position both sealing heads 245 and 246 in accordance with the scanning function of light source 425 and its associated cell 427. Cross member 266 is in this case provided with a centrally located bearing 483 which journals the vertical shaft 484 of motor 482. Motor 482 is supported on channel member 485 which is mounted directly on reciprocating slides 278 and 279 so that the motor and the entire longitudinal sealing assembly reciprocates vertically as a unit. Cross arms 486, 487 are slidably mounted by means of sleeves 488 and 489 which are provided with racks 490, 491 respectively. These racks mesh with a pinion 492 on motor shaft 484 in such a way that when shaft 484 turns in a clockwise direction (as seen in Fig. 47), sealing heads 245 and 246 are contracted so that they move laterally towards each other and towards the centerline of table 2. When shaft 484 turns in a counterclockwise direction, the sealing heads are moved outwardly away from each other. This simultaneous positioning of both the sealing heads expedites the longitudinal sealing operation since each head is required to move only half of the distance for any increment of increased width due to scanning of the article.

Registry of the knives 247 and 262 with slots 358 is accomplished by means of a plate 493 mounted on shaft 484 in housing 494. Plate 493 is provided with a plurality of rollers 495, 495 which are so timed with respect to pinion 492 that whenever any roller is seated in slot 496 of latch 497, the knives on the sealing heads 245 and 246 register with some two slots 358, 358. Actuation of latch 497 which must engage one of the rollers 495 whenever motor 482 stops, is accomplished by means of solenoid 498 mounted on channel 485. The armature 499 of solenoid 498 is connected to a lever 500, secured to a rock shaft 501 which extends vertically through channel 485 and engages a pin 502 on latch 497. Pin 502 extends upwardly through guide plate 503 which is slotted at 504 as is short lever 505 connecting shaft 501 with pin 502. Latch 497 is spring-loaded into a disengaging position by means of a plate 506 secured to the end of the latch and springs 507, 507 which urge plungers 508 into engagement with the plate 506.

Whenever solenoid 498 is energized, armature 499 exerts a pull on lever 500 sufficient to overcome the pressure of springs 507, 507 and to slide latch 497 into engagement with one of the rollers 495. In order to insure this engagement, the slow speed, high torque motor 482 continues to turn until one roller 495 fully seats in slot 496, thus opening switch 509 to stop motor 482 when lever 500 engages arm 510 of the switch (as shown in Fig. 52). In this manner, it should be apparent that energization of solenoid 498 arrests transverse movement of the sealing heads 245 and 246 and also serves to register the slitting knives on the heads with a slot on the table. Case 494 may be filled with a suitable lubricant and for this purpose an oil seal 511 is provided in the bottom of the housing for shaft 484, and

in the modified form, light source 425 is mounted on sealing head 246 as shown in Fig. 46. Otherwise, the construction of the packaging machine is the same as previously described.

Referring now to Fig. 57, the control circuit for motor 482 and solenoid 498 will be described in conjunction with the simplified circuit such as shown in Fig. 56, and for this purpose the actuation of relays NS, AS, BS and CS is substantially the same as that which has been described previously. When the main switch is closed, motor 482 is rotated in a clockwise direction (as shown in Fig. 47) to contract sealing heads 245 and 246. This is accomplished through normally closed switch 421*a* which in the modified form is provided with normally closed contacts 515 and normally open contacts 516, normally closed contacts JS1, and MS4 of relays JS and MS respectively. This moves both sealing heads 245 and 246 towards the centerline 476 of the table until the light beam from source 425 to cell 427 is broken either by the end 512 of slot 513 in table 1 (Fig. 48) or by the edge of an article on the table. When the light beam to cell 427 is broken in one of the ways just mentioned, relay RS is energized, in turn energizing relay JS through contacts 515 of switch 421*a*, contacts RS1, and normally closed contacts MS1 of relay MS. This stops the clockwise rotation of motor 482 by opening the motor circuit at contacts JS1. Immediately however, counterclockwise rotation of motor 482 is initiated through normally closed switch 509, contacts JS2, and switch 421*a*. This moves sealing heads 245 and 246 outwardly away from the centerline 476. Relay JS is held through contacts JS3 and normally closed contacts MS1. When the beam to cell 427 is cleared, solenoid RS is deenergized and solenoid 498 is energized through contacts JS4 and normally closed contacts RS2. This indexes the sealing heads 245 and 246 and also opens switch 509 to stop motor 482, as described above. In the event that the beam to cell 427 is again interrupted by a wider portion of the article to be wrapped, solenoid 498 is deenergized by opening of contacts RS2 when relay RS is energized, and counterclockwise rotatiton of motor 482 takes place as the motor starts through closed switch 509, closed contacts JS2, and switch 421*a*. This expands sealing heads until the beam to cell 427 is cleared, the motor 482 stops as described above, and this cycle is repeated as long as wider portions of the article continue to interrupt the beam to cell 427.

When the leading edge of the next article on web 29 travels to the point shown in Fig. 35, so that the beam from source 435 is interrupted, relay QS is energized, closing contacts QS1 and QS2. This energizes relay KS through contacts QS2 and normally closed contacts LS2 of relay LS. Energization of relay KS stops web 29 by energizing solenoid 67 through contacts KS1. Likewise, sealing heads 245 and 246 drop when solenoid 301 is energized through contacts KS2 and switch 456. As sealing heads 245 and 246 drop, cam 289 reverses switch 421*a* to open contacts 515 and close contacts 516. This opens a second switch in the motor starting circuit to positively prevent the motor 482 from turning even if relay JS should be deenergized to close contacts JS1. Also, a holding circuit to solenoid 498 is closed through contacts 516. As the sealing heads 245 and 246 reach the bottom of their downward stroke, cam 289 closes switch 449 which energizes relay MS. This in turn deenergizes relay JS when contacts MS1 open. Solenoid 498 however, is held through closed contacts 516 of switch 421*a* as noted above. Likewise, solenoid 67 is held by contacts MS3. Solenoid LS is energized when contacts MS5 close and holds itself through contacts LS1. Relay KS is deenergized when contacts LS2 open but solenoid 67 is held as noted, by contacts MS3. Solenoid 301 is deenergized however, when contacts KS2 of relay KS open. When the sealing heads 245 and 246 rise on their return stroke, switch 421*a* returns to its original position to close contacts 515 and open contacts 516. This deenergizes solenoid 498 and closes switch 509. When switch 449 opens due to return travel of cam 289, solenoid MS is deenergized, closing the circuit to motor 482 through contacts MS4, JS1 and 515 so that clockwise rotation of motor 482 moves heads 245 and 246 towards the centerline 476 to condition them for a repetition of the cycle. Solenoid 67 is deenergized to start web 29 when contacts MS3 open, but solenoid LS remains energized through holding contacts LS1 and QS1 until the trailing edge of the succeeding article clears the beam to cell 435, thus deenergizing relay QS and opening contacts QS1. In the diagram of Fig. 57, the reset switch is shown with only one set of contacts connected since in this form it is unnecessary to shunt switch 449.

This completes the operating cycle for the electrical circuits used in conjunction with the modified form of Figs. 46–52. It will be noted however, that the switches 457 (457*a*) and 458 have been transferred from control by relay MS and contacts MS2 thereof, to control relay BS so that the operating cycle of sealing head 170 serves to hold the web travel. This retains relay BS energized until switch 457 (457*a*) is opened by the operator to restart the web. As in the case of Figs. 54 and 55, the circuit of 56 may be set for uniform width operation merely by opening switch 459 and throwing switch 456 to its alternate position.

It will thus be understood that I have provided an automatic article wrapping or packaging machine which is characterized by its compactness and its ability to wrap continuously a succession of articles which vary one from another with respect to height, width and length. The machine is particularly useful in wrapping food products which it may be desired to pack individually. Examples of such items are meats, fruits, and produce. The speed with which this packaging can be accomplished is greatly in excess of any other previously known device and the ability to make a few changes in the circuits to accommodate articles of uniform size, may be done with the flip of a switch and without the necessity of shutting down the machine until mechanical adjustments are made. The machine is equipped with adequate safety features and in addition, requires little or no experience on the part of the operator. This applies both to the form in which the articles are indexed with respect to one edge of the wrapping sheet, and also when they are indexed with respect to the center of the wrapping sheet. It will also be understood that the food articles to be wrapped may have been previously placed in or between another wrapping material or a tray.

Having thus described our invention, we claim:

1. In an automatic packaging machine, a table, means for feeding a first web of sheet material along the length of said table and upon which articles are placed, said feeding means also transporting the articles through the machine, means

for feeding a second web of sheet material in alignment with and over the first web of material and articles, means for measuring the length of said article at a predetermined station along the table, and pressure-sealing means responsive to the measuring means for joining the webs to each other at the leading and trailing edge of the article and in spaced relation thereto, whereby variable length articles may be wrapped automatically.

2. In an automatic packaging machine, a table, means for feeding a first web of sheet material along the length of said table and upon which articles are placed, said feeding means also transporting the articles through the machine, means for feeding a second web of sheet material in alignment with and over the first web of material and articles, means for measuring the length of said articles at a predetermined station along the table, means for measuring the width of said articles at a predetermined station along the table, transverse sealing means responsive to the first of said measuring means for joining the webs to each other at the leading and trailing edge of the articles and in spaced relation thereto, and longitudinal sealing means responsive to the second of said measuring means for joining the webs to each other on each side of the articles and in spaced relation thereto, whereby articles of variable length and width may be wrapped automatically.

3. In an automatic packaging machine, a table, means for feeding a first web of sheet material along the length of said table and upon which articles are placed, said feeding means also transporting the articles through the machine, means for feeding a second web of sheet material in alignment with and over the first web of material and articles, a plurality of means for measuring said articles at predetermined stations along the table, sealing means responsive to one of said measuring means for joining the webs to each other around the articles and in spaced relation thereto, whereby articles of various sizes may be wrapped automatically, and longitudinal sealing means responsive to another of said measuring means for joining the webs to each other on each side of the articles and in spaced relation thereto, whereby articles of variable length and width may be wrapped automatically.

4. In an automatic packaging machine, a table, means for feeding a first web of sheet material along the length of said table and upon which articles are placed, said feeding means also transporting the articles through the machine, means for feeding a second web of sheet material in alignment with and over the first web of material and articles, means for measuring the length of said articles at a predetermined station along the table, means for measuring the width of said articles at a predetermined station along the table, transverse sealing means responsive to the first of said measuring means for joining the webs to each other at the leading and trailing edge of the articles and in spaced relation thereto, longitudinal sealing means responsive to the second of said measuring means for joining the webs to each other on each side of the articles and in spaced relation thereto, whereby articles of variable length and width may be wrapped automatically, and means for removing the packaged article from the table.

5. In an automatic packaging machine, a table, means for feeding a first web of sheet material along the length of said table and upon which articles are placed, said feeding means also transporting the articles through the machine, a plurality of cooperating rolls along the edges of said table adapted to engage opposite lateral edges of the web, a perforating disk on two opposite rolls, a drive motor, driving connections between said motor and said rolls, means for feeding a second web of sheet material in alignment with and over the first web of material and articles, means for controlling the feed of said second web of material, means for measuring the length of said articles at a predetermined station along the table, means for measuring the width of said articles at a predetermined station along the table, transverse sealing means responsive to the first of said measuring means for joining the webs to each other at the leading and trailing edge of the articles and in spaced relation thereto, and longitudinal sealing means responsive to the second of said measuring means for joining the webs to each other on each side of the articles and in spaced relation thereto, whereby articles of variable length and width may be wrapped automatically.

6. In an automatic packaging machine, a table, means for feeding a first web of sheet material along the length of said table and upon which articles are placed, said feeding means also transporting the articles through the machine, a plurality of cooperating rolls along the edges of said table adapted to engage opposite lateral edges of the web, a perforating disk on two opposite rolls, a drive motor, driving connections between said motor and said rolls, a clutch operatively associated with said driving connections, means for feeding a second web of sheet material in alignment with and over the first web of material and articles, means for controlling the feed of said second web of material, means for measuring the length of said articles at a predetermined station along the table, means for measuring the width of said articles at a predetermined station along the table, transverse sealing means responsive to the first of said measuring means for joining the webs to each other at the leading and trailing edge of the articles and in spaced relation thereto, and longitudinal sealing means responsive to the second of said measuring means for joining the webs to each other on each side of the articles and in spaced relation thereto, whereby articles of variable length and width may be wrapped automatically.

7. In an automatic packaging machine, a table, means for feeding a first web of sheet material along the length of said table and upon which articles are placed, said feeding means also transporting the articles through the machine, a plurality of cooperating rolls along the edges of said table adapted to engage opposite lateral edges of the web, a perforating disk on two opposite rolls, a drive motor, driving connections between said motor and said rolls, a clutch operatively associated with said driving connections, a solenoid actuated clutch operatively associated with said driving connections, a spring adapted to engage said clutch when the solenoid is deenergized, means for feeding a second web of sheet material in alignment with and over the first web of material and articles, means for controlling the feed of said second web of material, means for measuring the length of said articles at a predetermined station along the table, means for measuring the width of said articles at a predetermined station along the table, transverse sealing means responsive to the the first of said

measuring means for joining the webs to each other at the leading and trailing edge of the articles and in spaced relation thereto, and longitudinal sealing means responsive to the second of said measuring means for joining the webs to each other on each side of the articles and in spaced relation thereto, whereby articles of variable length and width may be wrapped automatically.

8. In an automatic packaging machine, a table, means for feeding a first web of sheet material along the length of said table and upon which articles are placed, said feeding means also transporting the articles through the machine, a pair of rolls for feeding said web of material, tensioning means positioned to cooperate with said feed rolls, means for feeding a second web of sheet material in alignment with and over the first web of material and articles, means for measuring the length of said articles at a predetermined station along the table, means for measuring the width of said articles at a predetermined station along the table, transverse sealing means responsive to the first of said measuring means for joining the webs to each other at the leading and trailing edge of the articles and in spaced relation thereto, and longitudinal sealing means responsive to the second of said measuring means for joining the webs to each other on each side of the articles and in spaced relation thereto, whereby articles of variable length and width may be wrapped automatically.

9. In an automatic packaging machine, a table, means for feeding a first web of sheet material along the length of said table and upon which articles are placed, said feeding means also transporting the articles through the machine, means for feeding a second web of sheet material in alignment with and over the first web of material and articles, means comprising at least one idler roll over which said second web of sheet material runs, a driven roll adapted to selectively cooperate with said idler roll, a drive motor, driving connections between said motor and said driven roll, means for measuring the length of said articles at a predetermined station along the table, means for measuring the width of said articles at a predetermined station along the table, transverse sealing means responsive to the first of said measuring means for joining the webs to each other at the leading and trailing edge of the articles and in spaced relation thereto, and longitudinal sealing means responsive to the second of said measuring means for joining the webs to each other on each side of the articles and in spaced relation thereto, whereby articles of variable length and width may be wrapped automatically.

10. In an automatic packaging machine, a table, means for feeding a first web of sheet material along the length of said table and upon which articles are placed, said feeding means also transporting the articles through the machine, means for feeding a second web of sheet material in alignment with and over the first web of material and articles, means comprising at least one idler roll over which said second web of sheet material runs, a driven roll adapted to selectively cooperate with said idler roll, a drive motor, driving connections between said motor and said driven roll, a soleniod actuated clutch operatively associated with said driving connections, a spring positioned to engage said clutch when the solenoid is deenergized, means for measuring the length of said articles at a predetermined station along the table, means for measuring the width of said articles at a predetermined station along the table, transverse sealing means responsive to the first of said measuring means for joining the webs to each other at the leading and trailing edge of the articles and in spaced relation thereto, and longitudnial sealing means reponsive to the second of said measuring means for joining the webs to each other on each side of the articles and in spaced relation thereto, whereby articles of variable length and width may be wrapped automatically.

11. In an automatic packaging machine, a table, means for feeding a first web of sheet material along the length of said table and upon which articles are placed, said feeding means also transporting the articles through the machine, means for feeding a second web of sheet material in alignment with and over the first web of material and articles, means comprising at least one idler roll over which said second web of sheet material runs, a driven roll adapted to selectively cooperate with said idler roll, a drive motor, driving connections between said motor and said driven roll, a solenoid actuated clutch operatively associated with said driving connections, a spring positioned to engage said clutch when the solenoid is deenergized, a pivoting support for said driving roll, a second solenoid for pivoting said support whereby the driving roll may be selectively engaged and disengaged with the second web and idler roll, means for measuring the length of said articles at a predetermined station along the table, means for measuring the width of said articles at a predetermined station along the table, transverse sealing means responsive to the first of said measuring means for joining the webs to each other at the leading and trailing edge of the articles and in spaced relation thereto, and longitudinal sealing means responsive to the second of said measuring means for joining the webs to each other on each side of the articles and in spaced relation thereto, whereby articles of variable length and width may be wrapped automatically.

12. In an automatic packaging machine, a table, means for feeding a first web of sheet material along the length of said table and upon which articles are placed, said feeding means also transporting the articles through the machine, means for feeding a second web of sheet material in alignment with and over the first web of material and articles, means comprising at least one idler roll over which said second web of sheet material runs, a driven roll adapted to selectively cooperate with said idler roll, a drive motor, driving connections between said motor and said driven roll, a solenoid actuated clutch operatively associated with said driving connections, a spring positioned to engage said clutch when the solenoid is deenergized, a pivoting support for said driving roll, a second solenoid for pivoting said support whereby the driving roll may be selectively engaged and disengaged with the second web and idler roll, a spring also associated with the pivoting support positioned to disengage the driving roll with the second web and driven roll, means for measuring the length of said articles at a predetermined station along the table, means for measuring the width of said articles at a predetermined station along the table, transverse sealing means responsive to the first of said measuring means for joining the webs to each other at the leading and trailing edge of the

articles and in spaced relation thereto, and longitudinal sealing means responsive to the second of said measuring means for joining the webs to each other on each side of the articles and in spaced relation thereto, whereby articles of variable length and width may be wrapped automatically.

13. In an automatic packaging machine, a table, means for feeding a first web of sheet material along the length of said table and upon which articles are placed, said feeding means also transporting the articles through the machine, means for feeding a second web of sheet material in alignment with and over the first web of material and articles, means comprising at least one idler roll over which said second web of sheet material runs, a driven roll adapted to selectively cooperate with said idler roll, a drive motor, driving connections between said motor and said driven roll, a solenoid actuated clutch operatively associated with said driving connections, a spring positioned to engage said clutch when the solenoid is deenergized, a pivoting support for said driving roll, a second solenoid connected to the pivoting support and adapted to disengage the driving roll with the second web and idler roll, a spring also associated with the pivoting support positioned to engage the driving roll with the second web and driven roll, means for measuring the length of said articles at a predetermined station along the table, means for measuring the width of said articles at a predetermined station along the table, transverse sealing means responsive to the first of said measuring means for joining the webs to each other at the leading and trailing edge of the articles and in spaced relation thereto, and longitudinal sealing means responsive to the second of said measuring means for joining the webs to each other on each side of the articles and in spaced relation thereto, whereby articles of variable length and width may be wrapped automatically.

14. In an automatic packaging machine, a table, means for feeding a first web of sheet material along the length of said table and upon which articles are placed, said feeding means also transporting the articles through the machine, means for feeding a second web of sheet material in alignment with and over the first web of material and articles, means comprising at least one idler roll over which said second web of sheet material runs, a driven roll adapted to selectively cooperate with said idler roll, a drive motor, driving connections between said motor and said driven roll, a solenoid actuated clutch operatively associated with said driving connections, a spring positioned to engage said clutch when the solenoid is deenergized, a pivoting support for said driving roll, a second solenoid connected to the pivoting support and adapted to disengage the driving roll with the second web and idler roll, a spring also associated with the pivoting support positioned to oppose the operation of said second solenoid, means for measuring the length of said articles at a predetermined station along the table, means for measuring the width of said articles at a predetermined station along the table, transverse sealing means responsive to the first of said measuring means for joining the webs to each other at the leading and trailing edge of the articles and in spaced relation thereto, and longitudinal sealing means responsive to the second of said measuring means for joining the webs to each other on each side of the articles and in spaced relation thereto, whereby articles of variable length and width may be wrapped automatically.

15. In automatic packaging machinery, a horizontal table, means for feeding a ply of thermoplastic sheet material along said table, means for feeding a second ply of thermoplastic sheet material in alignment with and over the first ply of sheet material, control means for each of said feeding means, a vertically reciprocating transverse sealing head positioned across said table and plies, measuring means positioned in advance of said sealing means, a longitudinal sealing head assembly positioned above said table, a second measuring means mounted on said sealing head assembly for scanning the width of an article moving along the table, a third measuring means positioned along said table between the transverse and longitudinal sealing heads, and means responsive to said third measuring means for vertically actuating the longitudinal sealing head assembly.

16. Apparatus in accordance with claim 15, in which the third measuring means is positioned to be actuated by the trailing edge of the article to be longitudinally sealed.

17. Apparatus in accordance with claim 15, in which the third measuring means is positioned to be actuated by the leading edge of the succeeding article.

18. In automatic article packaging machinery, a horizontal table, means for feeding a first web of sheet material along said table, means for feeding a second web of sheet material in alignment with and over an article on the first web of material, control means for each of said feed means, a sealing head assembly comprising a cross bar, a pair of vertically reciprocating slides for supporting said cross bar, a pair of plungers supported in said cross bar and adapted to have relative movement therewith, at least one heat sealing element supported on said plungers, a knife mounted in the cross bar and extending adjacent the heat sealing elements in closely spaced parallel relation thereto, a cam follower of each of said slides, a countershaft journaled in spaced relation below said table, a pair of cams on said countershaft, a motor, driving connections between said motor and said countershaft, a solenoid actuated clutch for said driving connections, a measuring means associated with the surface of said table for scanning articles moving along said table, and means responsive to said measuring means for energizing and deenergizing the solenoid actuated clutch.

19. Apparatus in accordance with claim 18, having a first transverse sealing head assembly, a pair of heat sealing elements in said transverse sealing head assembly, and a pair of longitudinal sealing head assemblies.

20. Apparatus in accordance with claim 18, in which the measuring means is a light-sensitive cell.

21. Apparatus in accordance with claim 18, in which the knife is substantially shorter than the width of the first web of sheet material.

22. Apparatus in accordance with claim 18, in which the sealing head assembly is positioned transversely of the webs, and in which a pair of additional sealing head assemblies are positioned longitudinally of the webs to provide lengthwise seals between successive transverse seals.

23. In automatic article packaging machinery having a horizontal table over which a pair of webs are fed, a frame, means for feeding a sup-

ply of web material upon which articles are placed along said table comprising, a plurality of feed rolls positioned along the edges of the table through which the lateral edges of the web are threaded, a motor mounted on said frame, driving connections between said motor and at least two of said feed rolls, a solenoid actuated clutch for said driving connections, a transverse sealing head assembly mounted above said table, a support for said sealing head assembly, means for reciprocating said sealing head assembly in said support, a solenoid control for said reciprocating means, a light-sensitive cell positioned along said table and directed to scan the table, thereby to detect the presence of an article moving along said table, a pair of longitudinal sealing head assemblies mounted above said table, a support for said longitudinal sealing head assemblies, means for reciprocating said longitudinal sealing heads in said support, a solenoid control for said longitudinal sealing head reciprocating means, and electrical connections between said light-sensitive cell and said solenoids.

24. In automatic article packaging machinery having a horizontal table over which a pair of webs are fed, a frame, means for feeding a supply of web material upon which articles are placed along said table comprising, a plurality of feed rolls positioned along the edges of the table through which the lateral edges of the web are threaded, a motor mounted on said frame, driving connections between said motor and at least two of said feed rolls, a solenoid actuated clutch for said driving connections, a transverse sealing head assembly mounted above said table, a support for said sealing head assembly, means for reciprocating said sealing head assembly in said support, a solenoid control for said reciprocating means, a light-sensitive cell positioned along said table and directed to scan the table, thereby to detect the presence of an article moving along said table, a pair of longitudinal sealing head assemblies mounted above said table, a support for said longitudinal sealing head assemblies, means for reciprocating said longitudinal sealing heads in said support, a solenoid control for said longitudinal sealing head reciprocating means, electrical connections between said light-sensitive cell and said solenoids, a plurality of longitudinal slots extending over at least a portion of said table, a pivoting rake mounted on the frame beneath said slots and having fingers adapted to project upwardly through the slots when the rake is pivoted to engage a wrapped article on the top of the table, means for moving the rake longitudinally of the table, and driving connections between said motor and said last-named means.

25. In automatic article packaging machinery having a horizontal table over which a pair of webs are fed, a frame, means for feeding a supply of web material upon which articles are placed along said table comprising, a plurality of feed rolls positioned along the edges of the table through which the lateral edges of the web are threaded, a motor mounted on said frame, driving connections between said motor and at least two of said feed rolls, a solenoid actuated clutch for said driving connections, a transverse sealing head assembly mounted above said table, a support for said sealing head assembly, means for reciprocating said sealing head assembly in said support, a solenoid control for said reciprocating means, a light-sensitive cell positioned along said table and directed to scan the table, thereby to detect the presence of an article moving along said table, a pair of longitudinal sealing head assemblies mounted above said table, a support for said longitudinal sealing head assemblies, means for reciprocating said longitudinal sealing heads in said support, a solenoid control for said longitudinal sealing head reciprocating means, electrical connections between said light-sensitive cell and said solenoids, a plurality of longitudinal slots extending over at least a portion of said table, a pivoting rake mounted on the frame beneath said slots and having fingers adapted to project upwardly through the slots when the rake is pivoted to engage a wrapped article on the top of the table, means for moving the rake longitudinally of the table, and driving connections between said motor and said last-named means.

26. In automatic article packaging apparatus, a horizontal table, means for feeding a first web of sheet material along the length of said table, means for feeding a second web of sheet material substantially narrower than the first web to a superimposed position in alignment with and over articles on the first web of material, means for controlling the feed of said second web of material, means for measuring the articles longitudinally on the table as the articles are transported on the web, means responsive to said measuring means for transversely joining the webs of material in spaced relation to said article, means for measuring the articles transversely on the table as the articles are transported on the web, means responsive to said last-named measuring means for longitudinally sealing said webs on either side of said article, and means for removing said wrapped article from said last-named station.

27. In automatic article packaging apparatus, a horizontal table, means for feeding a first web of sheet material along the length of said table, a plurality of cooperating rolls along the edges of said table adapted to engage opposite lateral edges of the web, a drive motor, driving connections between said motor and said rolls, means for feeding a second web of sheet material from an elevated position to a superimposed position in alignment with and over articles on the first web of material, means for controlling the feed of said second web of material, means for measuring the articles longitudinally on the table as the articles are transported on the web, means responsive to said measuring means for transversely joining the webs of material in spaced relation to said article, means for measuring the articles transversely on the table as the articles are transported on the web, means responsive to said last named measuring means for longitudinally sealing said webs on either side of said article, and means for removing said wrapped article from said last-named station.

28. In automatic article packaging apparatus, a horizontal table, means for feeding a first web of sheet material along the length of said table, a plurality of cooperating rolls along the edges of said table adapted to engage opposite lateral edges of the web, means on at least two opposite pairs of rolls for longitudinally weakening the web as it passes between the rolls, a drive motor, driving connections between said motor and said rolls, means for feeding a second web of sheet material from an elevated position to a superimposed position in alignment with and over articles on the first web of material, means for controlling the feed of said second web of material, means for measuring the articles longitudinally on the table as the articles are transported on the web, means responsive to said measuring means for transversely joining the webs of material in spaced relation to said article, means for measuring the articles transversely on the table as the articles are transported on the web, means responsive to said last-named measuring means for longitudinally sealing said webs on either side of said article, and means for removing said wrapped article from said last-named station.

29. In automatic article packaging machinery, a horizontal table, means for feeding a first web of sheet material along said table, means for feeding a second web of sheet material in superimposed relation to articles carried on said first web of material, control means for said feed means, a sealing head assembly comprising a cross bar, a pair of plungers supported in said cross bar and adapted to have relative movement therewith, at least one heat sealing element supported on said plungers, a knife mounted in the cross bar and extending adjacent the heat sealing elements in closely spaced parallel relation thereto, at least one guard member slidably supported on the cross bar and positioned in closely spaced parallel relation adjacent the heat sealing member, switch means mounted on the cross bar to be actuated by relative movement of the guard and the cross bar, a cam follower on each of said slides, a countershaft journaled in spaced relation below said table, a pair of cams on said countershaft, a motor, driving connections between said motor and said countershaft, a solenoid actuated clutch for said driving connections, a detector associated with the surface of said table for detecting the presence of articles moving along said table, and means responsive to said detector for energizing and deenergizing the solenoid actuated clutch.

30. In automatic article packaging machinery having a horizontal table over which a pair of webs are fed, a frame on which the table is supported, means for feeding a supply of web material along said table including, a plurality of feed rolls positioned along the edges of the table through which the lateral edges of at least one of the webs are threaded, a motor mounted on said frame, driving connections between said motor and at least two of said feed rolls, a solenoid actuated clutch for said driving connections, a transverse sealing head assembly mounted above said table, a support for said sealing head assembly, a countershaft mounted on the frame, driving means between the countershaft and the sealing head assembly whereby rotation of the countershaft actuates the sealing head assembly vertically in the support, driving connections between said countershaft and the motor, a solenoid actuated clutch in said last-named driving connections, a light-sensitive cell positioned along said table and directed to scan the table, thereby to detect the presence of an article moving along said table between said webs, and electrical connections between the solenoids for both clutches and the light-sensitive cell, whereby the web material is temporarily held stationary while the sealing head is actuated vertically to seal the webs to each other.

31. In automatic article packaging machinery having a horizontal table over which a pair of webs extend, a frame on which the table is supported, means for feeding a supply of web material along said table including, a plurality of feed rolls positioned along the edges of the table through which the lateral edges of at least one of the webs are threaded, a motor mounted on said frame, driving connections between said motor and at least two of said feed rolls, a clutch for said driving connections, a transverse sealing head assembly mounted above said table, a support for said sealing head assembly, a countershaft mounted on the frame, driving means between the countershaft and the sealing head assembly whereby rotation of the countershaft actuates the sealing head assembly vertically in the support, driving connections between said countershaft and the motor, a clutch in said last-named driving connections, means positioned along said table to measure an article on the table between the webs, and clutch actuating means responsive to said measuring means for sequentially actuating each of said clutches whereby the web material is temporarily held stationary while the sealing head is actuated vertically to seal the webs to each other.

32. In automatic article packaging machinery having a horizontal table over which a pair of webs extend, a frame on which the table is supported, means for feeding a supply of web material along said table including a plurality of feed rolls positioned along the edges of the table through which the lateral edges of at least one of the webs are threaded, a motor mounted on said frame, driving connections between said motor and at least two of said feed rolls, a clutch for said driving connections, a transverse sealing head assembly mounted above said table, a support for said sealing head assembly, a countershaft mounted on the frame, driving means between the countershaft and the sealing head assembly whereby rotation of the countershaft actuates the sealing head assembly vertically in the support, driving connections between said countershaft and the motor, a clutch in said last-named driving connections, a longitudinal sealing head assembly mounted above said table, a support for said longitudinal sealing head assembly, a second countershaft mounted on the frame, driving means between said second countershaft and the longitudinal sealing head assembly whereby rotation of the second countershaft actuates the longitudinal sealing head assembly vertically in its support, driving connections between said second countershaft and the motor, a solenoid actuated clutch in said last-named driving connections, means positioned along said table to measure an article on the table between the webs, and clutch actuating means responsive to said measuring means for sequentially actuating each of said clutches, whereby the web material is temporarily held stationary while the sealing head is actuated vertically to seal the webs to each other.

33. In automatic article packaging machinery having a horizontal table over which a pair of webs extend, a frame on which the table is supported, means for feeding a supply of web material along said table including a plurality of feed rolls positioned along the edges of the table through which the lateral edges of at least one of the webs are threaded, a motor mounted on said frame, driving connections between said motor and at least two of said feed rolls, a clutch for said driving connections, a transverse sealing head assembly mounted above said table, a support for said sealing head assembly, a countershaft mounted on the frame, a brake on said countershaft, a guard on said sealing head assembly, means responsive to the position of said guard for setting said brake, driving means between the countershaft and the sealing head assembly whereby rotation of the countershaft actuates the sealing head assembly vertically in the support, driving connections between said countershaft and the motor, a clutch in said last-named driving connections, a longitudinal sealing head assembly mounted above said table, a support for said longitudinal sealing head assembly, a second countershaft mounted on the frame, driving means between said second countershaft and the longitudinal sealing head assembly whereby rota-

tion of the second countershaft actuates the longitudinal sealing head assembly vertically in its support, driving connections between said second countershaft and the motor, a solenoid actuated clutch in said last-named driving connections, means positioned along said table to measure an article on the table between the webs, and clutch actuating means responsive to said measuring means for sequentially actuating each of said clutches, whereby the web material is temporarily held stationary while the sealing head is actuated vertically to seal the webs to each other.

34. In automatic article packaging machinery having a horizontal table over which a pair of webs extend, a frame on which the table is supported, means for feeding a supply of web material along said table including a plurality of feed rolls positioned along the edges of the table through which the lateral edges of at least one of the webs are threaded, a motor mounted on said frame, driving connections between said motor and at least two of said feed rolls, a clutch for said driving connections, a transverse sealing head assembly mounted above said table, a support for said sealing head assembly, a countershaft mounted on the frame, a brake on said countershaft, a guard on said sealing head assembly, means responsive to the position of said guard for setting said brake, driving means between the countershaft and the sealing head assembly whereby rotation of the countershaft actuates the sealing head assembly vertically in the support, driving connections between said countershaft and the motor, a clutch in said last-named driving connections, a longitudinal sealing head assembly mounted above said table, a support for said longitudinal sealing head assembly, a second countershaft mounted on the frame, a brake on said countershaft, a guard on said sealing head assembly, means responsive to the position of said guard for setting said brake, driving means between said second countershaft and the longitudinal sealing head assembly whereby rotation of the second countershaft actuates the longitudinal sealing head assembly vertically in its support, driving connections between said second countershaft and the motor, a solenoid actuated clutch in said last-named driving connections, means positioned along said table to measure an article on the table between the webs, and clutch actuating means responsive to said measuring means for sequentially actuating each of said clutches, whereby the web material is temporarily held stationary while the sealing head is actuated vertically to seal the webs to each other.

35. In automatic article packaging machinery having a horizontal table over which a pair of webs are fed, a frame, means for feeding a supply of web material along said table, a plurality of feed rolls positioned along the edges of the table through which the lateral edges of the web are threaded, a motor mounted on said frame, driving connections between said motor and at least two of said feed rolls, a solenoid actuated clutch for said driving connections, a transverse sealing head assembly mounted above said table, a support for said sealing head assembly, means for reciprocating said sealing head assembly in said support, a solenoid control for said reciprocating means, a light-sensitive cell positioned along said table and directed to scan the table, thereby to measure an article moving along said table between the webs, a pair of longitudinal sealing head assemblies mounted above said table, a support for said longitudinal sealing head assemblies, means for reciprocating said longitudinal sealing heads in said support, means for laterally moving the longitudinal sealing head assemblies with respect to each other, a solenoid control for said longitudinal sealing head reciprocating means, and electrical connections between said light-sensitive cell and said solenoids.

36. In automatic article packaging machinery having a horizontal table over which a pair of webs are fed, a frame, means for feeding a supply of web material along said table, a plurality of feed rolls positioned along the edges of the table through which the lateral edges of the web are threaded, a motor mounted on said frame, driving connections between said motor and at least two of said feed rolls, a solenoid actuated clutch for said driving connections, a transverse sealing head assembly mounted above said table, a support for said sealing head assembly, means for reciprocating said sealing head assembly in said support, a solenoid control for said reciprocating means, a light-sensitive cell positioned along said table and directed to scan the table, thereby to detect the presence of an article moving along said table between the webs, a pair of longitudinal sealing head assemblies mounted above said table, a support for said longitudinal sealing head assemblies, means for reciprocating said longitudinal sealing heads in said support, at least one of said longitudinal sealing head assemblies being laterally movable with respect to the other sealing head assembly, means for scanning the table to determine the maximum width of an article to be packaged, means responsive to said scanning means for automatically moving at least one of the longitudinal sealing head assemblies with respect to the other sealing head assembly, a solenoid control for said longitudinal sealing head reciprocating means, and electrical connections between said light-sensitive cell and said solenoids.

37. In automatic article packaging machinery having a horizontal table over which a pair of webs are fed, a frame, means for feeding a supply of web material along said table, a plurality of feed rolls positioned along the edges of the table through which the lateral edges of the web are threaded, a motor mounted on said frame, driving connections between said motor and at least two of said feed rolls, a solenoid actuated clutch for said driving connections, a transverse sealing head assembly mounted above said table, a support for said sealing head assembly, means for reciprocating said sealing head assembly in said support, a solenoid control for said reciprocating means, a light-sensitive cell positioned along said table and directed to scan the table, thereby to detect the presence of an article moving along said table between the webs, a pair of longitudinal sealing head assemblies mounted above said able, a support for said longitudinal sealing head assemblies, means for reciprocating said longitudinal sealing heads in said support, one of said longitudinal sealing head assemblies being relatively fixed transversely of the table, the other of said sealing head assemblies being laterally movable with respect to said fixed sealing head assembly, means for scanning the table to determine the maximum width of an article to be packaged, means responsive to said scanning means for automatically moving at least one of the longitudinal sealing head assemblies with respect to the other sealing head assembly, a solenoid control for said longitudinal sealing head reciprocat-

ing means, and electrical connections between said light-sensitive cell and said solenoids.

38. In automatic article packaging machinery having a horizontal table over which a pair of webs are fed, a frame, means for feeding a supply of web material along said table, a plurality of feed rolls positioned along the edges of the table through which the lateral edges of the web are threaded, a motor mounted on said frame, driving connections between said motor and at least two of said feed rolls, a solenoid actuated clutch for said driving connections, a transverse sealing head assembly mounted above said table, a support for said sealing head assembly, means for reciprocating said sealing head assembly in said support, a solenoid control for said reciprocating means, a light-sensitive cell positioned along said table and directed to scan the table, thereby to detect the presence of an article moving along said table between the webs, a pair of longitudinal sealing head assemblies mounted above said table, a support for said longitudinal sealing head assemblies, means for reciprocating said longitudinal sealing heads in said support, one of said longitudinal sealing head assemblies being relatively fixed transversely of the table, the other of said sealing head assemblies being laterally movable with respect to said fixed sealing head assembly, means for scanning the table to determine the maximum width of an article to be packaged, a continuously driven chain mounted transversely above said sealing head assemblies, a dog associated with the movable sealing head assembly and adapted to selectively engage the upper and lower flights of said chain, a solenoid for pivoting said dog, means responsive to said scanning means for energizing said solenoid in accordance with the width of an article to be packaged, a solenoid control for said longitudinal sealing head reciprocating means, and electrical connections between said light-sensitive cell and said solenoids.

39. In automatic article packaging machinery having a horizontal table over which a pair of webs are fed, a frame, means for feeding a supply of web material along said table, a plurality of feed rolls positioned along the edges of the table through which the lateral edges of the web are threaded, a motor mounted on said frame, driving connections between said motor and at least two of said feed rolls, a solenoid actuated clutch for said driving connections, a transverse sealing head assembly mounted above said table, a support for said sealing head assembly, means for reciprocating said sealing head assembly in said support, a solenoid control for said reciprocating means, a light-sensitive cell positioned along said table and directed to scan the table, thereby to detect the presence of an article moving along said table between the webs, a pair of longitudinal sealing head assemblies mounted above said table, a support for said longitudinal sealing head assemblies, means for reciprocating said longitudinal sealing heads in said support, one of said longitudinal sealing head assemblies being relatively fixed transversely of the table, the other of said sealing head assemblies being laterally movable with respect to said fixed sealing head assembly, means for scanning the table to determine the maximum width of an article to be packaged, a continuously driven chain mounted transversely above said sealing head assemblies, a dog associated with the movable sealing head assembly and adapted to selectively engage the upper and lower flights of said chain, a solenoid for pivoting said dog, means for latching said dog in a predetermined registered position, means responsive to said scanning means for energizing said solenoid in accordance with the width of an article to be packaged, a solenoid control for said longitudinal sealing head reciprocating means, and electrical connections between said light-sensitive cell and said solenoids.

40. In automatic article packaging machinery having a horizontal table over which a pair of webs are fed, a frame, means for feeding a supply of web material along said table, a plurality of feed rolls positioned along the edges of the table through which the lateral edges of the web are threaded, a motor mounted on said frame, driving connections between said motor and at least two of said feed rolls, a solenoid actuated clutch for said driving connections, a transverse sealing head assembly mounted above said table, a support for said sealing head assembly, means for reciprocating said sealing head assembly in said support, a solenoid control for said reciprocating means, a light-sensitive cell positioned along said table and directed to scan the table, thereby to detect the presence of an article moving along said table between the webs, a pair of longitudinal sealing head assemblies mounted above said table, a support for said longitudinal sealing head assemblies, means for reciprocating said longitudinal sealing heads in said support, said longitudinal sealing head assemblies being transversely movable with respect to each other, a motor mounted on said sealing head assembly support, driving connections between said motor and said sealing head assemblies whereby rotation of the motor in one direction moves the sealing head assemblies away from each other and rotation of the motor in the other direction moves the sealing head assemblies toward each other, means for scanning the table to determine the maximum width of an article to be packaged, means responsive to said scanning means for rotating said motor in accordance with the width of an article to be packaged, a solenoid control for said longitudinal sealing head reciprocating means, and electrical connections between said light-sensitive cell and said solenoids.

41. In automatic article packaging machinery having a horizontal table over which a pair of webs are fed, a frame, means for feeding a supply of web material along said table, a plurality of feed rolls positioned along the edges of the table through which the lateral edges of the web are threaded, a motor mounted on said frame, driving connections between said motor and at least two of said feed rolls, a solenoid actuated clutch for said driving connections, a transverse sealing head assembly mounted above said table, a support for said sealing head assembly, means for reciprocating said sealing head assembly in said support, a solenoid control for said reciprocating means, a light-sensitive cell positioned along said table and directed to scan the table, thereby to detect the presence of an article moving along said table between the webs, a pair of longitudinal sealing head assemblies mounted above said table, a support for said longitudinal sealing head assemblies, means for reciprocating said longitudinal sealing heads in said support, said longitudinal sealing head assemblies being transversely movable with respect to each other, a motor mounted on said sealing head assembly support, driving connections between said motor and said sealing head assemblies whereby rotation of the motor in one direction moves the seal-

ing head assemblies away from each other and rotation of the motor in the other direction moves the sealing head assemblies toward each other, means for stopping said motor in a predetermined registered position, means for scanning the table to determine the maximum width of an article to be packaged, means responsive to said scanning means for rotating said motor in accordance with the width of an article to be packaged, a solenoid control for said longitudinal sealing head reciprocating means, and electrical connections between said light-sensitive cell and said solenoids.

42. In automatic article packaging machinery having a horizontal table means for feeding, a pair of webs along said table, a frame, a plurality of feed rolls positioned along the edges of the table through which the lateral edges of one of said webs are threaded, a motor mounted on said frame, driving connections between said motor and at least two of said feed rolls, a solenoid actuated clutch for said driving connections, a transverse sealing head assembly mounted on said table, a support for said sealing head assembly, a knife in said sealing head assembly, said knife being adapted to register with a slot in the table, means for reciprocating said sealing head assembly in said support, a solenoid control for said reciprocating means, a light-sensitive cell positioned along said table and directed to scan the table thereby to detect the presence of an article moving along said table between the webs, a pair of longitudinal sealing head assemblies mounted above said table, a support for said longitudinal sealing head assemblies, a knife in each of said sealing head assemblies, a plurality of longitudinal slots in said table, positioned to receive said knives, means for reciprocating said longitudinal sealing heads in said support, means for laterally moving at least one of said sealing head assemblies with respect to the other sealing head assembly, means for automatically registering at least one of said knives with the longitudinal slots in the table, means for scanning the table to determine the maximum width of an article to be packaged, means responsive to said scanning means for automatically moving at least one of the longitudinal sealing head assemblies with respect to the other sealing head assembly, a solenoid control for said longitudinal sealing head reciprocating means, and electrical connections between said light-sensitive cell and said solenoid.

43. In automatic article packaging machinery having a horizontal table over which a pair of webs are fed, a frame, means for feeding a supply of web material along said table, a plurality of feed rolls positioned along the edges of the table through which the lateral edges of the web are threaded, a motor mounted on said frame, driving connections between said motor and at least two of said feed rolls, a solenoid actuated clutch for said driving connections, a transverse sealing head assembly mounted above said table, a support for said sealing head assembly, means for reciprocating said sealing head assembly in said support, a solenoid control for said reciprocating means, a light-sensitive cell positioned along said table and directed to scan the table, thereby to detect the presence of an article moving along said table between the webs, a pair of longitudinal sealing head assemblies mounted above said table, a support for said longitudinal sealing head assemblies, means for reciprocating said longitudinal sealing heads in said support, one of said longitudinal sealing head assemblies being relatively fixed transversely of the table, the other of said sealing head assemblies being laterally movable with respect to said fixed sealing head assembly, means for scanning the table to determine the maximum width of an article to be packaged, means responsive to said scanning means for automatically moving at least one of the longitudinal sealing head assemblies with respect to the other sealing head assembly, a solenoid control for said longitudinal sealing head reciprocating means, electrical connections between said light-sensitive cell and said solenoids, and a guide positioned along the table for registering articles to be packaged with respect to the relatively fixed longitudinal sealing head assembly.

44. In automatic article packaging machinery having a horizontal table over which a pair of webs are fed, a frame, means for feeding a supply of web material along said table, a plurality of feed rolls positioned along the edges of the table through which the lateral edges of the web are threaded, a motor mounted on said frame, driving connections between said motor and at least two of said feed rolls, a solenoid actuated clutch for said driving connections, a transverse sealing head assembly mounted above said table, a support for said sealing head assembly, means for reciprocating said sealing head assembly in said support, a solenoid control for said reciprocating means, a light-sensitive cell positioned along said table and directed to scan the table, thereby to detect the presence of an article moving along said table between the webs, a pair of longitudinal sealing head assemblies mounted above said table, a support for said longitudinal sealing head assemblies, means for reciprocating said longitudinal sealing heads in said support, said longitudinal sealing head assemblies being transversely movable with respect to each other, a motor mounted on said sealing head assembly support, driving connections between said motor and said sealing head assemblies whereby rotation of the motor in one direction moves the sealing head assemblies away from each other and rotation of the motor in the other direction moves the sealing head assemblies toward each other, means for scanning the table to determine the maximum width of an article to be packaged, means responsive to said scanning means for rotating said motor in accordance with the width of an article to be packaged, indicia extending longitudinally along the table for determining the proper placing of the articles on the table, a solenoid control for said longitudinal sealing head reciprocating means, and electrical connections between said light-sensitive cell and said solenoids.

45. In automatic article packaging machinery having a horizontal table over which a pair of webs are fed, a frame, means for feeding a supply of web material along the table, a plurality of feed rolls positioned along the edges of the table through which the lateral edges of the web are threaded, a motor mounted on said frame, driving connections between said motor and at least two of said feed rolls, a solenoid actuated clutch for said driving connections, a transverse sealing head assembly mounted above said table, a support for said sealing head assembly, means for reciprocating said sealing head assembly in said support, a solenoid control for said reciprocating means, a light-sensitive cell positioned along said table and directed to scan the table, thereby to detect the presence of an article moving along said table between the webs, a pair of longitudinal sealing head assemblies mounted above said

table, a support for said longitudinal sealing head assemblies, means for reciprocating said longitudinal sealing heads in said support, said longitudinal sealing head assemblies being transversely movable with respect to each other, a motor mounted on said sealing head assembly support, driving connections between said motor and said sealing head assemblies whereby rotation of the motor in one direction moves the sealing head assemblies away from each other and rotation of the motor in the other direction moves the sealing head assemblies toward each other, means for scanning the table to determine the maximum width of an article to be packaged, means responsive to said scanning means for rotating said motor in accordance with the width of an article to be packaged, a switch positioned at the front of said table, means for actuating said switch, said means being controlled by the presence of an article to be packaged on the

table, a solenoid control for said longitudinal sealing head reciprocating means, and electrical connections between said light-sensitive cell and said solenoids.

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