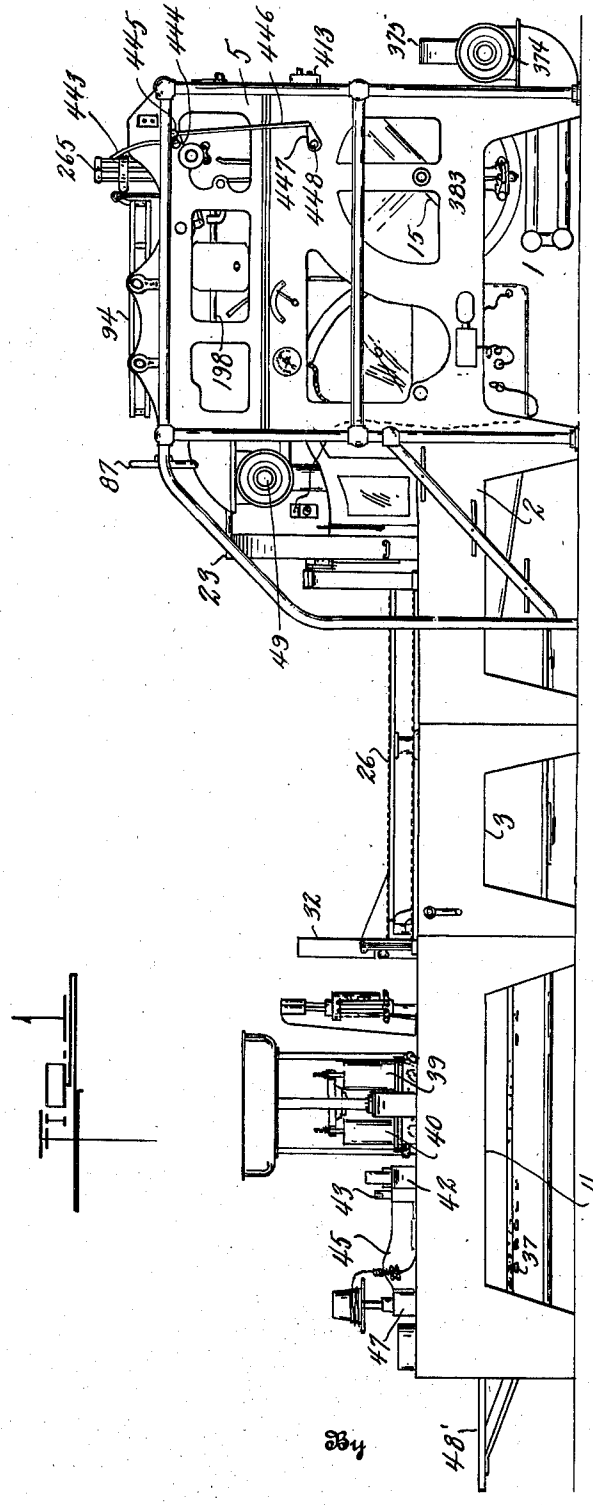
Nov. 3, 1936. H. T. SCOTT 2,059,403

AUTOMATIC PAPER BOTTLE MACHINE

Filed April 7, 1932 30 Sheets-Sheet 1



Henry T. Scott

Inventor

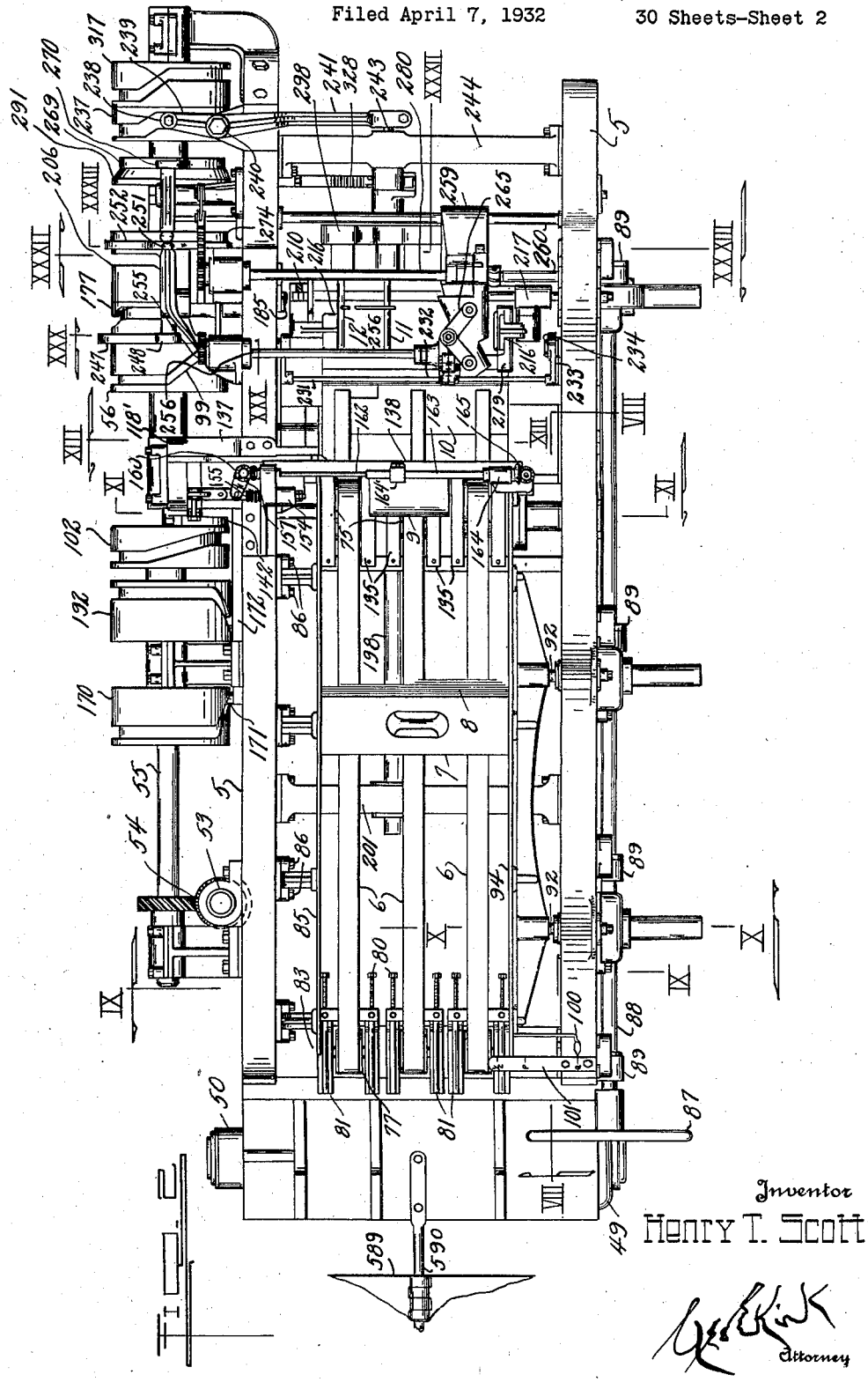
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AUTOMATIC PAPER BOTTLE MACHINE

Filed April 7, 1932 30 Sheets-Sheet 2



Inventor
Henry T. Scott

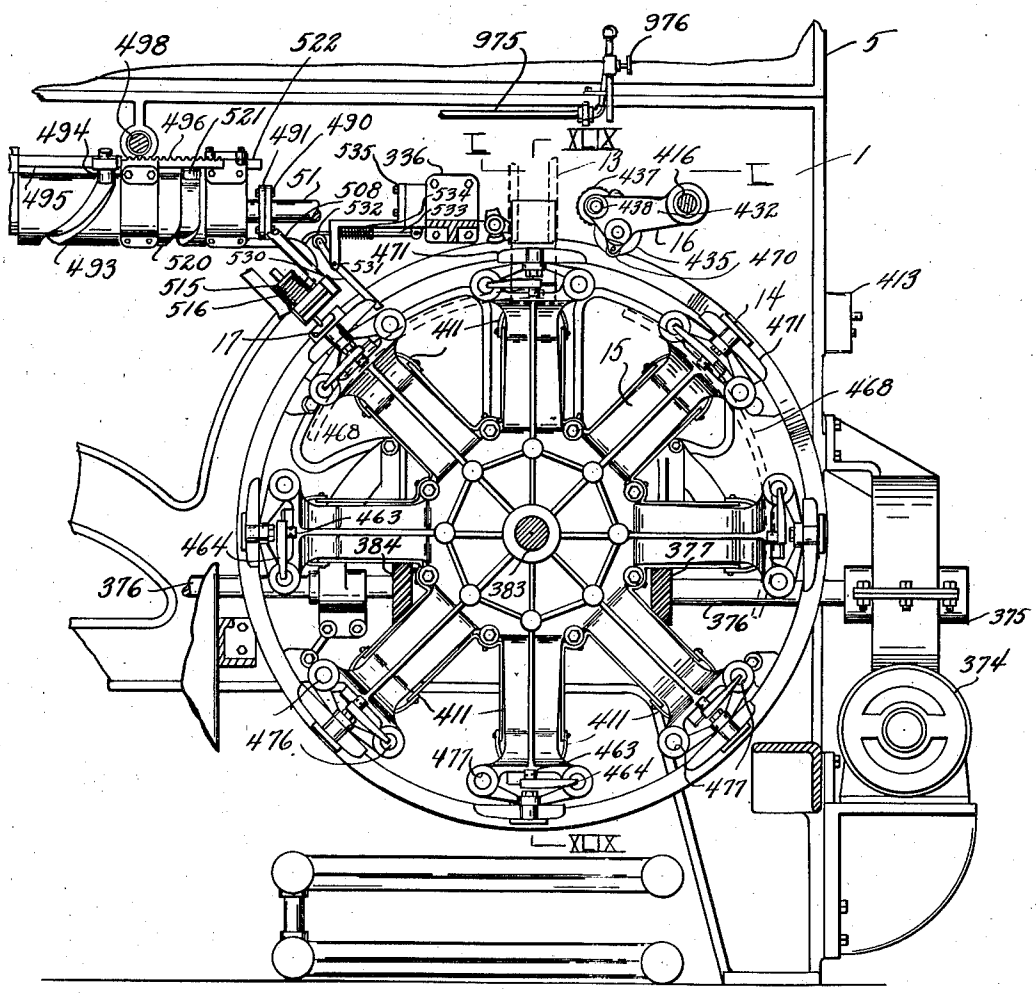
Attorney

Nov. 3, 1936. H. T. SCOTT 2,059,403

AUTOMATIC PAPER BOTTLE MACHINE

Filed April 7, 1932 30 Sheets-Sheet 3

FIG. 3



Inventor

Henry T. Scott

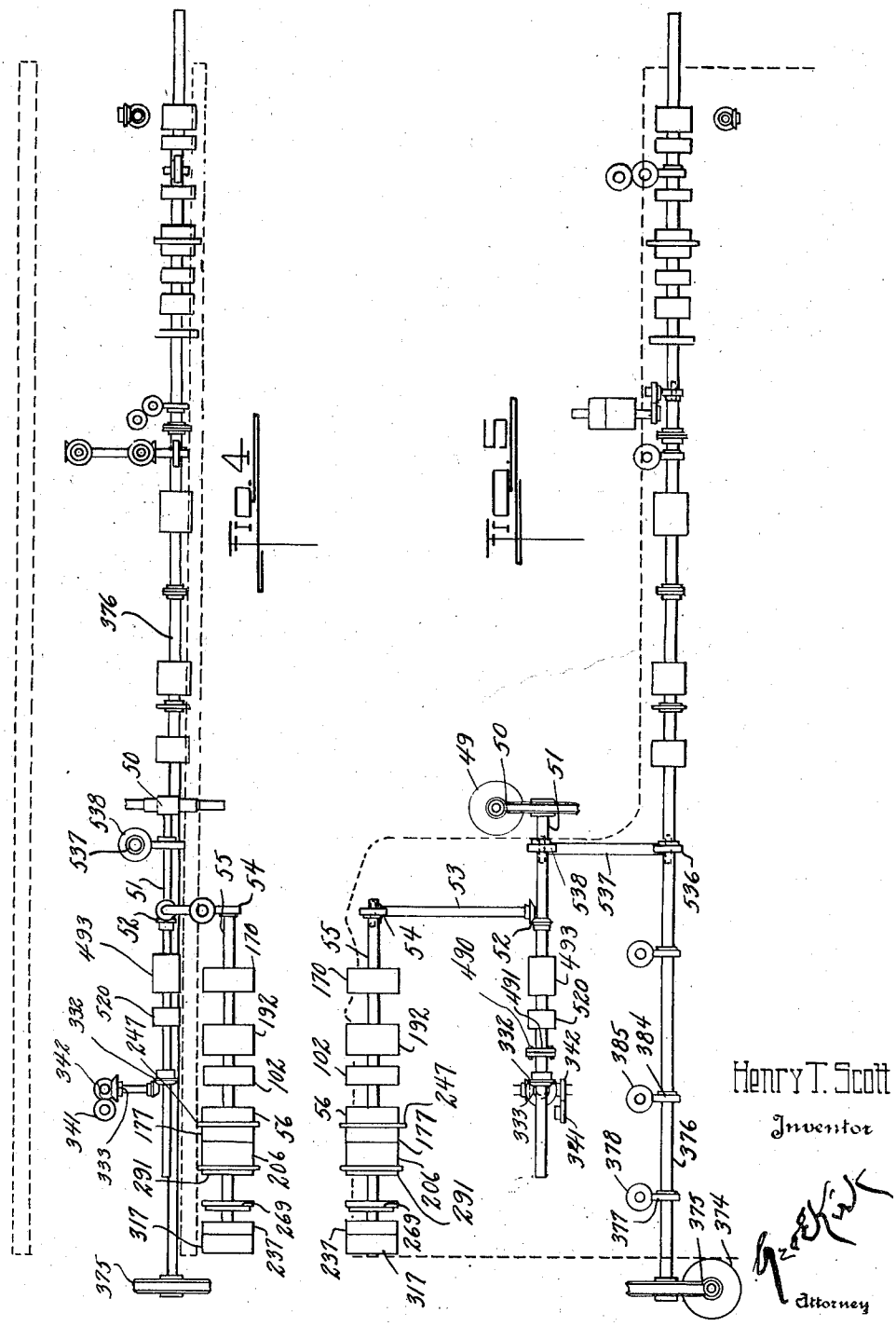
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Attorney

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AUTOMATIC PAPER BOTTLE MACHINE

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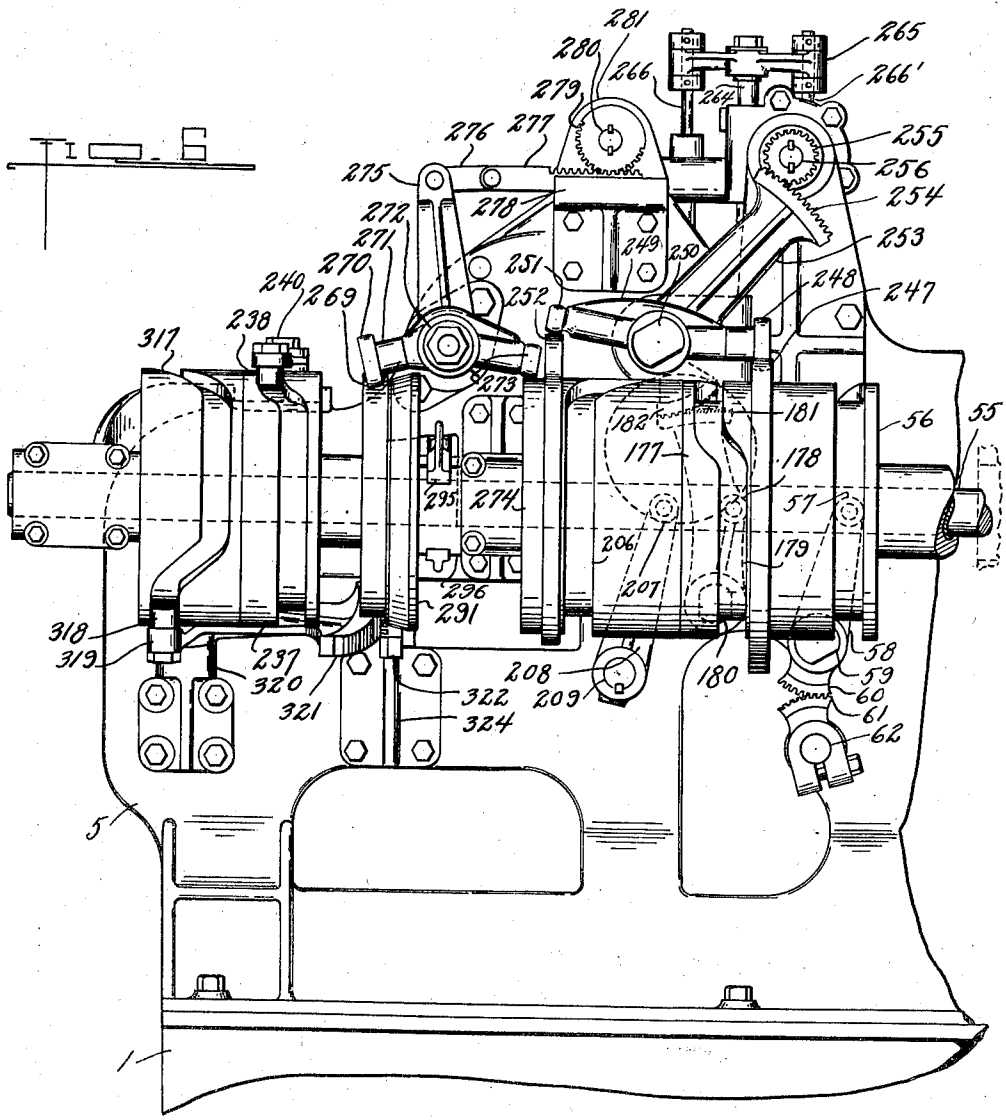


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AUTOMATIC PAPER BOTTLE MACHINE

Filed April 7, 1932 30 Sheets-Sheet 5

FIG. 6



Henry T. Scott
Inventor

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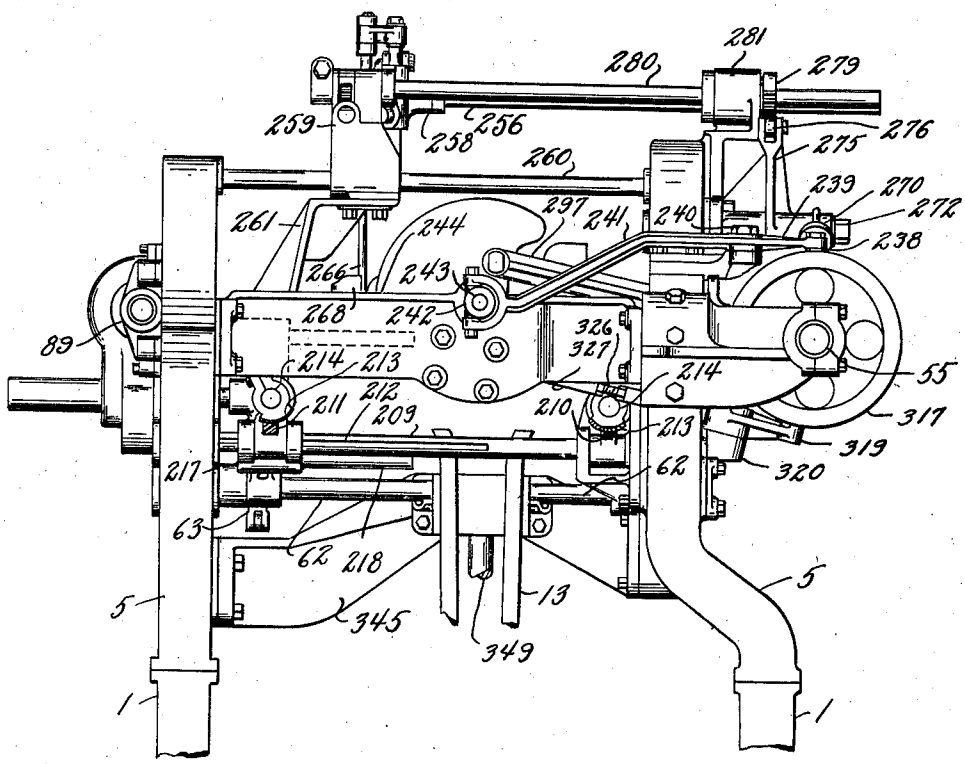
Attorney

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AUTOMATIC PAPER BOTTLE MACHINE

Filed April 7, 1932 30 Sheets-Sheet 6

FIG. 7.



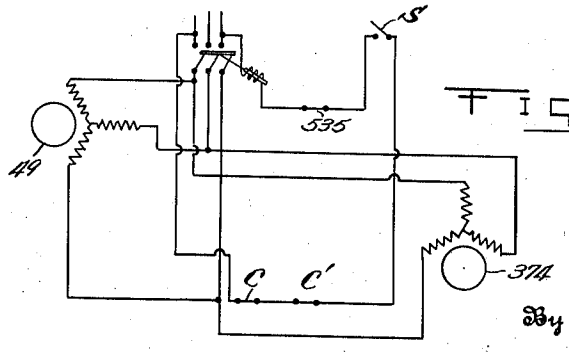


FIG. 7A.

Inventor
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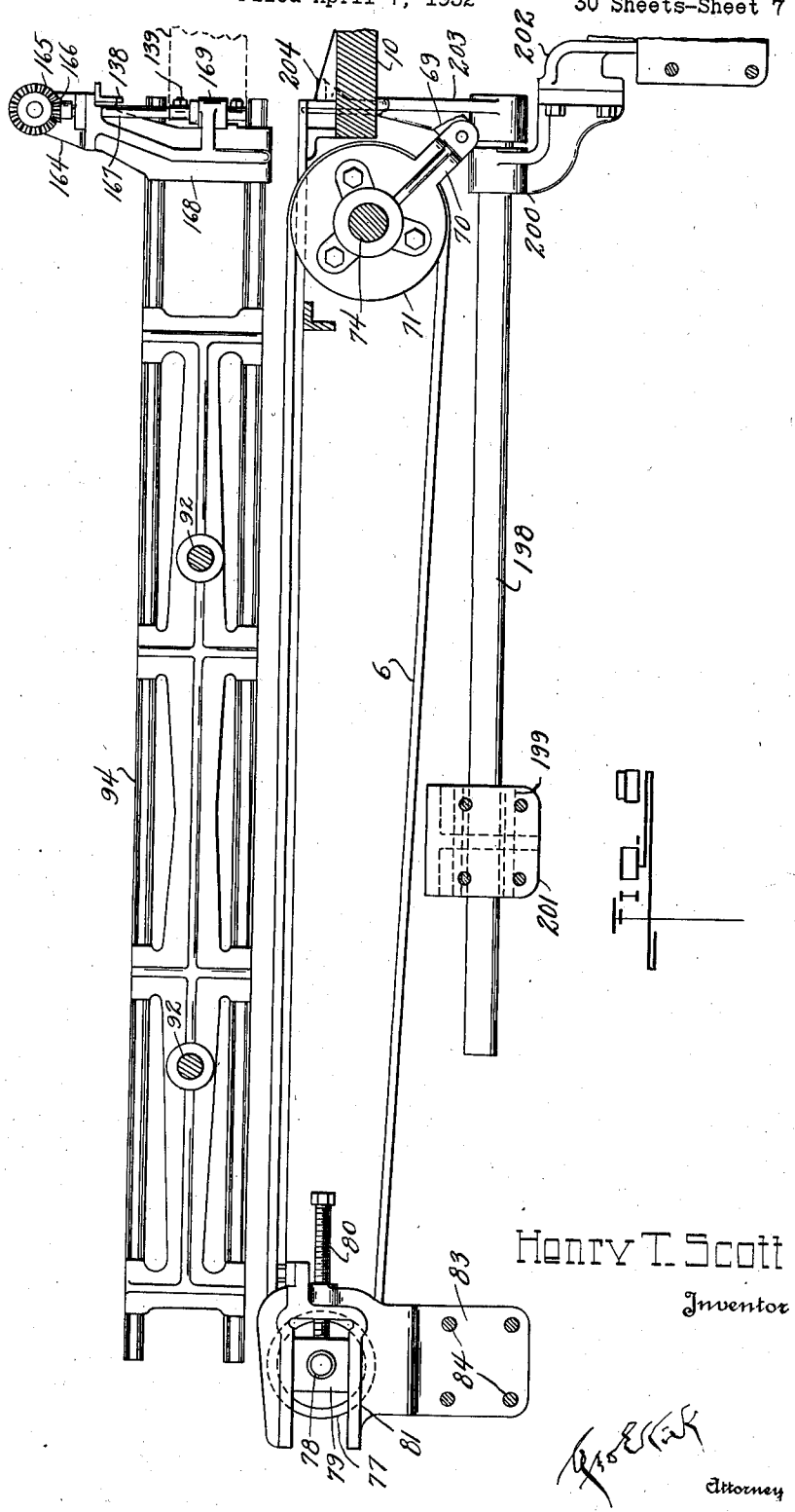


Fig. 1.

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Inventor

Attorney

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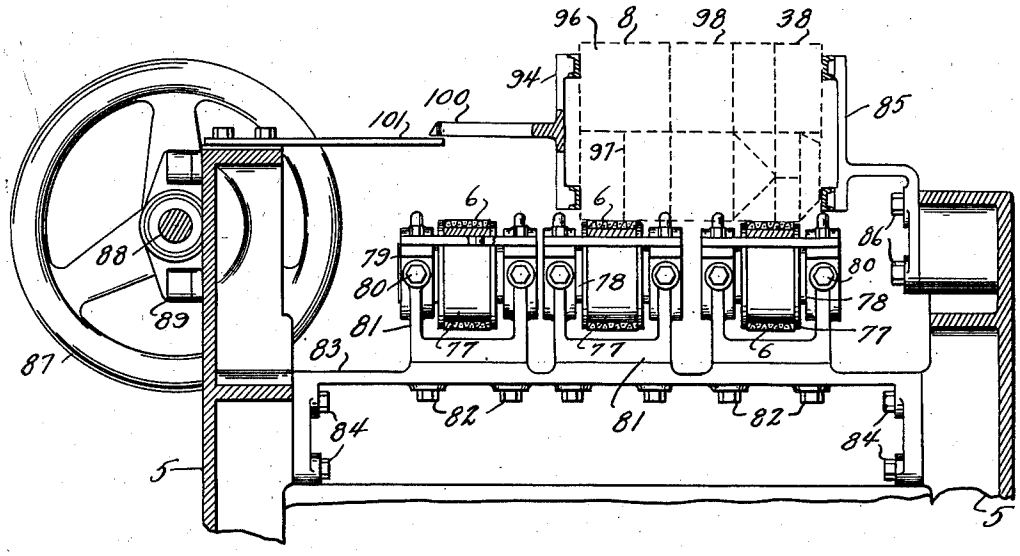


FIG. 9

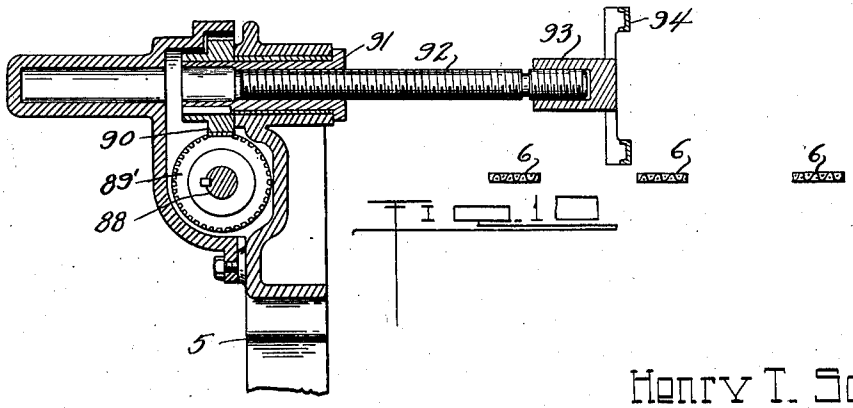


FIG. 10

Henry T. Scott

Inventor

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Attorney

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AUTOMATIC PAPER BOTTLE MACHINE

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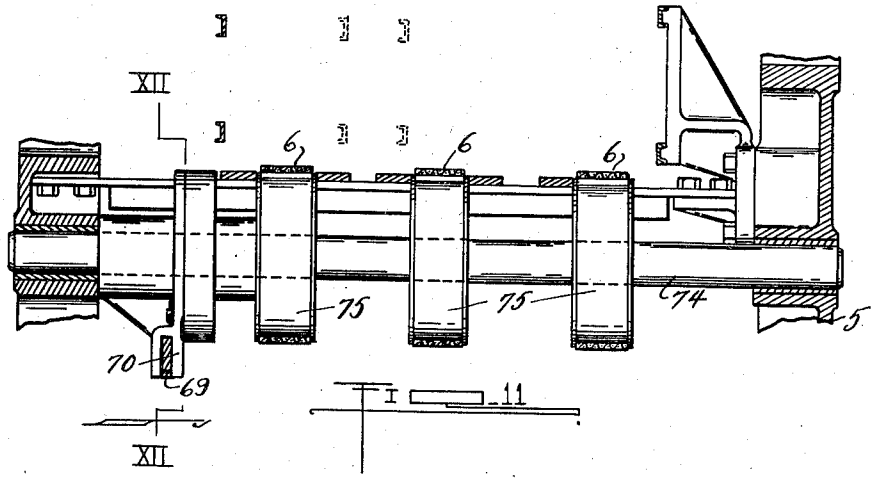


FIG. 11

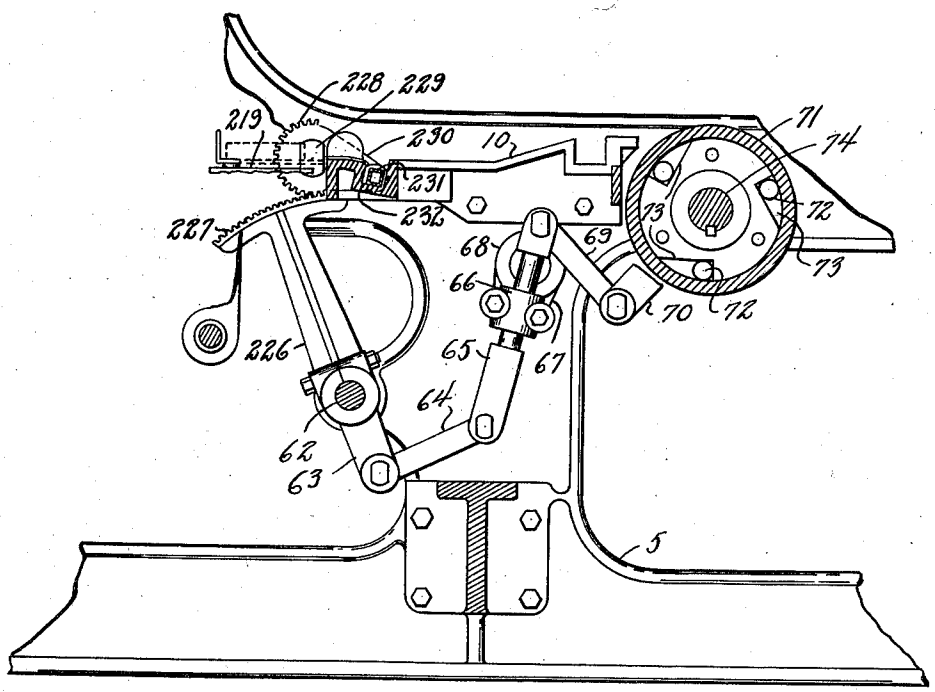


FIG. 12

Inventor
Henry T. Scott

By

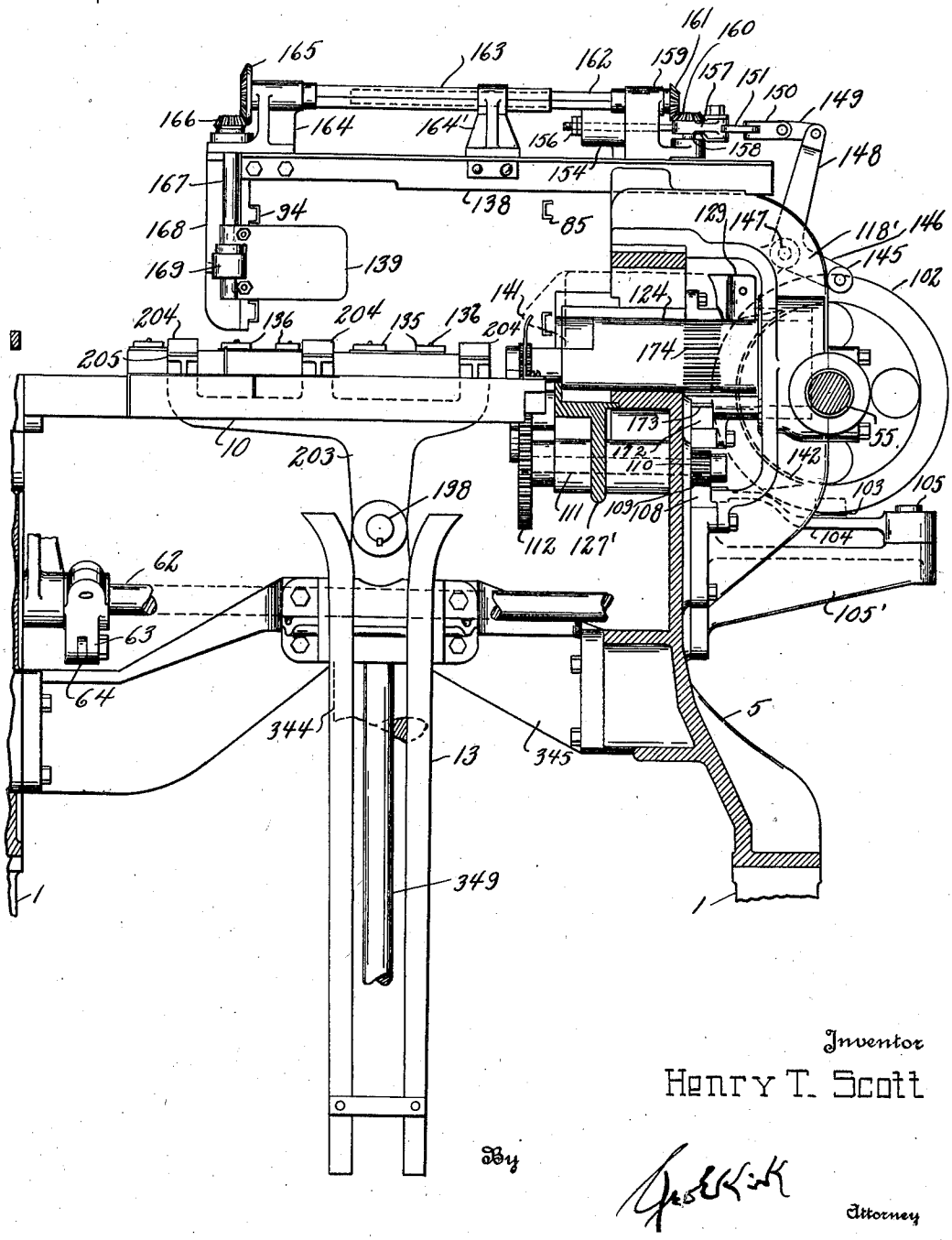
Attorney

Nov. 3, 1936. H. T. SCOTT 2,059,403

AUTOMATIC PAPER BOTTLE MACHINE

Filed April 7, 1932 30 Sheets-Sheet 10

Fig. 13



Inventor

Henry T. Scott

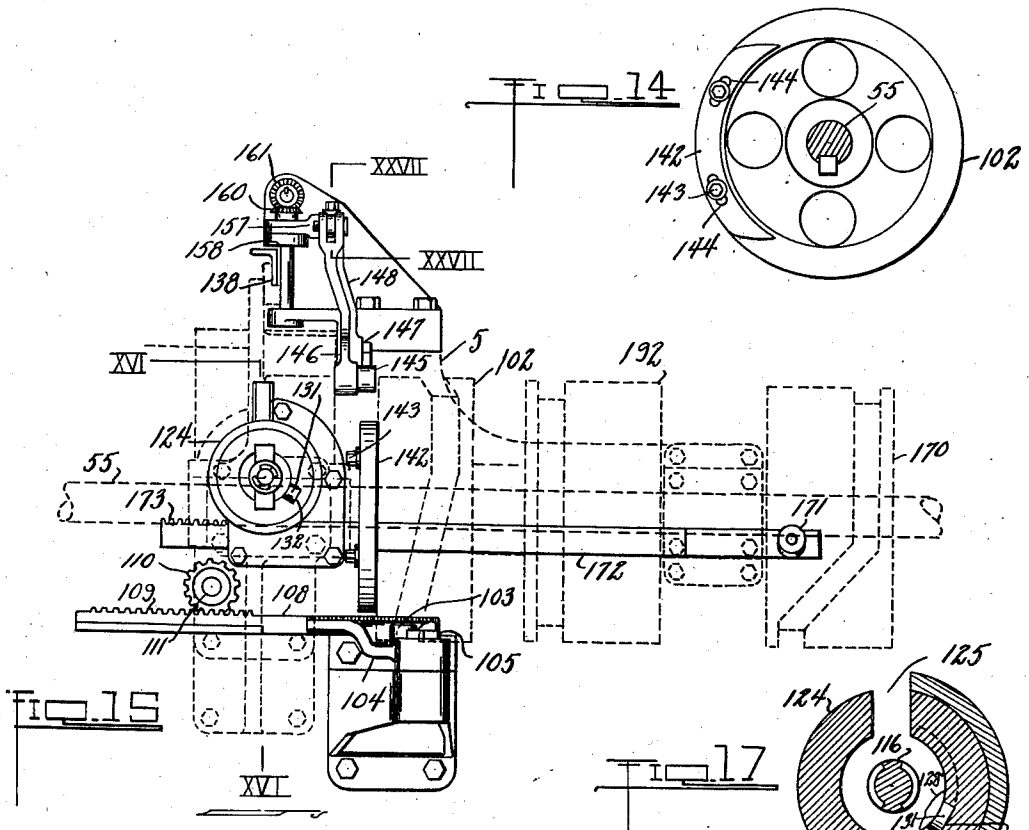
By

Attorney

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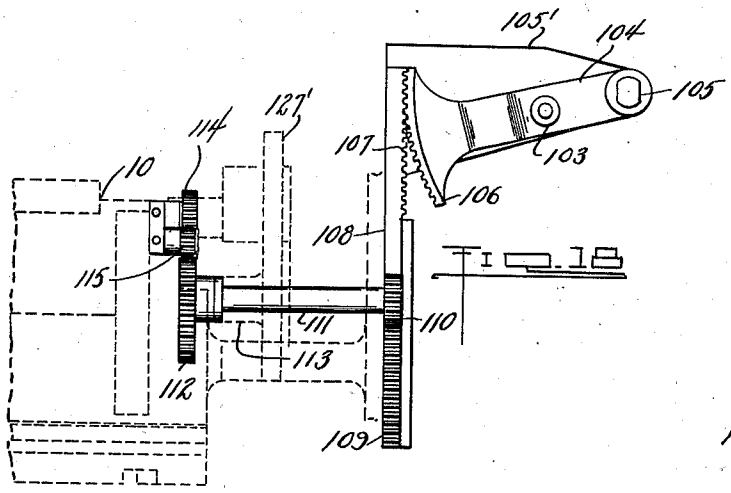


FIG. 18

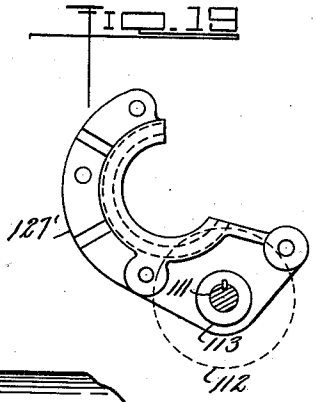


FIG. 19

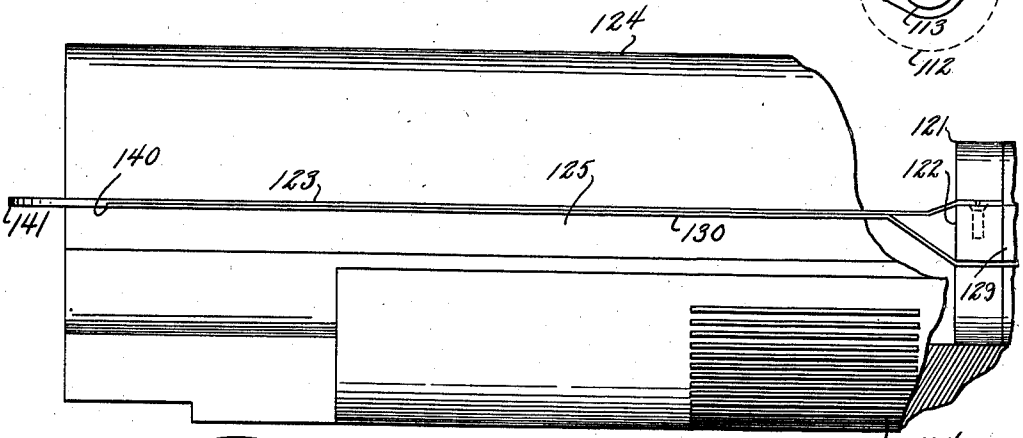


FIG. 20

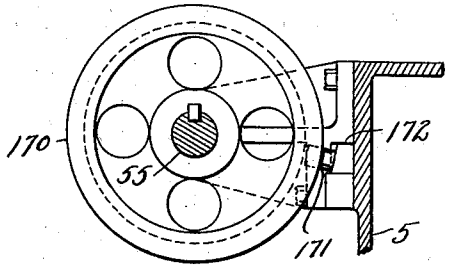


FIG. 21

Henry T. Scott

Inventor

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Attorney

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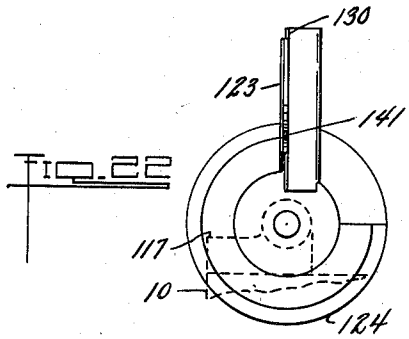


Fig. 22

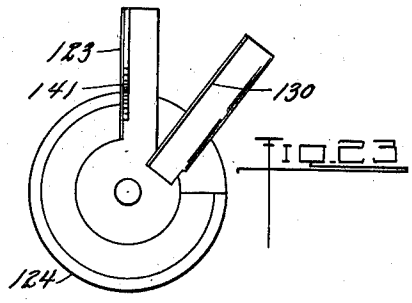


Fig. 23

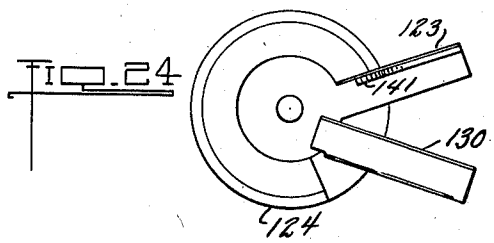


Fig. 24

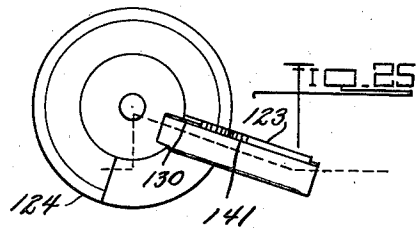


Fig. 25

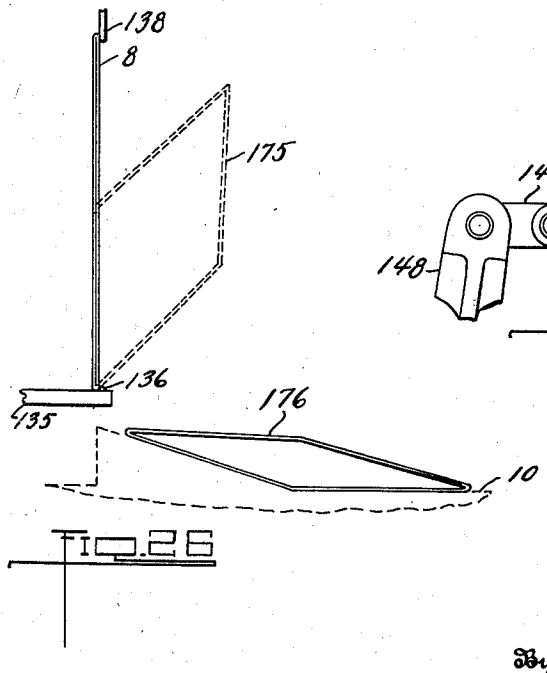


Fig. 26

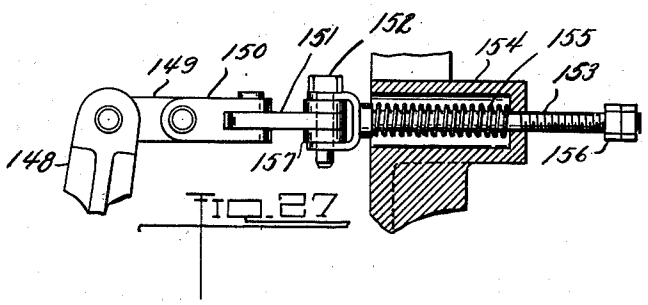


Fig. 27

Henry T. Scott
Inventor

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Attorney

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AUTOMATIC PAPER BOTTLE MACHINE

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FIG. 28

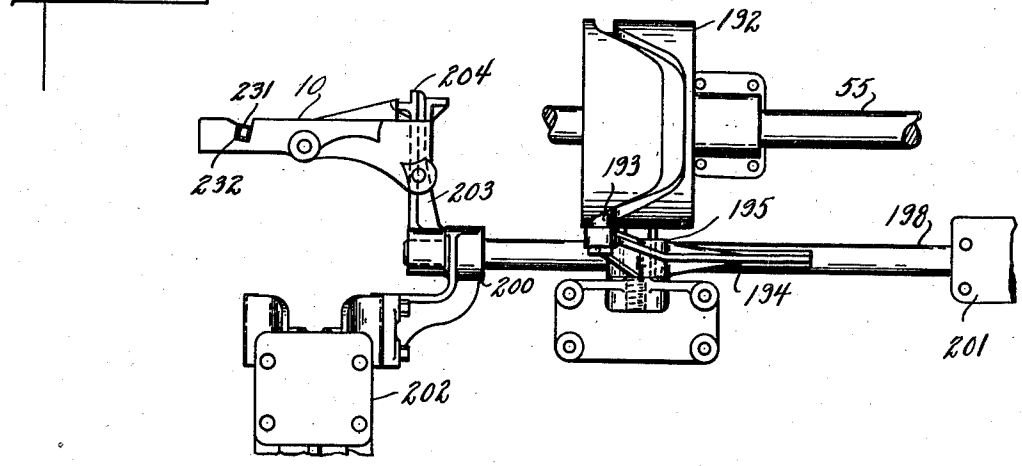
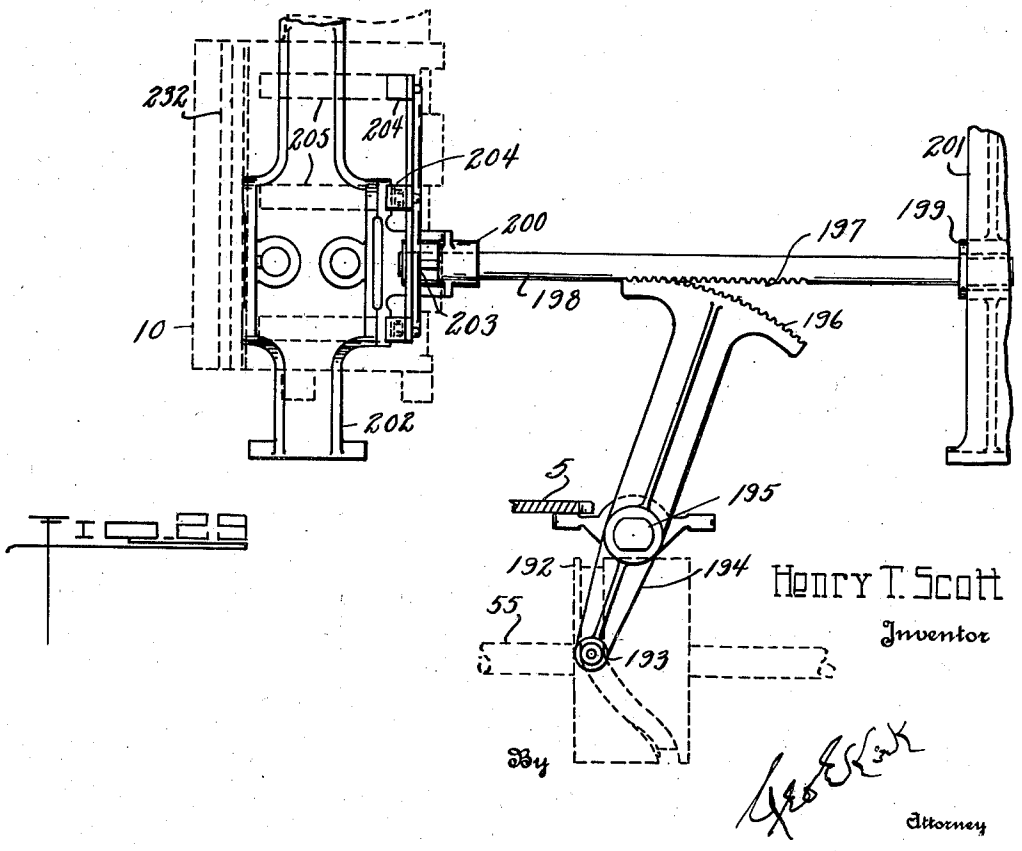


FIG. 29



Henry T. Scott
Inventor

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Attorney

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AUTOMATIC PAPER BOTTLE MACHINE

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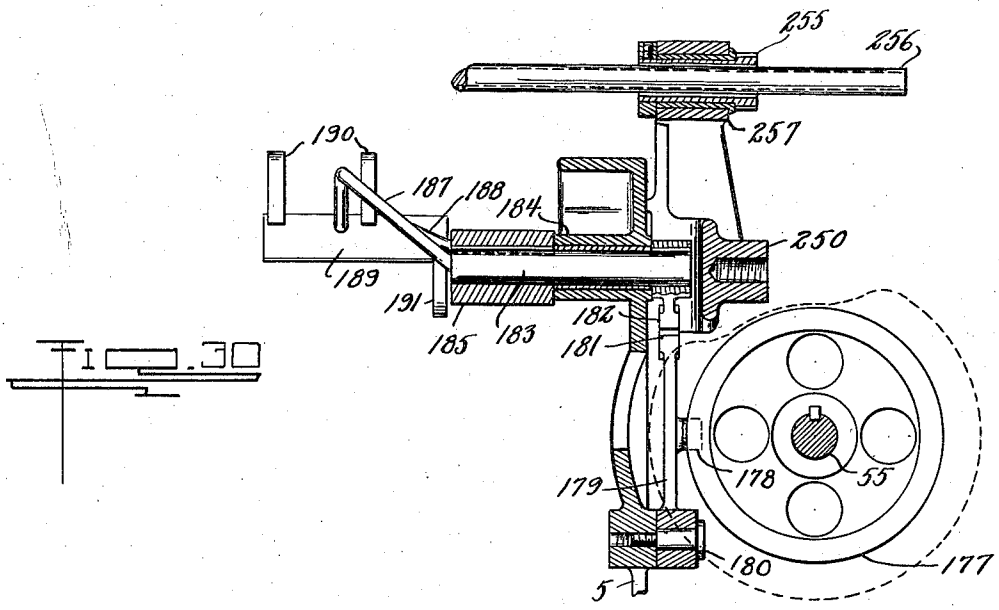


FIG. 30

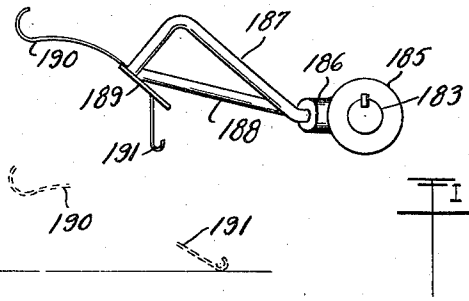


FIG. 31

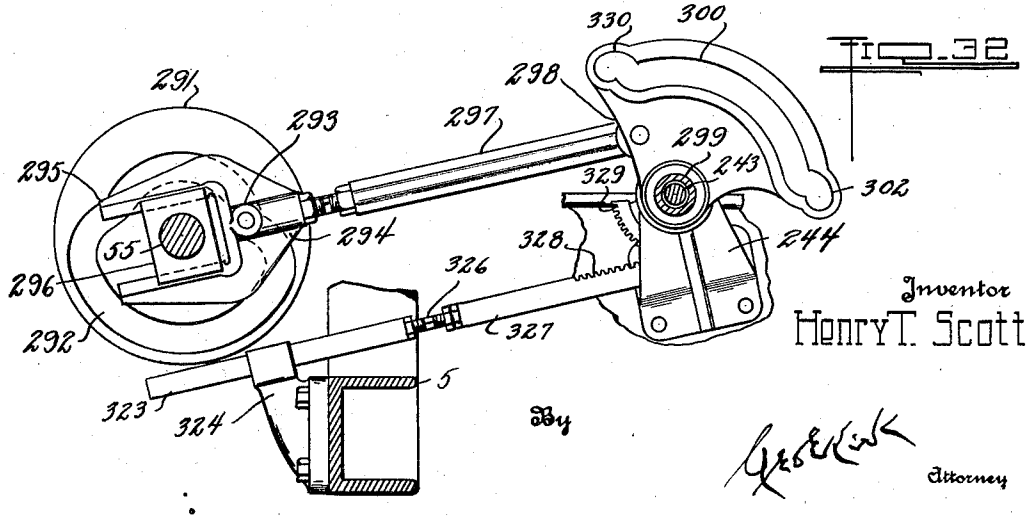


FIG. 32

Inventor
Henry T. Scott

By

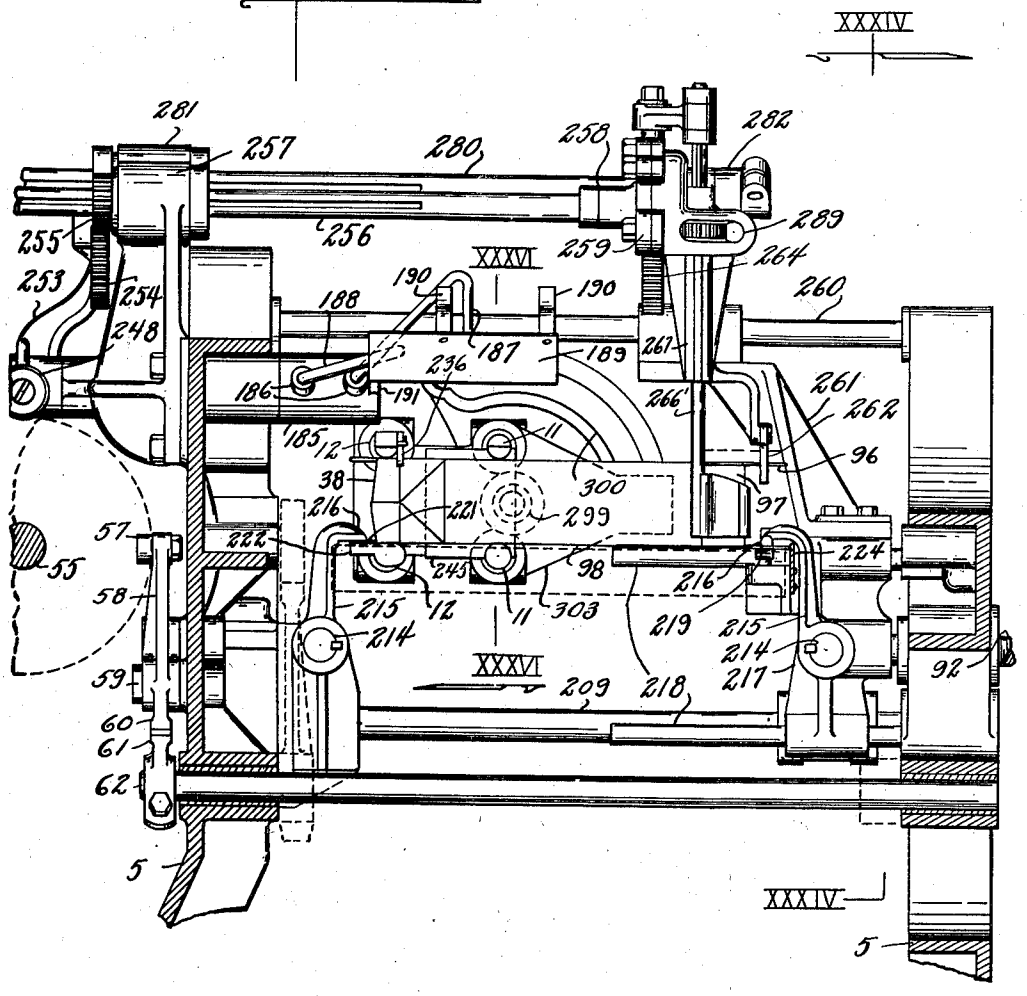
Attorney

Nov. 3, 1936. H. T. SCOTT 2,059,403

AUTOMATIC PAPER BOTTLE MACHINE

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FIG. 33



Inventor

Henry T. Scott

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Attorney

Nov. 3, 1936. H. T. SCOTT 2,059,403

AUTOMATIC PAPER BOTTLE MACHINE

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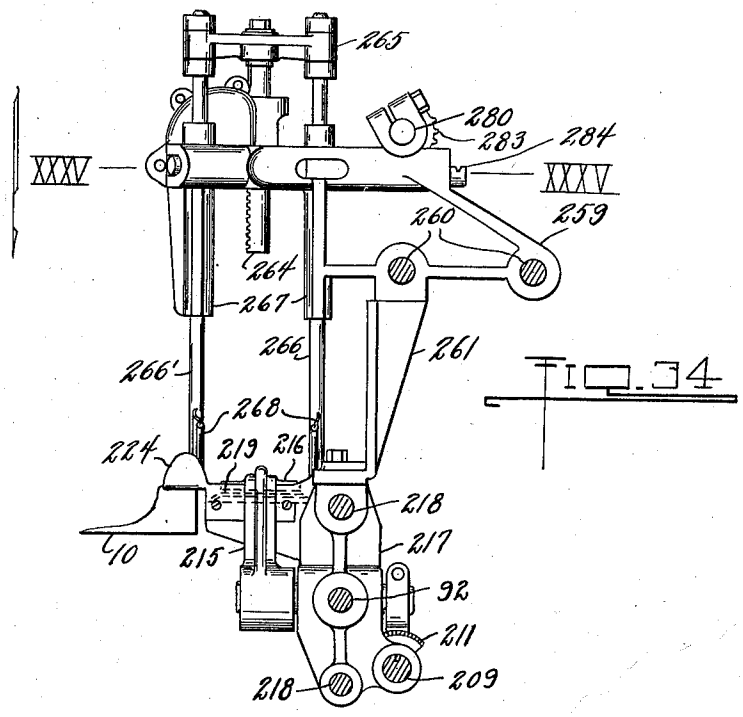


FIG. 34

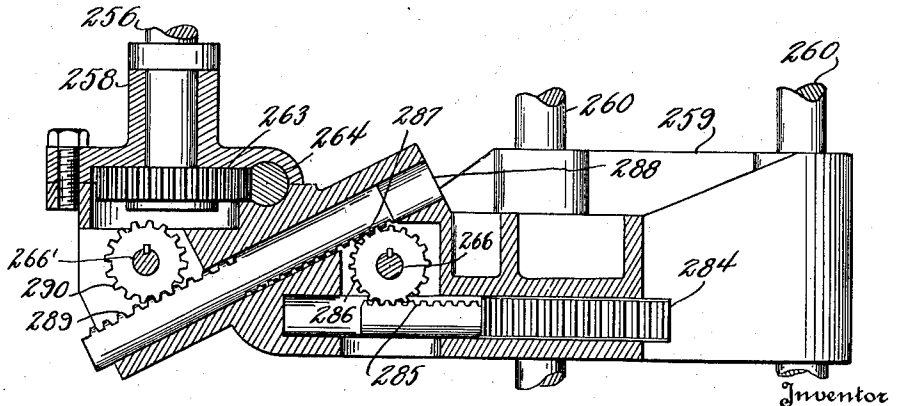


FIG. 35

Inventor
Henry T. Scott

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Attorney

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AUTOMATIC PAPER BOTTLE MACHINE

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FIG. 36

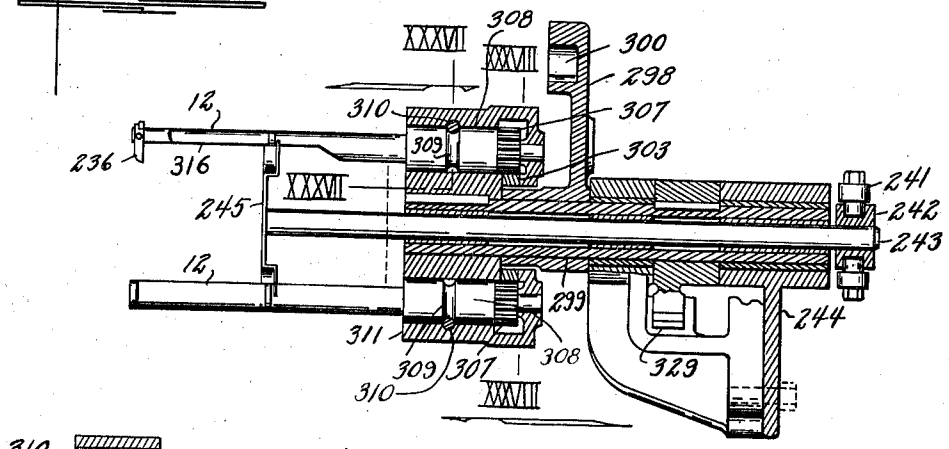
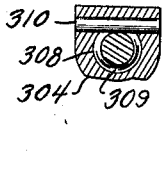


FIG. 37



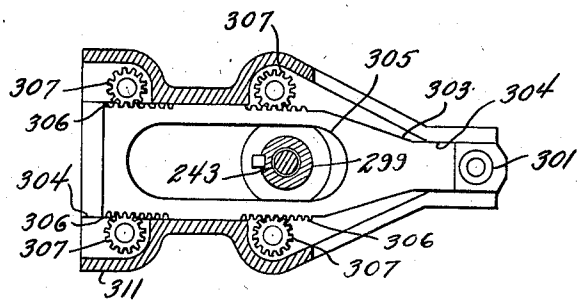


FIG. 38

Inventor

Henry T. Scott

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Attorney

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FIG. 39

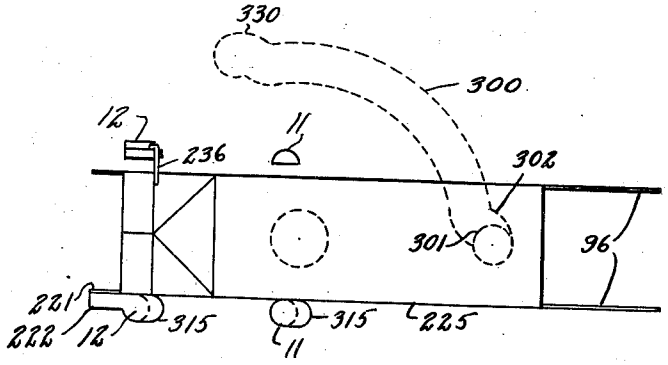


FIG. 40

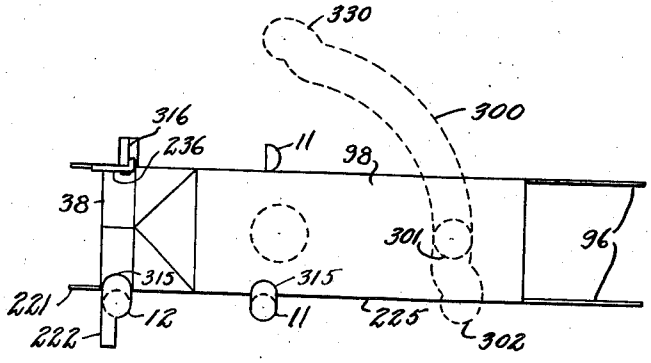
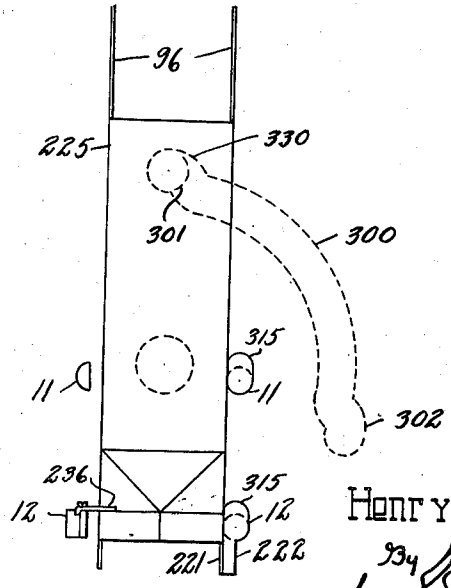


FIG. 41

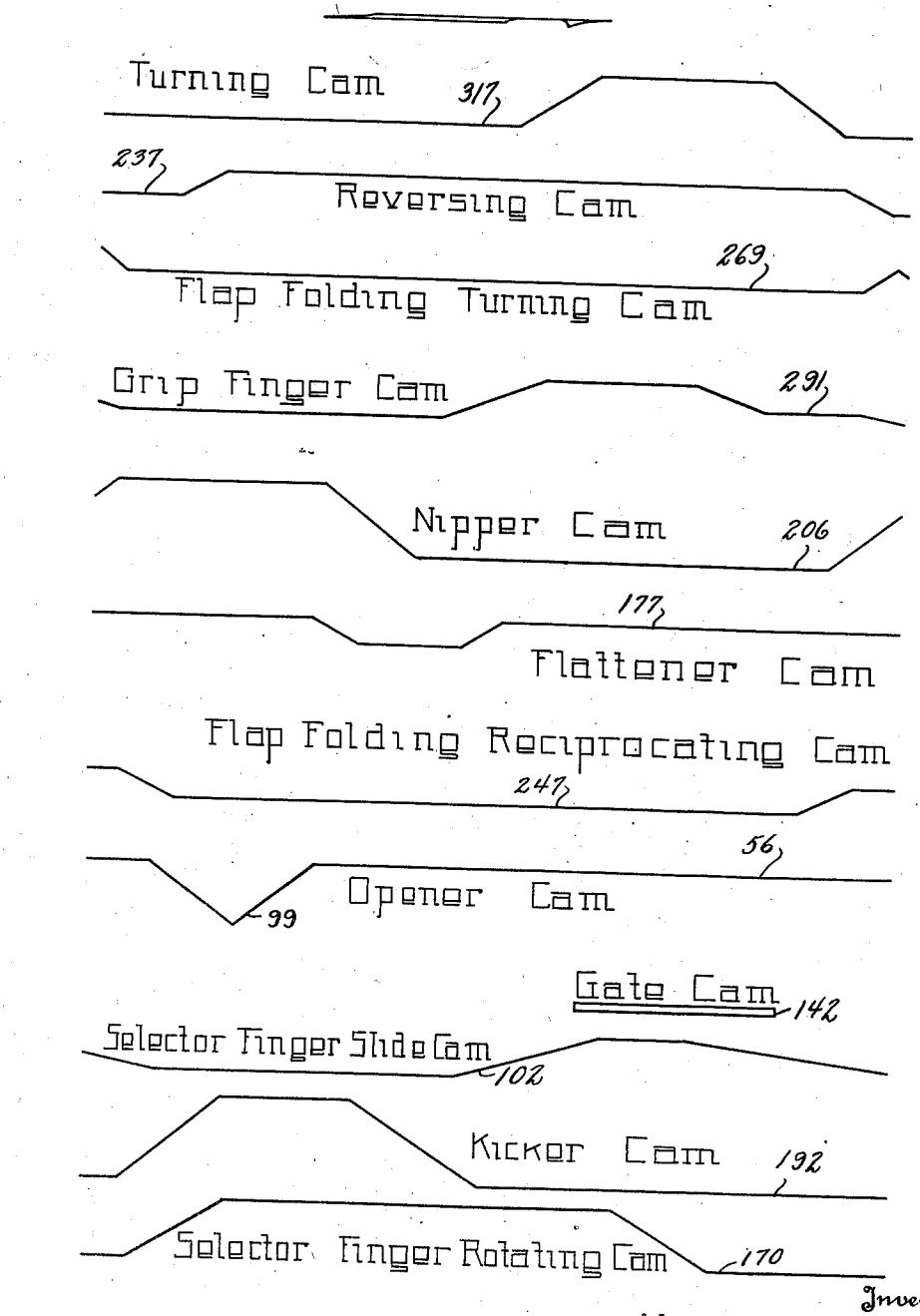


Inventor
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By
Attorney

Nov. 3, 1936. H. T. SCOTT 2,059,403

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Inventor
Henry T. Scott

Fig. 42

By

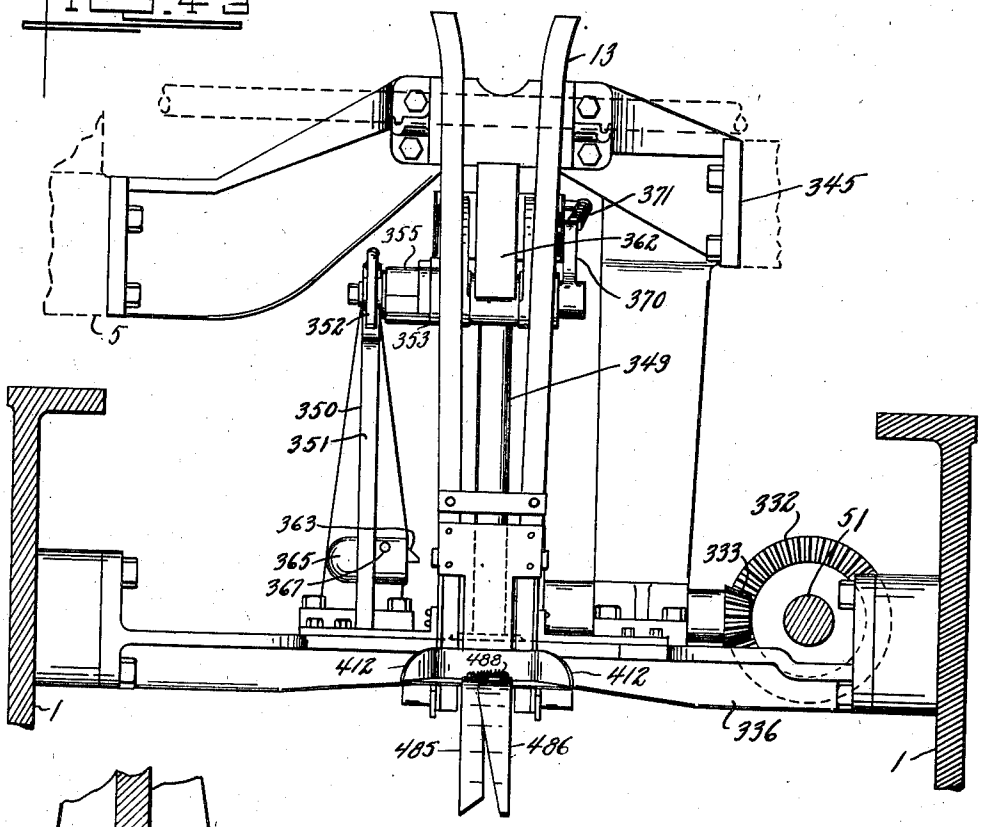
Attorney

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AUTOMATIC PAPER BOTTLE MACHINE

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Fig. 43



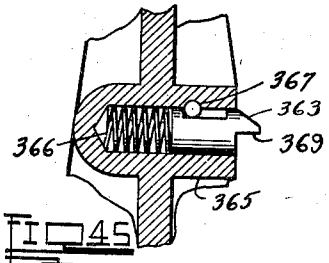


Fig. 45

Fig. 44

Inventor
Henry T. Scott

Attorney

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Fig. 46

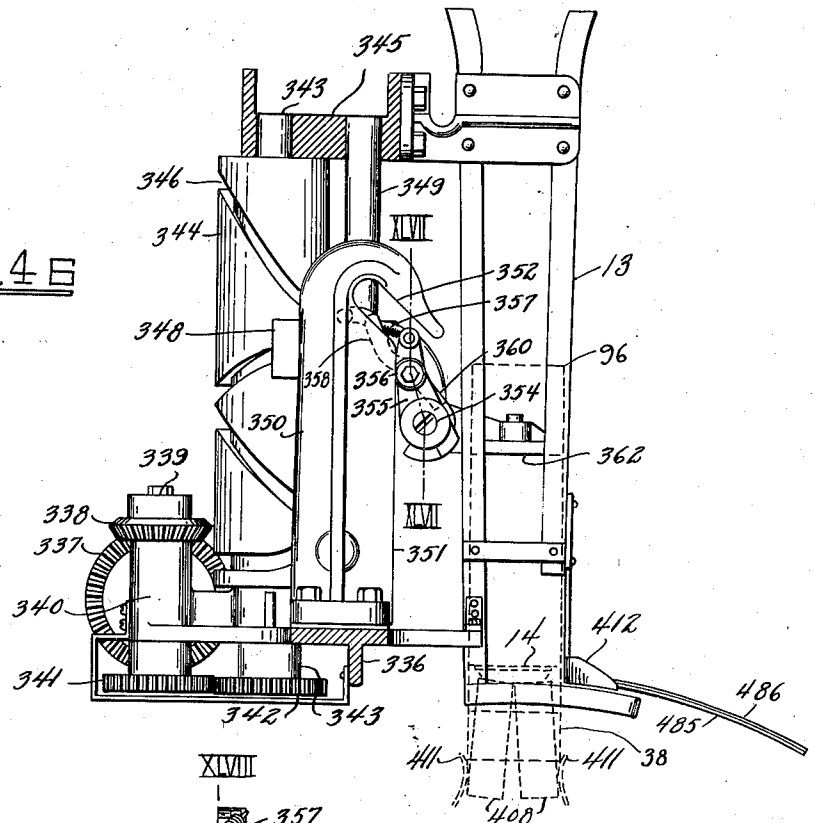


Fig. 47

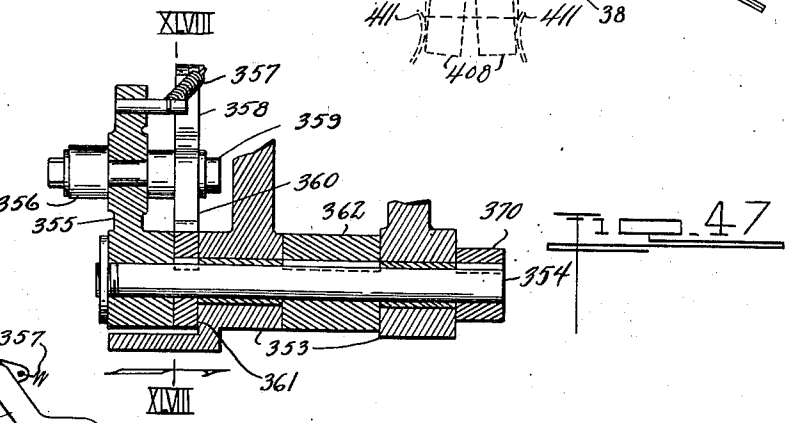
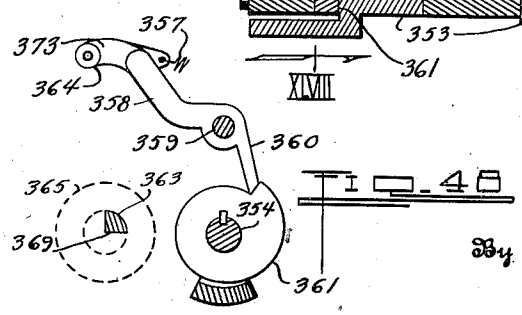


Fig. 48



Inventor

Henry T. Scott

By

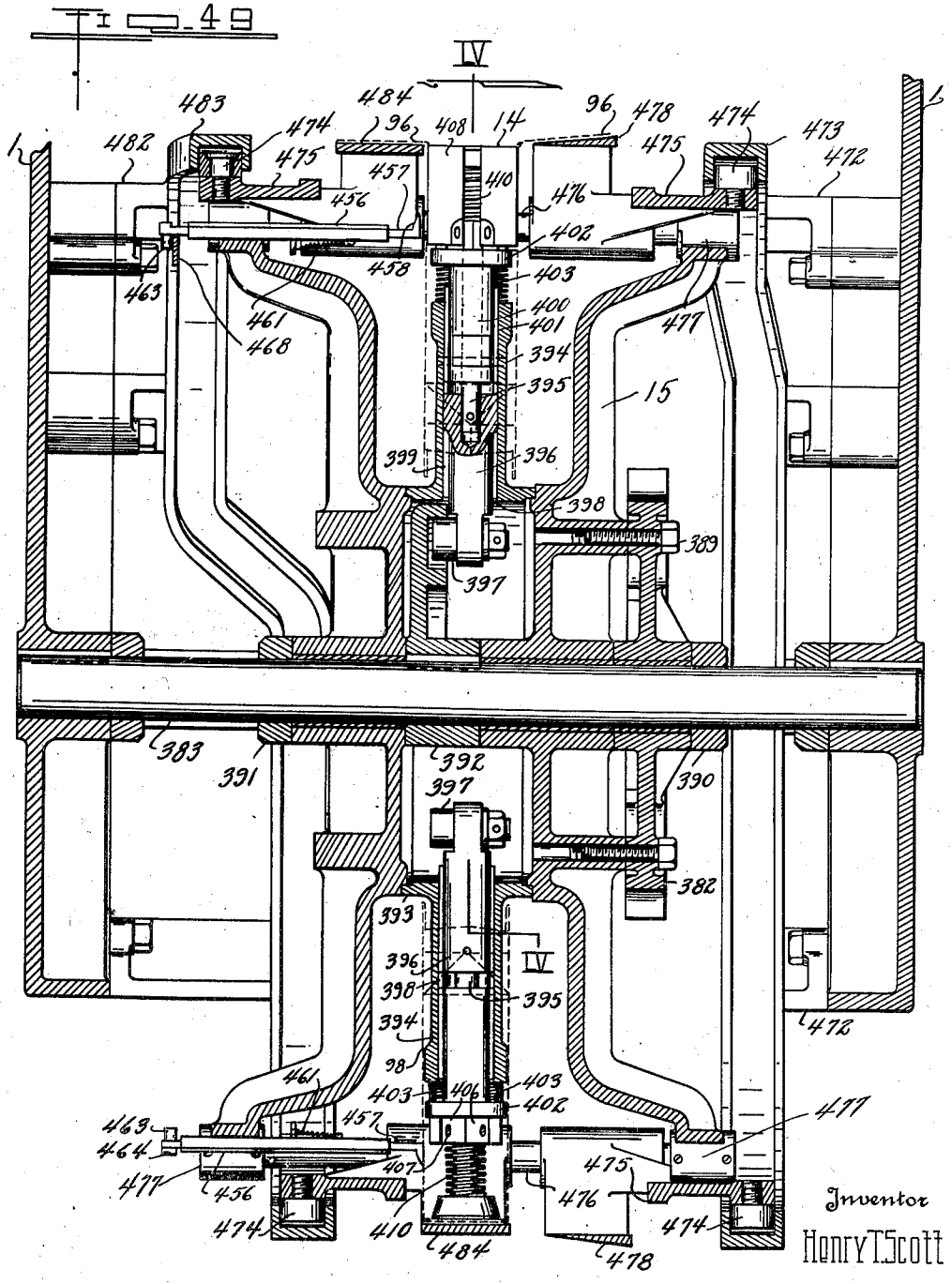
Attorney

Nov. 3, 1936. H. T. SCOTT 2,059,403

AUTOMATIC PAPER BOTTLE MACHINE

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FIG. 49



Inventor
Henry T. Scott

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Attorney

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AUTOMATIC PAPER BOTTLE MACHINE

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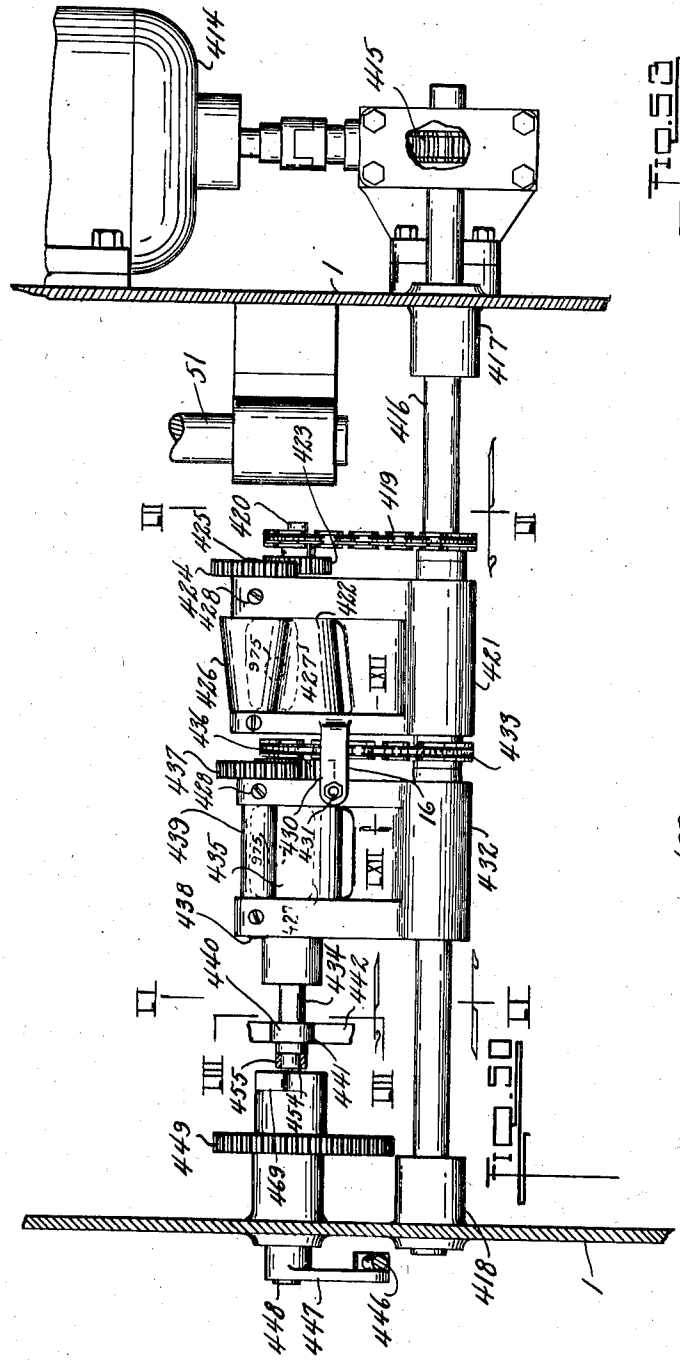


FIG. 50

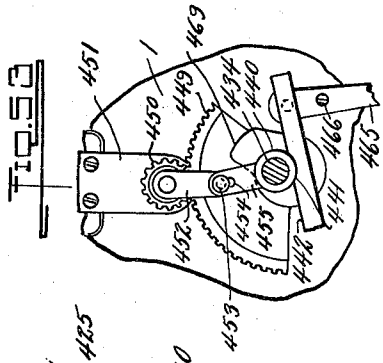


FIG. 53

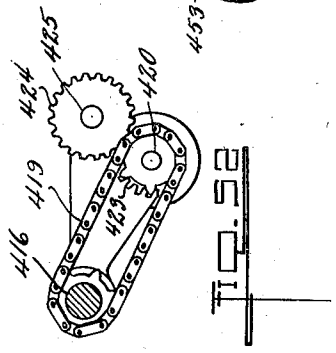


FIG. 52

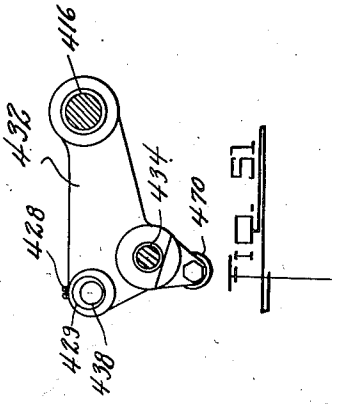


FIG. 51

Inventor
Henry T. Scott

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Attorney

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FIG. 54

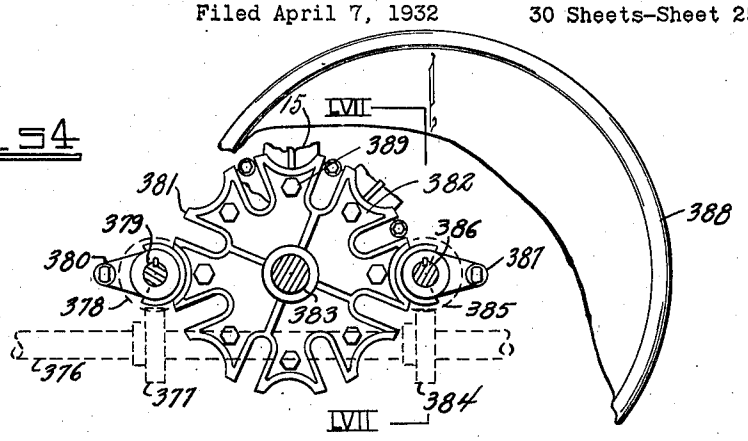


FIG. 55

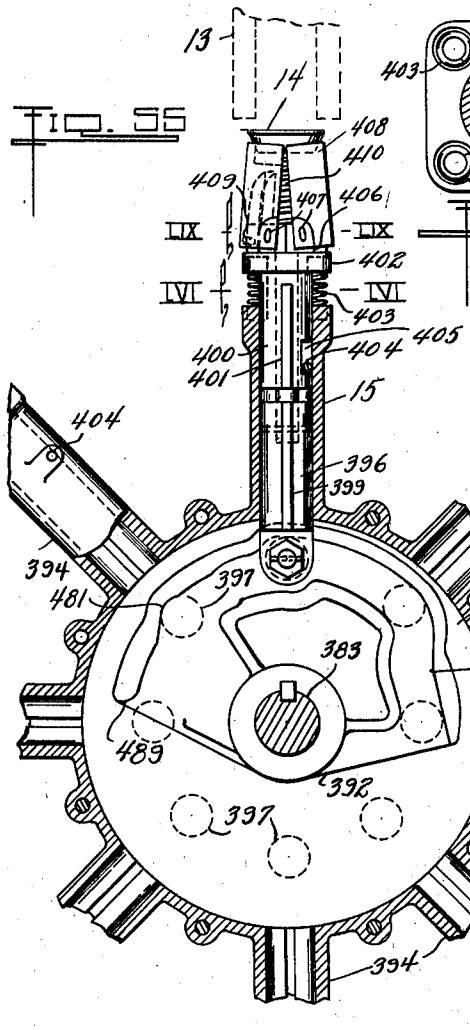


FIG. 56

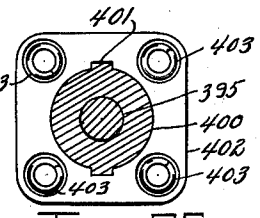


FIG. 57

FIG. 58

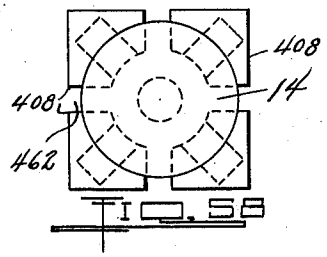
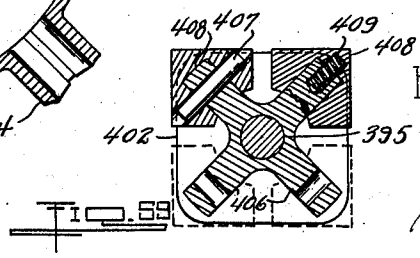


FIG. 59



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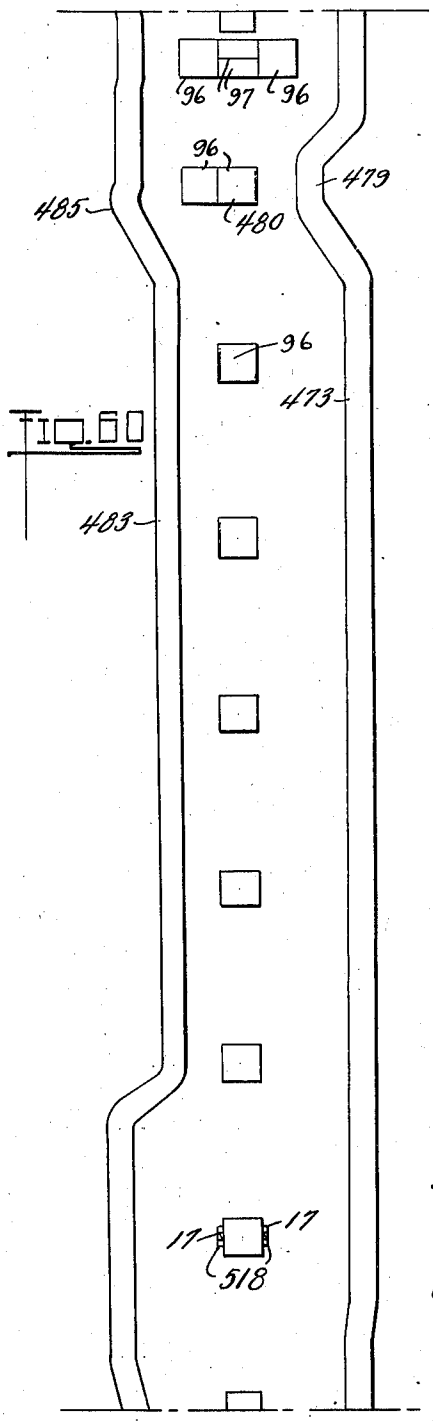


FIG. 60

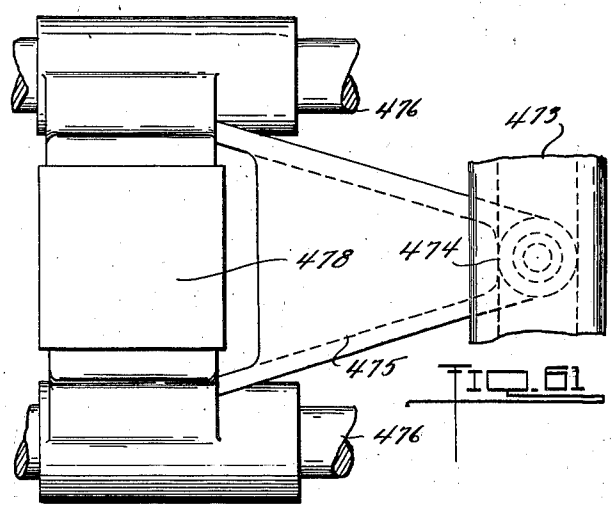


FIG. 61

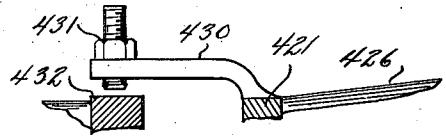


FIG. 62

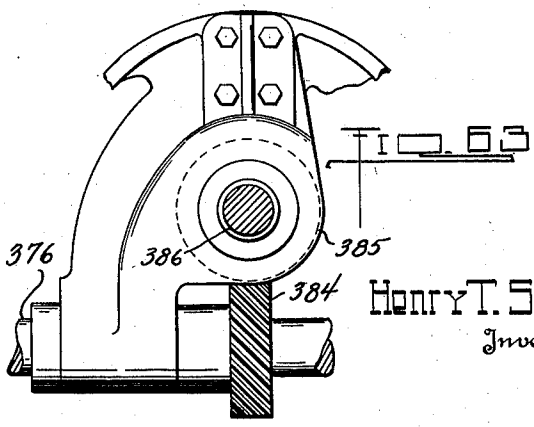


FIG. 63

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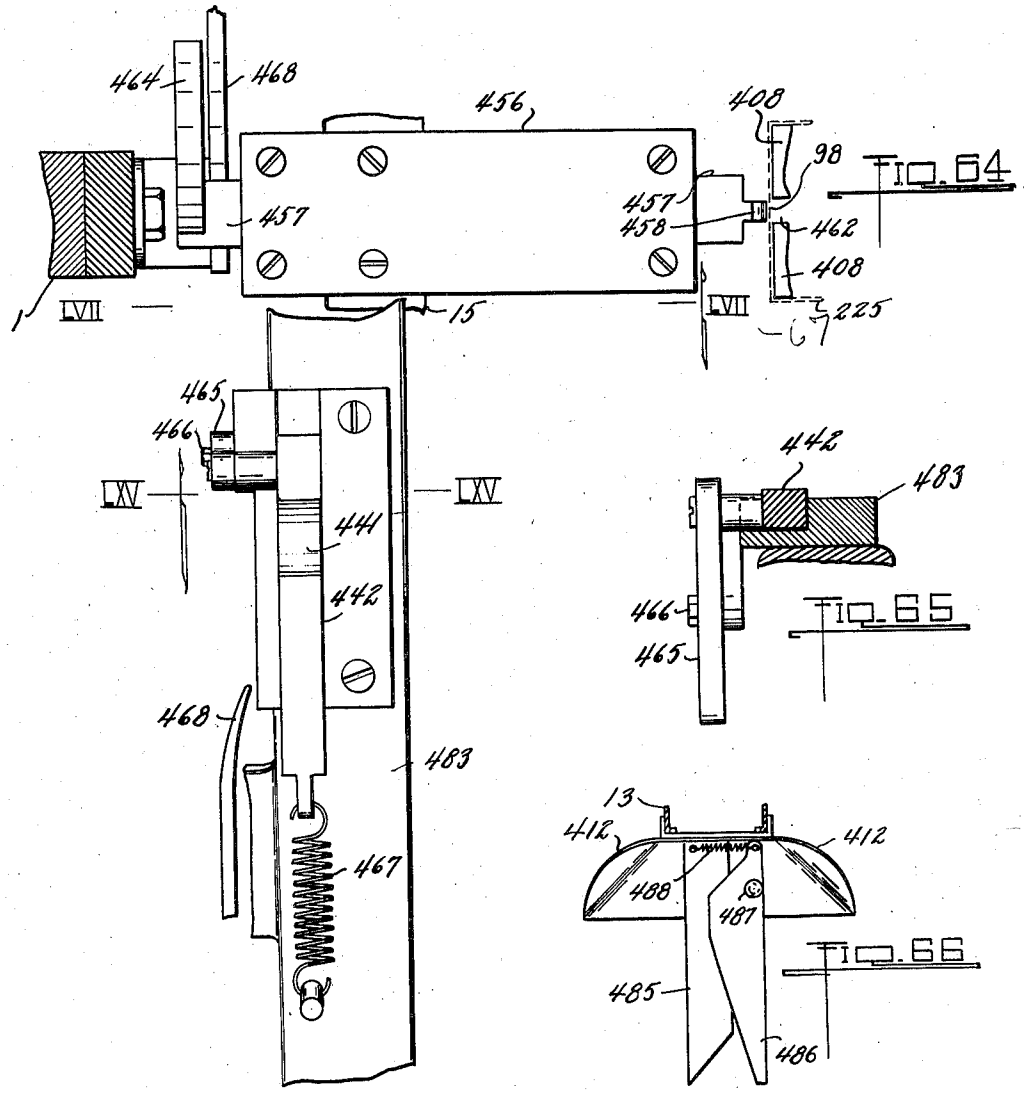


FIG. 64

FIG. 65

FIG. 66

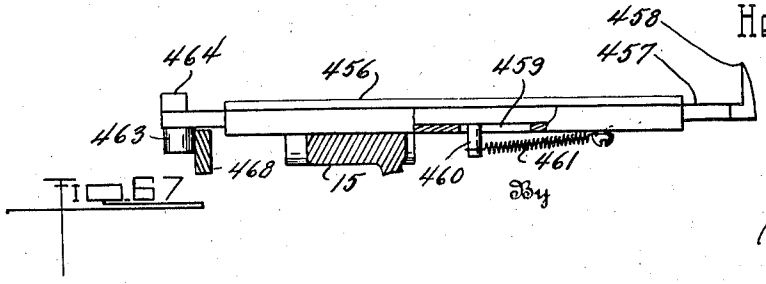


FIG. 67

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Inventor

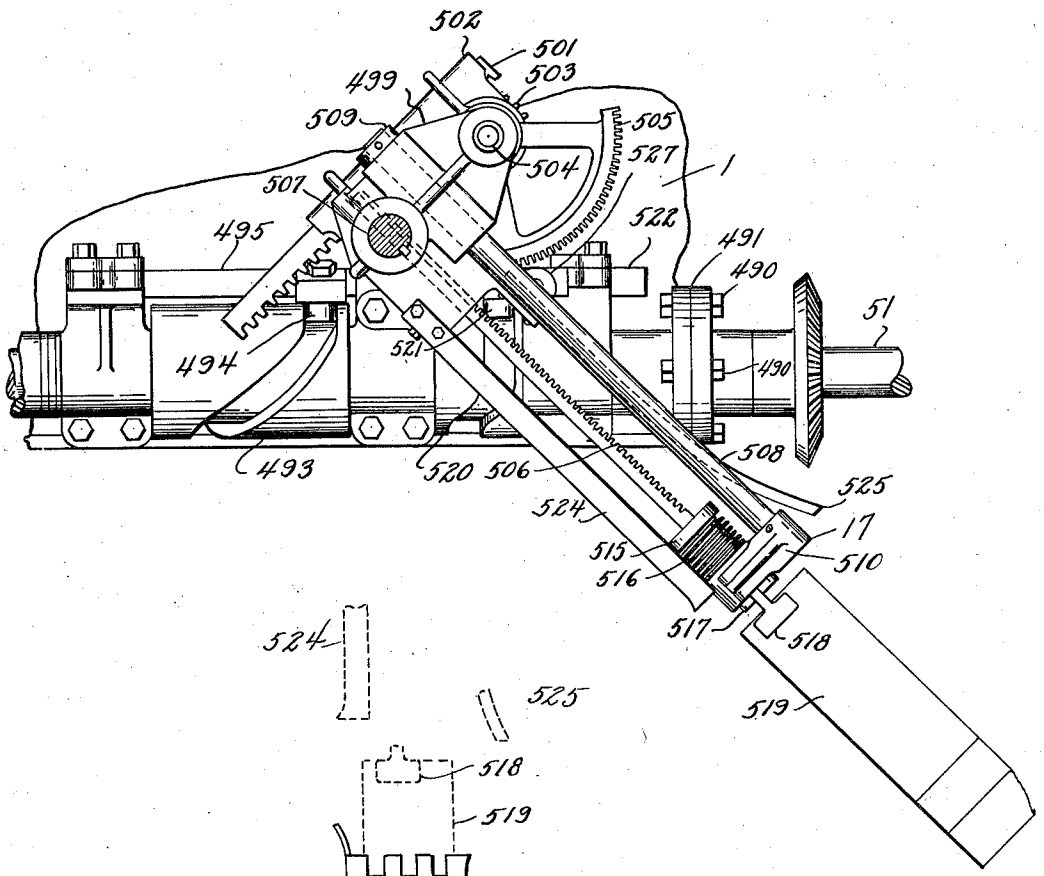
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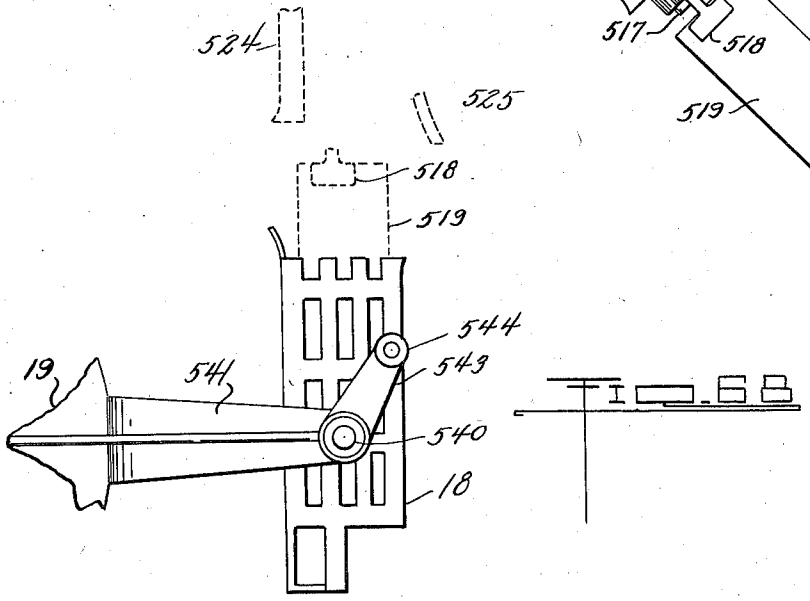


FIG. 68

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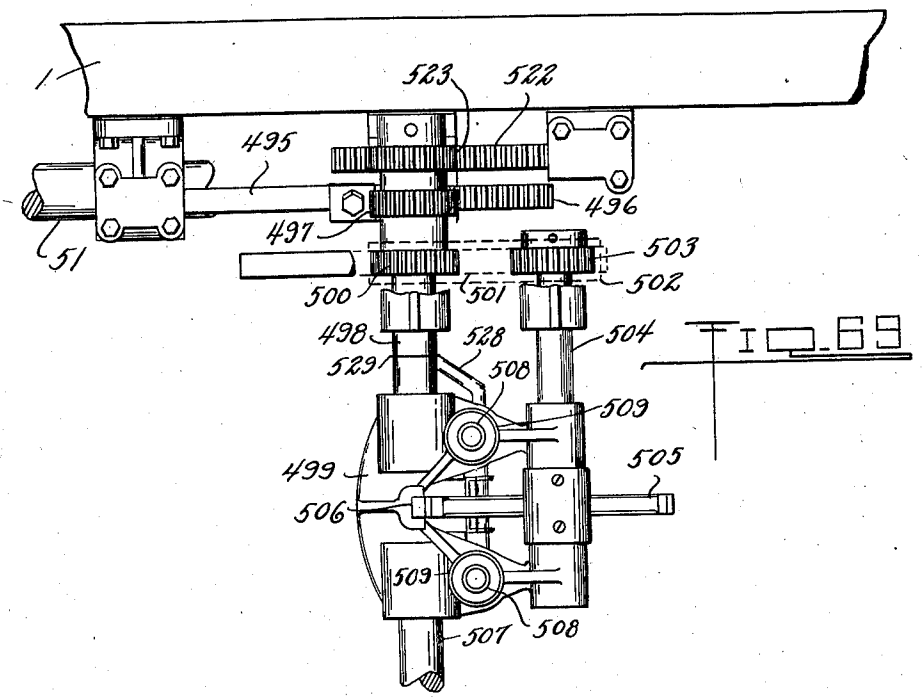


FIG. 69

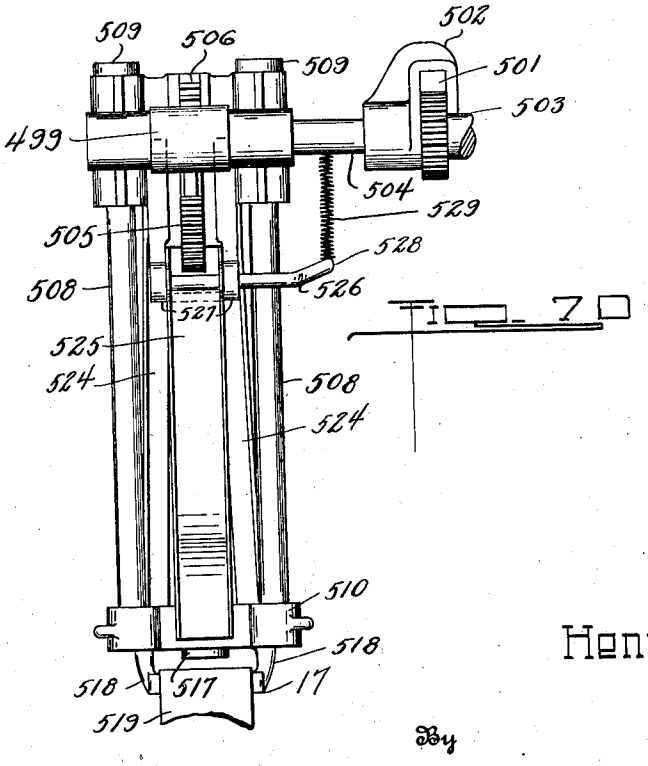


FIG. 70

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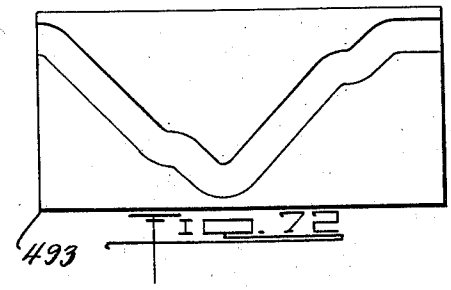


FIG. 72

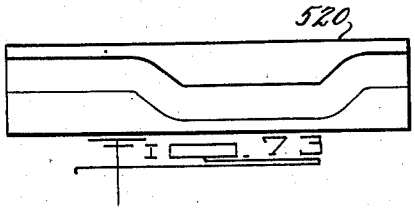


FIG. 73

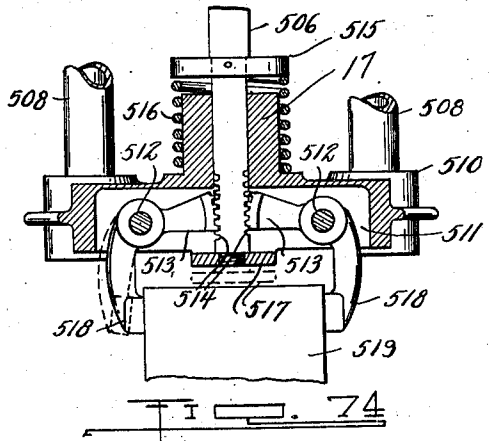


FIG. 74

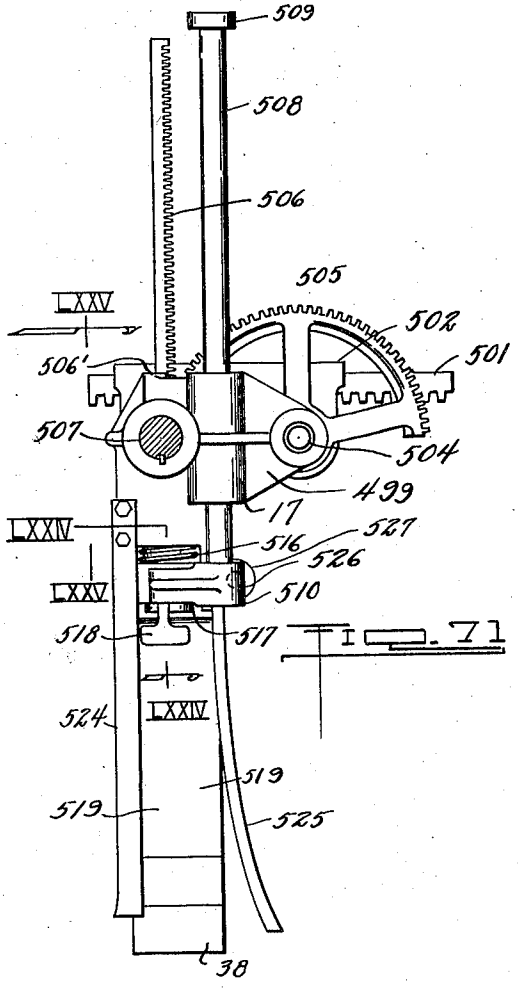


FIG. 71

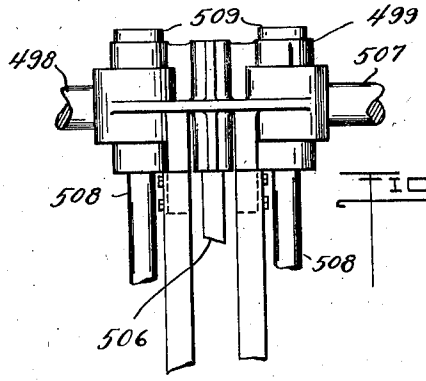


FIG. 75

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Patented Nov. 3, 193t

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UNITED STATES PATENT OFFICE

2,059,403

AUTOMATIC PAPER BOTTLE MACHINE

Henry T. Scott, Toledo, Ohio, assignor to The American Paper Bottle Company, Toledo, Ohio, a corporation of Ohio

Application April 7, 1932, Serial No. 603,861

27 Claims. (Cl. 93—53)

This invention relates to packaging material, more particularly for sealing the material in a container, say of one piece of fiber or paper.

This invention has utility when embodied especially in connection with the preparation of foods, as juices of fruits, or for milk. In the carrying out of the invention, it is advantageous that the package be one for shipment in knock-down condition. When such condition is obviated or avoided, the carrying out of the invention may be from leak-proofing the container through to delivery of the sealed, charged package.

In the complete carrying out of the invention hereunder, a flat tubular blank of open ends may be supplied from a magazine to be progressed, say along a conveyor as herein disclosed. In this feeding operation, fingers are progressed to enter into the on-edge collapsed blank from one end. A holding flap moves out of the way as these fingers flip the flat tube, into which they have entered, down into side position from the on-edge position in the magazine. The fingers have then partially opened the tubular blank. However, the blank in general form is an open tube and is ready to be thrust forward, there to have a minor terminal flap portion, from a common side at opposite ends, gripped. A rock bar then acts upon the blank by an upward swing of an adjacent side. The rectangular or square tube is thus thrust into slightly-past rectangular position. A pair of engaging bars then come over the blank and are rocked for holding. The blank is up-ended for descent through a chute, and to land upon a mandrel.

At this position, the bottom, or end of the tube first to be sealed, is up. This bottom comprises a pair of opposing minor flaps and disposed at right angles thereto respectively, a pair of opposing major flaps. These minor flaps are folded toward each other to approximate abutting position, and as pressed down upon the mandrel, the mandrel expands to hold the container.

This mandrel is a part of an intermittently driven wheel, and in shifting of this wheel from this position under the chute, the major flaps, as outwardly extending, are directed to pass under gluing rolls, continuously driven, and then a deck on one side, which supported one of the flaps, is shifted to cause such flap to be in position over the two minor flaps of the bottom. At a succeeding movement of this mandrel carrying wheel, the opposite bottom flap is put over the first of the major bottom flaps, and the completion of the bottom is had. The outer deck and mandrel, by compressing action, hold these glued bottom forming flaps in assembly during the continuation of the travel of the wheel until the takeoff of this one-end-closed rectangular tube having an open upper extension.

After the container has thus been squared and one end closed and sealed it is passed on to other automatically operating devices by which it is coated exteriorly and interiorly with paraffin, cooled, filled with fluid or solid material, closed and stapled. The mechanisms for performing these operations form no part of the present invention and will be hereinafter only briefly referred to.

Referring to the drawings:

Figure 1 is a left side elevation of an embodiment of the invention in a machine for taking flat tubular blanks, setting such up, coating, filling and sealing;

Figure 2 is a plan view of the feeder or supply magazine section of the machine of Figure 1, parts being broken away;

Figure 3 is a side elevation of the gluing mechanism, parts being broken away;

Figure 4 is a plan view of the power drive layout shown diagrammatically;

Figure 5 is a side view of the power drive, shown diagrammatically;

Figure 6 is a side view, taken from the right side of the machine, showing a portion of the feeder control cams;

Figure 7 is an end elevation of the feeding section, taken from the front of the machine, or the right of Figure 1;

Figure 8 is a view on the line VIII—VIII, Figure 2;

Figure 9 is a view on the line IX—IX, Figure 2;

Figure 10 is a view on the line X—X, Figure 2;

Figure 11 is a view on the line XI—XI, Figure 2;

Figure 12 is a view on the line XII—XII, Figure 11;

Figure 13 is a view on the line XIII—XIII, Figure 2;

Figure 14 is a detail view in side elevation of the gate operating cam of the pull-out mechanism for flat container tubes from the supply magazine or feeder;

Figure 15 is a side elevation of the gate operating and selector finger operating devices of the pull-over mechanism;

Figure 16 is a view on the line XVI—XVI, Figure 15;

Figure 17 is a view on the line XVII—XVII, Figure 16;

Figure 18 is a plan view of the selector finger reciprocatory drive of the pull-off mechanism;

Figure 19 is a front elevation of the selector finger carrying bracket;

Figure 20 is a plan view of the selector finger device;

Figure 21 is a side elevation of the selector finger rotating cam;

Figure 22 is a diagrammatic showing of the starting position of the selector fingers;

Figure 23 is a view similar to Figure 22, showing the first position after starting;

Figure 24 is a view similar to Figure 22, showing the second position after starting;

Figure 25 is a view similar to Figure 22, showing the third position after starting;

Figure 26 is a diagrammatic showing of the blank movement as acted upon by the selector fingers;

Figure 27 is a view on the line XXVII—XXVII, Figure 15;

Figure 28 is a side elevation of the pull-off or kicker mechanism and drive;

Figure 29 is a plan view of the mechanism of Figure 28;

Figure 30 is a view on the line XXX—XXX, Figure 2, showing the flattener mechanism and drive;

Figure 31 is a side view of the flattener of Figure 30;

Figure 32 is a view on the line XXXII—XXXII, Figure 2, disclosing drive features for the turnover or orienting mechanism;

Figure 33 is a view on the line XXXIII—XXXIII, Figure 2;

Figure 34 is a view on the line XXXIV—XXXIV, Figure 33;

Figure 35 is a view on the line XXXV—XXXV, Figure 34;

Figure 36 is a view on the line XXXVI—XXXVI, Figure 33;

Figure 37 is a view on the line XXXVII—XXXVII, Figure 36;

Figure 38 is a view on the line XXXVIII—XXXVIII, Figure 36;

Figure 39 is a diagrammatic showing of the first position before orienting of the blank;

Figure 40 shows the blank of Figure 39 gripped for shifting from horizontal to vertical position;

Figure 41 shows the blank of Figure 44 upended and released;

Figure 42 is a diagrammatic showing of the feeder cams effecting the pull-over operations;

Figure 43 is a front view of the chute from the orienting to the glueing mechanism;

Figure 44 is a plan view of the mechanism of Figure 43;

Figure 45 is a view on the line VL—VL, Figure 44;

Figure 46 is a side view of the mechanism of Figure 43;

Figure 47 is a view on the line XLVII—XLVII, Figure 46;

Figure 48 is a view on the line XLVIII—XLVIII, Figure 47;

Figure 49 is a section on the line XLIX—XLIX, Figure 3;

Figure 50 is a view on the line L—L, Figure 3;

Figure 51 is a view on the line LI—LI, Figure 50;

Figure 52 is a view on the line LII—LII, Figure 50;

Figure 53 is a view on the line LIII—LIII, Figure 50;

Figure 54 is a side elevation of the drive for the gluer unit;

Figure 55 is a view on the line LV—LV, Figure 49;

Figure 56 is a view on the line LVI—LVI, Figure 55;

Figure 57 is a view on the line LVII—LVII, Figure 54;

Figure 58 is a plan view of one of the gluer mandrels;

Figure 59 is a view on the line LVIV—LVIV, Figure 55;

Figure 60 is a diagrammatic showing of the gluer control cams;

Figure 61 is a plan view of one of the flap folders operating from the gluer mechanism cams;

Figure 62 is a view on the line LXII—LXII, Figure 50;

Figure 63 is a view on the line LXIII—LXIII, Figure 57;

Figure 64 is a plan view of the safety device on the gluer mechanism or section;

Figure 65 is a view on the line LXV—LXV, Figure 64;

Figure 66 is a plan view of the flap guides toward the adhesive applying section from the chute;

Figure 67 is a view on the line LXVII—LXVII, Figure 64, parts being broken away;

Figure 68 is a side view of the transfer mechanism from the gluer to the coating mechanism or section;

Figure 69 is a plan view of the mechanism of Figure 68;

Figure 70 is a view of the mechanism of Figure 69 from the right;

Figure 71 is a side view of the mechanism of Figure 68, ready to discharge to a basket or seat in the coating mechanism;

Figure 72 is a diagrammatic showing of the carton grip finger cam of the transfer mechanism to the coating mechanism;

Figure 73 is a diagrammatic showing of the swing control cam;

Figure 74 is a view on the line LXXIV, Figure 71;

Figure 75 is a view on the line LXXV—LXXV Figure 71; and

Figure 76 is a wiring diagram.

The embodiment of the invention of the machine in this disclosure comprises frame sections **1**, **2**, **3**, **4**, (Fig. 1) in a lineal series. The frame **1** has thereon supplemental frame. This supplemental frame **5** has therein parallel series of endless belts **6**, upon which may ride block **7** as a backer for a plurality of on-edge flat, open end, tubular sections **8** (Fig. 2), which is a supply magazine. These blanks or tube sections are progressed to the right (Fig. 2). One at a time, these sections are pulled over, away from the supply magazine and under guide shield **9**, to be opened up on platform **10**. From this platform **10**, the individual tube section is pulled over, gripped by bars **11**, **12**, and oriented to be thrust down in chute **13** (Fig. 3), there to be disposed upon a collapsed mandrel, having a head **14**. These mandrels are in an endless series or wheel **15**, and in step by step rotation (clockwise, Fig. 3) flaps of the tubular section are folded over, adhesive applied at device **16**, and pressure applied in the folding of these flaps over to close an end of the tube upon the mandrel terminus **14**.

In the step by step rotation of this wheel or drum **15**, the adhesive or glue is allowed to set. Engaging device **17** takes hold of this carton

or paper bottle as the mandrel is collapsed, pulls such off the mandrel and discharges the one-end-closed carton, closed end upward, into a mechanism within which the paraffin coating is applied.

A driving motor is indicated at 49 (Fig. 10) which motor through speed reduction gearing 50 drives shaft 51 having gear connection 52 through vertical shaft 53, having gear connection 54 to upper horizontal shaft 55 (Fig. 2).

This shaft 55 has thereon cam 56 (Figs. 2, 6, 42). This cam 56 has roller 57 therein mounted on arm 58 from fulcrum 59. Fixed with the arm 58 is segment 60 in mesh with segment 61 fast on shaft 62. This shaft 62 has fixed thereon arm 63 (Fig. 12) from which extends link 64 connected to lever 65, adjustably clamped in bearing 66 at arm 67 on fixed fulcrum 68.

This lever 65 extends past the fulcrum 68, and is there provided with link 69, engaging arm 70 fixed with drum 71 coacting with rollers 72 in ways 73, to thereby provide an intermittent grip device connection to shaft 74. This shaft 74 has thereon belt pulleys 75 (Fig. 11), over which travel belts 6 (Figs. 3, 9, 10, 11). These belts 6 pass about pulleys 77 on separate shafts 78 mounted on blocks 79, adjustable by screws 80 for sliding in yokes 81 and thereby to provide slack take up or adjustment means for tension on these belts, one independently of the other.

These yokes 81 are mounted by bolts 82 (Fig. 9) on spacer block 83 anchored by bolts 84 with the frame 5.

Fixed guide 85 above the plane of the belts 6 is mounted by bolts 86 in fixed position as to the frame 5.

The opposing guide is adjustable

Hand wheel 87 (Figs. 2, 9, 10) is fixed on shaft 88 mounted in bearings 89 along the frame 5. This shaft 88 has fixed thereon gears 89' in mesh with pinions 90, fixed with internally threaded sleeves 91, in which are located screw threaded stems 92 held by blocks 93 against rotation. These blocks 93 are fixed with guide 94 opposing the guide 85 and above the plane of the belts 6 to accommodate the length of flat tubes 8 for varying capacity thereof. These tubes in the disclosure hereunder are provided with major bottom flaps 96, minor bottom flaps 97, intermediate side body portions 98, and top closure extension 38.

The cam 56, in its rotation, has offset portion 99 (Figs. 2, 42) effect rocking action of the drum 71 in this intermittent driving of the belts 6. There is thus a step by step propulsion of these belts 6, so that the block 7 may carry these flat tubes 8 to the right (Fig. 2).

The positioning of the guide 94 may be to predetermined adjusted positions, for fixed with the guide 94 is pointer 100 (Figs. 2, 9) movable along scale 101, which may bear markings for containers of, say one-half pint, pint, quart, or other predetermined capacities such as liter, etc.

Removing flat tubes from the magazine

Cam 102 on shaft 55 (Fig. 2) has roller 103 (Fig. 18) coact therewith (Figs. 13, 42). This roller 103 is on arm 104 having fixed fulcrum 105, mounted by bracket 105' from the frame 5. This arm terminates in segment 106 in mesh with rack 107 on bar 108 having at an angle thereto an additional rack or toothed portion 109 in mesh with pinion 110 (Figs. 13, 18). This pinion 110 is on shaft 111 which, remote from the pinion 110, carries gear 112. This shaft 111 is in fixed bearing 113. The gear 112 is in mesh with intermediate gear 114 mounted on the platform 10. This intermediate gear 114 is in mesh with pinion 115, fixed with square threaded screw 116 mounted in bearing 117, carried by the platform 10 (Fig. 16). The remote end of this threaded member 116 has bearing trunnion 118 in bracket 118' mounted on the frame 5. Fixed on this screw 116 is nut 119. This nut 119 has threaded portion 120 upon which is mounted supplemental nut or threaded portion 121, having arm 122 carrying blade or finger 123. The screw 116 is located in tubular shell 124 having a slot 125 (Fig. 17) in its upper portion as a guide for the arm 122 carrying the blade 123. This tubular shell or barrel 124 is mounted in bushing 126 fixed in socket 127 of the bracket 118' (Figs. 16, 17). At the inward end, this bushing 126 is retained from longitudinal movement by bearing 127' on the frame 5 (Figs. 16, 18, 19) mounting the bearing 113.

About the nut 119 is bushing 128 mounting a sleeve 128' having radially extending arm 129 carrying blade or finger 130, shown in Fig. 16 in position parallel to the finger 123.

Sleeve 128' is provided with roller 131 (Figs. 15, 17) operable in cam way 132 in the barrel 124. The cam 102 offset portion is effective through the rack, and the speed-up gearing mechanism for a quick rotation of the screw 116 alternately in opposite directions. During this intermittent or back and forth motion effected by the rotation of the screw 116 in moving the nut 119, extension 133 coacts with way 134 (Figs. 16, 17) in the barrel 124, thereby holding the blade 123 in a vertical position in this thrusting operation. The roller 131, in riding along the path 132, rocks the blade 130 away from the blade 123; that is outward from the plane of Fig. 16. These thrusting operations mean the movement of the free ends of these blades 123, 130, into the terminal flat on-edge tube section 8, as located on slats or supporting platform 135 (Figs. 2, 13). This platform 135 has at its terminal portion slight upstanding portions 136 to offer resistance against the terminal container 8 sliding off therefrom.

From the frame 5 there is upstanding bracket 118' slidably carrying overhang 138, also as a lip for engaging the upper edge of the terminal flattened container 8 as retained by the projections 136 and the depending flange of the overhang 138 as well as movable wing 139. The finger 123 has recessed portion 140 (Fig. 20). By placing the fingers or blades 123, 130, together, the blade 130 nests in this recessed portion, and they may be thrust as a unit into the flat tube 8. It is to be noted (Fig. 16) in this travel into the tube with nose 141 of the blade 123 leading the way for both blades that, after the entrance travel and as well along in the tube, the roller 131 reaches the offset or upwardly extending portion of the cam 132 at the left in Fig. 16, thereby effecting swinging of the blade 130 away from the upstanding blade 123 (Fig. 23).

Release

Upon the side of the cam 102 is cam 142 adjustably mounted by bolts 143 in its slots 144. This cam 142 (Figs. 2, 13, 14) coacts with roller 145 on lever 146 having fulcrum 147 in the bracket 118'. This lever 146 has upstanding arm 148 connected by link 149 (Figs. 13, 27) with link 150 to link 151 connected by pin 152, with stem 153 extending through socket 154 wherein there is compression helical spring 155, normally urging this

stem 153 outward from the socket 155. Nuts 156 are adjustable to determine the limit of this outward travel. The stem 152 between the link 151 and the pin 153 engages arm 157 (Fig. 13), having fixed fulcrum 158 in bracket 159 fixed and mounted on the supplemental frame 5. Fixed with this arm 157 is beveled pinion 160 in mesh with beveled pinion 161 on square shaft portion 162 mounted in the bracket 159. This square shaft portion 162 has telescopic connection with shaft portion 163 mounted in bearings 164, 164', on the overhang or bar 138. As protruding through this bearing or bracket 164, the shaft section 163 carries pinion 165 in mesh with pinion 166 on vertical shaft 167 in the bracket 164, and additional bracket 168 providing bearing 169. Adjacent this bearing 169 there is fixed with this shaft 167 the wing or gate 139. Accordingly when the cam 142 is active through the roller 145, there is given a thrust of the arm 157 to rock the pinion 160 and thereby swing the gate 139 quickly to an opening position and back to a closing position. During this opening swing, the fingers or blades 123, 130, are thus effective in reducing the over-all height of this on-edge tube, so that it is free to swing clear of the bar 138.

On this shaft 55 is cam 170 (Figs. 2, 21, 42) coacting with roller 171 mounted on bar 172 having teeth 173 (Figs. 13, 15, 16) in mesh with teeth 174 on the barrel 124 (Fig. 20).

There is thus given a rocking or oscillation to this barrel 124 to shift the spread fingers from the position shown in Fig. 23 to the position shown in Fig. 24. The drive or angular movement for shifting this barrel 124 continues past the reversal position or travel action of the screw 116 upon the nut 119 so that the fingers or blades 123, 130, are coming toward the collapsed position (Fig. 25) at the initiation of the withdrawal or return stroke for the blades. At the fully retracted position, the bar 172 re-locates the fingers 123, 130, in the upright position ready for a succeeding cycle of this operation for pulling off one flat on-edge tube from the magazine supply. At this reduction of the over-all height of the on-edge tube 8, its opening position (Fig. 23) is shown in dotted outline 175 (Fig. 26). At the withdrawal position (Fig. 25), the tube is in partially open position 176 (Fig. 26) as deposited on the platform 10.

Top holding means

Means is provided to hold this partially open tube 176 against rising from the table 10. To this end, there is fixed on shaft 55 (Figs. 2, 6) cam 177 with which coacts roller 178 on arm 179, having fixed fulcrum 180 in the frame 5. This arm 179 beyond the roller 178 has segment 181 (Figs. 6, 30) in mesh with segment 182 fixed on shaft 183 extending through bearing 184. This shaft 183 has collar 185 having lateral bosses 186, for rods 187, 188, outward therefrom to plate 189 having spring fingers 190, 191, (Figs. 30, 31, 33). There is accordingly, following this laying of the partially opened tube 176 upon the table or platform 10, a rocking of these spring fingers 190, 191, to a predetermined clearance position above this platform 10 to hold the tube 176 against buckling upward as the tube is shifted to the right in Fig. 26.

Pull off or kicker for removing the partially opened tube from the platform 10

Fixed on the shaft 55 (Figs. 2, 28, 29) is cam 192 coacting with roller 193 on lever 194 having fixed fulcrum 195 in the frame 5. This lever 194, remote from the roller 193, has segment 196 in mesh with rack 197 on reciprocable bar or rod 198. This rod 198 (Figs. 2, 8, 28, 29) is mounted in bearings 199, 200, mounted on cross members 201, 202. This bar 198 is held against rocking and has its movement limited to reciprocation. Adjacent the bearing 200 there is upstanding section 203 having terminal lugs 204 (Fig. 13) movable in the reciprocation of the bar 198 in slots 205 in the platform 10. These lugs 204 (Fig. 13) in their horizontal travel, move from a concealed position to abut the left edge of the pre-selected tube 176 (Fig. 26) and shift such tube to the right along the platform 10. Retraction of the lugs 204 occurs before a succeeding container is partially opened for transfer from the magazine.

Engaging end flaps of the open end tube

Cam 206 on shaft 55 (Figs. 2, 6) has roller 207 coacting therewith. This roller 207 is on arm 208 mounted on shaft 209 (Figs. 6, 7, 33) mounted in the frame 5. This shaft 209 has fixed thereon skew gear segment 210 (Figs. 7, 33, 34) at the right side of the machine. Skew gear segment 211 is on spline 212 of this shaft 209 adjacent the left side of the machine. These respective skew gears 210, 211, coact with skew segments 213 mounted on fulcra 214, and carry upstanding arms 215 terminating in overhanging pressure portions or nippers 216. In this swing operation of these overhang portions 216 toward each other, they move down into gripping position. The fulcrum 214 adjacent the skew gear segment 211 is mounted in bracket 217 carried by directing rods 218 from the frame 5 and is adjustable toward and from the frame 5 by stem 92 simultaneously with the adjustment of the guide 94. This accommodates the machine to the capacity of the container or length of the tube used.

This bracket 217 has mounted thereon shoe 219 as a platform not only to sustain a portion of the tubular container but as an opposing surface upon which container flap 96 may rest with the nipper 216 pressed thereagainst.

Adjacent the skew gear 210, the nipper or overhang 216 in its drop position approaches container flap 221 and holds such directed against wing or shoe 222. This shoe or extension 222 is on rod 12. Upstanding guide 224 at the shoe 219 determines outward position limit for the flap 96 in its travel to position to be engaged by the nipper 216.

Opening of the tube from the position 176 (Fig. 26) to rectangular position 225 (Fig. 39)

In effecting this operation, arm 226 (Fig. 12), fixed with the arm 63 mounted on the rock shaft 62, upwardly extends to segment terminus 227 in mesh with segment 228 having fixed fulcrum 229. This segment 228 has arm 230 fixed therewith and extending diametrically, said arm carrying bar 231 located in recess 232 of the platform 10 (Figs. 2, 12, 28). The remote end of the bar from this arm 230 is connected by arm 233 to swing on fulcrum 234 mounted in the frame 5. In this shifting or rising movement of the bar 231 (Fig. 28), the blank 176 is shifted from past rectangular and beyond position 225.

The bar 231 recovers quickly and leaves the blank in a position to be grasped in rectangular set up position. In this orienting of the tube from the position 225, the tube is swung past finger 236 (Figs. 36, 39), which holds the blank 225 in the rectangular position. In order to

insure this rectangular position of the tube 225 from the position 176, there is a reversing cam operable to bring the tube into the rectangular position against the finger 236. Reversing cam 237 (Figs. 2, 42) coacts with roller 238 on arm 239 having fixed fulcrum 240 in the frame 5. This upper shorter arm 239 has longer lever arm 241 engaging collar 242 (Fig. 36) fixed with bar 243 located in sleeved mounting and cross piece 244 in the frame 5.

This rod 243 remote from the collar 242 carries plate 245 which is thrust toward the finger 236 into the fully set-up position for the container 225.

End closing

The squared container is prepared for end closing by having its minor flaps 97 folded inward. Rim cam 247 (Figs. 2, 6) acts on roller 248. This roller 248 is mounted on lever 249 mounted on fixed fulcrum 250 (Figs. 6, 30). This lever 249 extending past the fulcrum 250 terminates in roller 251 coacting with cam 252. This cam 252 is effective for maintaining the roller 248 at all times in cooperative relation with the cam 247. Fixed with this lever 249 is arm 253 (Figs. 6, 33) terminating in segment 254 in mesh with pinion 255 splined on shaft 256. This shaft 256 is mounted in bearing 257 fixed with the frame 5 and bearing 258 carried by bracket 259 mounted on rods 260 in the frame 5. This bracket 259 (Fig. 34) has portion 261 extending to the bracket 217. This means that there is the adjustment relatively to the frame 5 of the bracket 259 in the adjustment of the shoe 219 and the guide 94.

Cooperating with the finger 236 to hold the bottle or container in set up position is finger 262 from the member 261 (Fig. 33). The shaft 256 adjacent the bearing 258 is provided with pinion 263 (Figs. 33, 34, 35) in mesh with rack 264. Fixed with the rack 264 is yoke 265 carrying rods 266, 266', reciprocable through guides 267 fixed with the bracket 259. These rods 266, 266', remote from the yoke 265 have wings 268 thereon. In the movement of these rods, these two wings 268 are positioned outside of and adjacent the respective flaps of bottom closure extensions 97 of the container 225.

The apparatus is now in position for folding these flaps inward.

Fixed on shaft 55 is cam 269 (Figs. 2, 6, 42). This cam 269 coacts with roller 270 on lever 271 having fixed fulcrum 272 fixed with the frame 5. This lever 271 remote from the roller 270 is provided with roller 273 coacting with cam 274, which is effective for holding the roller 270 in cooperative relation with the cam 269 at all times. Fixed with this lever 271 is upstanding arm 275 from which extends link 276 to rack 277 reciprocable in guide 278 for holding this rack in cooperative relation with segment 279 splined on shaft 280, in bearing 281 fixed with the frame 5, and the bearing 282 fixed with the bracket 259. This shaft 280 adjacent the bearing 282 has pinion 283 (Figs. 33, 34, 35) in mesh with rack 284 reciprocable in bracket 259. This rack 284 has fixed therewith at right angles thereto additional rack 285 in mesh with pinion 286 splined on shaft 266. There is thus effected a rocking of this shaft 266 upon reciprocation of the rack 285 to thereby swing the wing 268 on this shaft 266 inward. This pinion 286 is in mesh with rack 287 in angularly directed way 288 of the bracket 259.

This rack 287 has fixed therewith and on the opposite side thereof a rack 289 in mesh with pinion 290 splined upon companion rod 266'. Accordingly, simultaneously with the inward swinging of the wing 268 upon the shaft 266, there is swinging theretoward of wing 268 on the shaft 266'. This effects simultaneous inward folding of the minor flaps 97. These wings 268 in their inward movement thrust the minor flaps 97 beyond position to approximate a transverse plane of the container 225, and the wings 268 quickly recover clear of the container, while the flaps 97 retain the inwardly bent position.

The cam 206 is now effective to lift the nippers or overhangs 216 and thereby release the extensions 96, 221, of the container 225. Gripping of the rectangular set up portions of the container 225 now occurs. Disk 291, fast on shaft 55 has in its side cam 292 (Figs. 2, 6, 32). Roller 293 coacting in this cam 292 is mounted in yoke 294, having fork 295 embracing block 296 thereby serving as a guide, this block 296 being loosely mounted on the shaft 55. Away from this fork 295 of the yoke 294 there extends longitudinally adjustable arm 297 as a link to plate 298 fulcrumed on sleeve 299 in the bracket 244 (Figs. 32, 36). This plate 298 has cam groove or way 300. The cam 292 in the rotation of the shaft 55 is accordingly effective to rock this plate 298 on the sleeve 299. Roller 301 rides in this way 300 of the plate 298 (Figs. 32, 36) which has a normal position offset terminus 302 (Figs. 32, 39). The rotation of the shaft 55 shifts this roller 301 from position 302 to start into the way 300 (Fig. 40). This roller 301 is mounted on slide 303 (Fig. 38) in guide 304. This slide 303 has open portion 305 about the sleeve 299. This spread portion of the slide is provided with rack portions 306 meshing with pinions 307. These pinions 307 are integral with cylindrical portions 308 (Fig. 36) having medial groove 309 engageable by pin 310 as keying means for anchoring against longitudinal shifting.

Block 311 provides way or guide 304. It is thus seen that this movement of the slide 303 effects rotation of the respective pinions 307. This extent of rotation is 90° for the rods 12, 11, 12, 11, respectively are integral with the barrels or cylindrical portions 308. This operation or 90° rotation of the pinions 307 swings the shoe 222 downward (Fig. 40) and brings arc extensions 315 of a pair of the rods 11, 12, to engage the container mid-portion 98.

Counter-clockwise rotation of the other pair of rods 11, 12, from the position in Fig. 39 to the position in Fig. 40 shifts cut-out or clearance portion 316 from facing position toward the container to on-edge gripping position of the container. Companion upper rod 11 has its cut-out portion 316 rotated with the rod 12, likewise, to have a diameter of this rod come into gripping engagement with the container as a shield terminus or catch moving this arc extension 315 into side catch position. The container is now gripped by the rocking of the four rods 11, 12, and held from transverse shifting by the finger 236 and the arc portions 315.

The held container is now in condition for orienting; that is, to be given a 90° turn counterclockwise from the position in Fig. 40 to the position in Fig. 41. Cam 317 (Figs. 2, 6, 42) is fixed on shaft 55. Coacting with this cam 317 is roller 318 fixed with lever 319 having fulcrum 320 fixed with the frame 5. This lever 319 has segment 321 in mesh with rack 322 (Figs. 6, 32). This rack 322 is on bar 323 through guide 324 fixed with the frame 5. Adjustable connection

326 assembles with this bar 323, bar 327 having rack 328 in mesh with segment 329 (Figs. 32, 36) fixed with the sleeve 299. This sleeve as protruding from the bracket 244 and past the plate 298 carries the block 311. The extent of rocking effective from this cam 317 is for 90° orienting of the block 311 relatively to the plate 298. This causes the roller 301 to move not only along the cam 300 but into cam terminus region 330 and thus effects a movement of the slide 303 relatively to the block 311. This is for a reverse 90° rocking from that between Figs. 39, 40, and there effects a release of the container in a vertical position so that it is free to drop with the lower portion open and the upper portion having the minor flaps inwardly directed.

As thus released, the container is free to fall by gravity into chute 13 (Figs. 7, 13, 43, 44, 46).

The container is now to have its bottom end closed—chute to the gluer

The shaft 51 (Figs. 5, 43, 44) has transmission connection through beveled gear 332 and beveled pinion 333 mounted on shaft 334 located in bearing 335 fixed with cross piece 336 in the frame 1. This shaft 34 remote from the pinion 333 is provided with beveled gear 337 in mesh with beveled gear 338 on shaft 339 (Fig. 46) mounted in gearing 340 in the cross piece 336. This shaft 339 remote from the pinion 338 has gear 341 in mesh with gear 342 on vertical shaft 343 carrying cam drum 344 between the cross piece 336 and cross piece 345, between the sides of the frame 5. This drum 344 is provided with endless reversing cam way 346 with which coacts follower shoe 347 on block 348 (Fig. 44). This block 348 is mounted to slide up and down on stem 349 fixed with the cross brace 336.

Adjacent this drum 344 is upstanding bracket 350 mounted on the frame member 336. This bracket 350 has cam face 351 terminating in an upward hook portion 352. The block 348 has pair of eyes 353 (Fig. 44) mounting rock shaft 354 (Fig. 47). This shaft 354 has loosely thereon arm 355 mounting roller 356 which rides along the cam 351, 352. Spring 357 extends to arm 358 which is loosely mounted on pin 359 (Figs. 47, 48) coaxial with the roller 356 and in the arm 355. The arm 358 is an arm of a lever having extension 360 held by the spring 357 to cooperate with cam 361 keyed to the shaft 354. Fixed with the shaft 354 between the eyes 353 is arm 362 effective in the descent of the block 348 to move down as extending in a horizontal direction in the chute 13 to a position down on the two inwardly folded minor flap portions 97, in thereby thrusting this open bottom container downward out of the chute 13.

This descent is permitted past trigger 363, for portion 364 of the arm 358 rides along the beveled face of this trigger 363 and thrusts this trigger into socket 365 against the action of compression spring 366 (Figs. 43, 45, 48) as the arm 362 is thrusting the container downward to insure delivery thereof from the chute 13. The trigger 363 is held from movement out of the way of socket 365 by key or pin 367. Upon the ascent or upward movement of the block 348, portion 364 of the arm 358 abuts under side 369 of the trigger 363 and thereby meets with such resistance that this lever 358, 360, is rocked upon its fulcrum 359 against the resistance of the spring 357 to throw the dog 360 clear of the cam 361. This releases the shaft 354 so that arm 370 (Figs. 43, 44) may be retracted by helical spring 371 and thus rock the arm 362 into upwardly extending position clear for a succeeding container to be dropped into the chute 13. The container may thus be descending in the chute 13 while this block 348 is ascending. At the upper limit of the ascent, the roller 356 rides into the cam portion 352 thereby again setting the dog 360 to engage the tooth of the cam 361 and the device is in position for a succeeding cycle of operations. In this upward swinging movement of the arm 362 it abuts adjustable stop 372. The snap-off of the lever 358, 360, relatively to the trigger 363 is through clearance portion 373.

Collapsible mandrel series and drive

The container as thus delivered from the chute 13 is firmly urged down upon the collapsible mandrel 14 as one of an endless series. Motor 374 (Figs. 1, 5) through worm gear speed reduction 375 is effective to drive shaft 376 (Fig. 54), mounted along the side of the machine opposite to that in Fig. 1, having skew gear 377 thereon in mesh with skew gear 378 on shaft 379 having pinion 380 to enter teeth 381 of star wheel gear 382 loose on shaft 383. This is a regular Geneva drive movement from the one tooth gear 380.

There is distribution of the transmission to this Geneva gear 382 from this shaft 376 by skew gear 384 in mesh with skew gear 385 on shaft 386 carrying one tooth gear 387 diametrically from the one tooth gear 380. The shaft 386 protrudes through the frame 1 and has thereon balance wheel 388 (Figs. 54, 57). This Geneva gear 382 is anchored by bolts 389 (Fig. 59). The shaft 383 is fixed against rotation relatively to the frame 1. The Geneva gear 382 is free to rotate on this shaft. The wheel or spider 15, anchored with this Geneva gear 382, is located as to the shaft 383 between collars 390, 391. Fixed on this shaft 383 between the sections inside the hub of the wheel 15 is cam 392 (Figs. 49, 55). This wheel 15 has intermediate section 393 having tubular radiating portions or spokes 394. Mandrel 14 has stem 395 extending into the tubular way 394 to be connected with block 396 carrying roller 397 to coact with the cam 392.

The spokes 394 have ways 398 with which coact splines 399 engaging with the block 396. Loosely about the stem 395 and located in the tube 394 is member 400 held against rotation by splines 401 coacting with the ways 398. This member 400 has terminal enlargement 402, between which and the terminus of the tubular portion 394 are compression helical springs 403. The outward thrusting action of each spring 403 is limited by pin 404 coacting in cut-out portion 405 (Fig. 55). This enlargement 402 is provided with upstanding ears 406 mounting pivot pins 407 (Fig. 59) thereby providing assembling means for corner portions 408 to rock relatively to the enlargement 402. Adjacent the enlargement 402 and below the pivot pins 407 compression helical springs 409 act between the mandrel sections 408 and the ears 406 for normally rocking the lower portions of these mandrel sections outward, thereby tending to throw the upper portions inward against the mandrel terminus 14, which is normally urged outward therefrom by compression helical spring 410 about the stem 395.

The springs 403 accordingly provide a yieldable mounting for the mandrel unit. The roller 397, as acted upon by the cam 392, draws the mandrel terminus 14 down into the mandrel corner portions 408 and thereby expands the mandrel. When the arm 362 thrusts the container down

upon the mandrel terminus 14, this pushing action may be sufficient to cause the mandrel 14 to expand the sections 408 and thus bring the container into position upon the expanded mandrel. Adjacent the spokes of the wheel 15, laterally of the tubular portions 394, leaf spring 411 (Fig. 3) engages against opposite sides of the container near the pivotal mountings of the mandrel sections 408 and frictionally grips this container against shifting relatively to this expanded mandrel.

Container in position for gluing

At this position on the mandrel, the container has its minor flaps 97 against the mandrel portion 14, and the adjacent major flaps 96 extend in parallel relation in the direction of the chute 13 and radially of this wheel 15. The parts are now in position for shifting and having the bottom completed by the gluing and pressing operations.

As this operation starts, the cam 392 is effective in movement away from the position shown in Fig. 55 to pull the head 14 down into position for firmly expanding the mandrel into holding position for the container. These upstanding portions 96, as this rotation of the wheel 15 starts, engage with wings 412 (Figs. 43, 46, 66) and are thus located in an approximately common plane at right angles to the general extent of the container or tangential to the wheel and parallel to the minor flaps 97 and outward.

Gluing

The inner side portions; that is, the sides of the portions 96 which are radially outward from the wheel 15 are now ready to have adhesive applied thereto. Manual switch 413 (Fig. 3) may be operated to cut in motor 414. This motor 414 mounted on the frame 1 is effective through worm gear speed reduction 415 (Fig. 55) to drive shaft 416 mounted on bearings 417, 418, in the frame 1.

This shaft 416 has sprocket chain transmission 419 (Figs. 50, 52) to shaft 420, swingably mounted as to the shaft 416 by bracket 421. This shaft 420 has fixed thereon tapered roll 422 and pinion 423. The pinion 423 is in mesh with gear 424 on shaft 425 also carried by the bracket 421. Fixed on this shaft 425 is complementary tapered roll 426 peripherally coacting with the roll 422 for adjustable clearance therewith. There is accordingly differential peripheral speed therebetween as simultaneously rotating in opposite directions. In the pocket between these two rolls 422, 426, a gob or wad of plastic adhesive 427 is placed, say as a mass of glue. The clearance for wiping film off this mass 427 upon the roller 422 may be adjusted by backing off set screw 428 and angularly shifting eccentric bearing 429.

The bracket 421 is provided with overhang 430 and adjustable set screw 431 to abut companion bracket 432 to the bracket 421. Adjacent this bracket 432 is sprocket chain transmission 433 from the shaft 416 to shaft 434, having fixed thereon glue or adhesive applying cylindrical roll 435 and pinion 436. This pinion 436 is in mesh with gear 437 on shaft 438 in the bracket 432, parallel to shaft 434 and carries companion minor diameter roll 439. Between these rolls 435 and 439 there is a formed pocket or recess for a semi-plastic mass or gob 427 of the adhesive or glue. The clearance between these parallel rolls for kneading the glue and imparting a film thereof to the roll 435 may be adjusted by backing off set screw 428, adjusting eccentric bearings 429 for the shaft 438 (Fig. 51).

As stated, the downward swing of the bracket 421 upon the shaft 416 as an axis, is determined by the adjustable stop 431 against the bracket 432. This bracket 432 has its swing downward from the shaft 416 limited. The shaft 434 carries roller 440 normally resting in seat 441 of bar 442 (Fig. 50, 53).

Gluer cut out, manual

In order to operate the machine without any gluing operation occurring, even though the motor 414 may be running, these rolls 422, 435, are lifted clear of operative position. To this end, handle 443 (Fig. 1) is shifted counter-clockwise upon its fulcrum 444. Short arm 445 of this angle lever 443 is thus effective through link 446 and arm 447 (Figs. 1, 50) to rock shaft 448 mounted in the frame 1 to turn segment 449 (Figs. 50, 53). This segment 449 is in mesh with pinion 450 carried by bracket 451 fixed with the frame 1. Fixed with this pinion 450 is arm 452 having pin 453 coacting with slot 454 in arm 455 loosely mounted on shaft 434. By this means the bracket 432 is thus swung upwardly upon the shaft 416 as an axis, the abutment 431 engages the bracket 432, and there is likewise a lifting of the bracket 421 so that these rolls are clear of operating position.

Gluer cut out, automatic

This manual cut out or shifting may be for considerable clearance. In effecting a gluing operation but slight movement may shift the gluing rolls away from operative position. Provision is made to have a slight movement clear of operative position occur automatically when a container is not on the mandrel. This avoids smearing the machine parts with the adhesive.

The wheel 15 (Figs. 3, 64, 67) has guide 456 through which extends slide 457 having terminus 458. The guide 456 has slot 459 through which extends pin 460 to be engaged by helical tension spring 461, normally urging the head 458 away from the guide 456 and into clearance 462 between collapsible mandrel sections 408. With a container 225 in position on the expanded mandrel, this head 458 may not enter this clearance way 462 and the gluing operation may be effected normally upon the spread flaps 96 of the container.

In the event there be not a container 225 on the mandrel, this head 458 enters this clearance way as urged by the spring 461. This slide 457, remote from the head 458, carries roller 463 and extension 464 (Figs. 53, 64, 65, 67). This shifting of the extension 464 brings such into the line of trigger 465, rocking this trigger on its fulcrum 466, and thereby pulling bearing bar 442 against resistance of spring 467 and shifting seat 441, thereby effecting a slight lifting movement for the shaft 434. This lifting movement is sufficient to move the adhesive applying rolls 422, 435, away from active position against the stock holding portions of the machine. After this operation, the roller 463 engages cam 468 to retract the head 458 from the mandrel. This cam 468 is effective until the slide 457 is again just past approximate registry with the clearance 462 at the position of the wheel for receiving a container from the chute 13. The trigger 465 is thus retracted so that a container may be shifted down upon the collapsible mandrel with but slight friction by the head 458. At the manual

throwing out of this adhesive applying roll mechanism, the rocking of the shaft **448** is effective through cam **469** (Fig. 53) engaging with the portion of the trigger **465**, adjacent the bar **442**, to lock out this automatic cut out mechanism for the gluing rolls. This avoids clicking in automatic operation in the event the machine may be running idly, that is, without a supply of the containers.

Gluing clearance

A predetermined clearance for normally applying the adhesive is made. To this end, the bracket **432** is provided with roll **470** (Figs. 3, 51). The respective arms of the spider **15** carry shoes **471** with which this roller **470** may coact.

Folding the flaps over

Fixed with the frame **1** (Fig. 49) by brackets **472** is endless cam **473**. This endless cam is coaxial with the shaft **383**. Guide roll **474** rides in this cam. This guide roll **474** is mounted on bracket **475** carried by pair of parallel guide rods **476** mounted in ways **477** of the wheel **15**. Fixed with this bracket **475** is beveled shoe **478** against which a flap **96** may be directed by the wing **412** to lie flat thereon. At the first shifting past the chute **13**, the pair of flaps **96** receive glue on their upper side. In passing to the succeeding station, cam portion **479** of the cam **473** (Fig. 60) has effected shifting of this shoe **478** to position over the expanded mandrel **14**, and thus has swung one extension **96** to be under the shoe **478** and with its adhesive side against the two inwardly turned minor flaps **97** as shown at position **480** (Fig. 60). At this position, the cam roller **397** (Fig. 55) rides into cam seat **481** thereby allowing the springs **403**, **410**, to thrust the mandrel portion **14** outward into an impacting position against the inner side of the flaps **97** to thrust such against the thrown-over extension or flap **96** at this position **480**. In moving out of this cam portion **481**, the portions **408** are expanded by retraction of the head **14**. This is a freeing of the container end so that this shoe **478** may be readily retracted. Each of the mandrels **14** in the annular series is provided with the folding mechanism for the flaps.

The opposite side of the frame **1** from that carrying the brackets **472** is provided with brackets **482** mounting cam **483** as a companion to the cam **473**. Rollers **474** are mounted on brackets **475**, located on rods **476** in guides **477** of the wheel **15**. This bracket **475** carries shoe **484**, which is flat, instead of being beveled as is the shoe **478**. The thin portion of the shoe **478** as adjacent the shoe **484** allows the unfolded flap **96**, which is to be outward, to swing toward closing position by cam portion **485** (Fig. 60).

In this operation the shoe **484**, in shifting over the mandrel, swings this other extension **96** against the sealed extension **96** which has been placed in closure position by the shoe **478**. This operation occurs simultaneously with the retraction of the shoe **478**. The flap **96** on the shoe **484** has had the film of adhesive applied thereto by the roller **435**. The adhesive which had been applied to the other flap **96** was by the roller **422**.

While the minor flaps **97** have been thrust down upon the mandrel head **14** by the arm **362**, any tendency of such flaps to swing back and interfere with the positioning of the first flap **96** with adhesive thereon against these minor flaps **97** may not occur, because the container, in passing the wings **412**, to lay the flaps **96** outward, has spring blade **485** (Fig. 66) as a depressing element to extend over the pair of flaps **97** during the gluing operation. Companion blade **486**, pivotally mounted on pin **487** with the wings **412**, has tension spring **488** yieldably holding the blade **486** away from the blade **485** so that even the corner portions of the minor flaps **97** may be held during the gluing operation upon the flaps **96**, and until the shoe **478** has moved sufficiently to have the flap **96** hold these minor flaps **97**. The yieldable blade **486** holds the flaps **97**, even during the starting operation of the shoe **478** and is thrust out of the way, first by this shoe **478**. Pressing operation occurs for the outer flap **96** against the under side of the shoe **484** for the roller **397** rides off cam terminus **489** (Fig. 55) and thereby allows the compression springs **403**, **410**, to act in holding the head **14** against the inner sides of the flaps **97** and thrusts such outward against the under side of the shoe **484**. This holding action in the intermittent rotation of the wheel **15** occurs throughout the lower 180° of movement herein shown as nearly five stations in this eight-armed wheel **15**.

Safety device to prevent jamming the container in chute 13

In the event the container may not pass upon the collapsible mandrel **14** in a proper manner or otherwise does not clear the chute **13**, there is interposed resistance to the descent of the arm **362** (Fig. 61). This interference reacts back through the drive for the arm to effect rupture of the frangible pins **490** in coupling **491** of drive shaft **51** (Figs. 3, 5, 68).

Take off to engage the container

After this cycle with the wheel **15**, the container has its bottom or radially outward end closed and the adhesive has been allowed to set. There is accordingly a one-end-closed container which is now ready to be removed from this wheel **15** by the unloading device.

After this practically 180° travel for pressing and setting the glued and closed outer end of the container on the collapsible mandrel **14**, **408**, the roller **397** passes into cam portion **492** (Fig. 55) after clear of the shoe **484** which allows a radially outward movement of the mandrel portion **408** due to the action of the springs **409**. The container is thus in a loose position to be held only by the leaf springs **411**.

On the shaft **51** (Figs. 3, 5, 68) is cam **493**, with which coacts roller **494**, fixed with slide bar **495** (Figs. 68, 69), having rack **496** in mesh with pinion **497**, loose on shaft **498** as the axis shaft for mounting the rockable portions of the unloading device including frame **499**. The pinion **497** has fixed therewith pinion **500** in mesh with rack **501** in guide **502**. This rack **501**, besides meshing with the pinion **500**, is held in mesh with pinion **503** on shaft **504**, parallel to the shaft **498** and carried by the frame **499**. Fixed on this shaft **504** is segment **505** (Figs. 69, 71) in mesh with rack **506** slidable in guide **506'** through the frame member **499**.

This yoke member **499** has bearing not only on the shaft **498** from the frame **1**, but is held in alignment by shaft **507** from the opposite side of the frame **1**. These shafts **498**, **507**, are in alignment and provide a bearing on which the member **499** may rock. The oscillation of the segment **505** moves this rack **506** in the guide of the frame **499**. The frame **499** carries pair of guide tubes **508** parallel to each other and the

rack 506. These tubes 508 have terminal enlargements 509 limiting the downward travel of these tubes relatively to the frame 499 and carry on the opposite side of the frame 499, yoke 510 (Figs. 70, 71, 74). This yoke 510 has recessed portions 511 mounting pivot pins 512 carrying segments 513 in mesh with tooth portions 514 on the portion of the rack 506 remote from the frame 499.

Fixed on the rack bar 506 is collar 515 normally thrust away from the yoke 510 by compression helical spring 516. The limit of this upward thrust is determined by washer 517 abutting the lower side of the yoke 510. In the downward thrust of this rack 506 when the enlargements 509 of the guide tubes 508 abut the frame 499, the further operation of the rack 506 is against the resistance of the spring 516, and causes the racks 514 to act upon the segments 513 and rock depending gripping jaws 518 to spread position as to closed-end-container 519 upon a collapsed mandrel. Upon initiation of the reverse movement of the rack 506, the take up is of course at first with the spring 516, which causes the slight movement of the yoke 510 relatively to the rack 506 sufficient to swing the jaws 518 into gripping position as to the container 519 before the washer 517 contacts the yoke 510 for the continuation of the reverse travel with the jaws 518 effective to pull the container 519 off the mandrel.

Pull-off

This pulling operation of the closed-end container 519 is radial of the wheel 15 a sufficient distance to clear this container even as to the flaps of its unclosed end 38 from this mandrel.

At this withdrawn position, the next operation of this unloading device is to swing this container for delivery of the container to the coating device. To this end, there is fixed on the shaft 51 cam 520, with which coacts rollers 521 (Figs. 3, 68). This roller 521 is fixed with slide 522 forming a rack in mesh with pinion 523 fast on the shaft 498, which is keyed to the yoke 499. This cam 520, fast on the shaft 51 with the cam 493, is so disposed that at this withdrawn position of the container 519, as gripped by the jaws 518, there is effected swinging of this container on the shaft 498 as an axis, approximately 45° downward so that the container 519 is in vertical position with its open end downward. At this vertical position there is reversal of the travel of this container 519 radially of the shaft 498, and at this limit outward the enlargements 509 effect release of this container for delivery to the coating mechanism.

In drawing the container 519 off the mandrel and toward the member 499, this travel of the container 519 is directed by pair of guides 524 rigid with the frame 499. Opposing this pair of guides 524 is finger 525 fixedly mounted on hinge pin 526 (Figs. 68, 70). This pin 526 is in bearings 527 fixed with the frame 499. This pin 526 has angularly offset end 528 as a crank arm connected by tension spring 529 to extend about the shaft 498. There is thus provided yieldable holding action for the guide side 525.

In the pulling of the container 519 off the mandrel, should there be release of the container from the jaws 518 during this operation, say even to remove only partially the container from the mandrel, no portion of the machine is wrecked thereby, for the finger 525 will yield as striking such container in the transverse swinging of this unloading device.

Safety stop device in the event unloading device has not been effective

In the event the container is not fully removed from the mandrel, the container strikes arm 530 (Fig. 3) and rocks such arm on its fulcrum 531 to shift roller 532, to pull arm 533, against the resistance of spring 534 and thereby open switch 535 and stop the motors 49, 374. The entire machine is thus stopped except the glue rollers operated by the independent motor 414 (Fig. 50). The main driving mechanism for the machine has the load between the motors 49, 374, distributed by its inter-connection gearing 536, (Fig. 5) shaft 537 and gearing 538. This gearing maintains the timing relationship notwithstanding two motors are used in the driving operation, and there is thus in effect a common motor drive.

In the switch diagram shown in Figure 76 the manually operable control switch is indicated at S, and this switch, when closed, causes motors 49 and 374 to be energized for the normal operation of the machine. The switch may be of any desired type and the circuit may also be provided with automatic means for throwing out the movable member to interrupt the current supply in the event that any portion of the machine is not functioning properly, such automatically operating cut-outs being indicated, for instance, at C and C'.

It will be appreciated that the design and arrangement of the component elements of the carton opening and one end closing and sealing mechanism may be considerably varied in adapting the machine to handle cartons of different dimensions and shapes and that numerous changes may be made in the details of the mechanism disclosed by way of example without failing to realize the advantages thereof

What is claimed and it is desired to secure by Letters Patent is:

1. An automatic cartoning machine comprising, in combination, means for maintaining in pack formation a plurality of collapsed open-ended cartons, an expansible and contractible mandrel which, when expanded, has the same effective cross-sectional area as the interior of a finished carton and, when contracted, has a lesser effective cross-sectional area, mechanism for withdrawing a single collapsed carton from the pack, opening the same, and placing it over the mandrel while the latter is contracted, and means for expanding and contracting the mandrel.

2. An automatic cartoning machine comprising, in combination, means for maintaining in pack formation a plurality of collapsed open-ended cartons, an expansible and contractible mandrel which, when expanded, has the same effective cross-sectional area as the interior of a finished carton and, when contracted, has a lesser effective cross-sectional area, mechanism for withdrawing a single collapsed carton from the pack, opening the same, and placing it over the mandrel while the latter is contracted, means for expanding the mandrel after emplacement of a carton thereon and for subsequently contracting the same, and a device for removing the carton from the subsequently contracted mandrel.

3. The combination set forth in claim 2 in which means is provided for halting the operation of the machine in the event that the carton removing means fails to act.

4. An automatic cartoning machine compris-

ing, in combination, an expansible and contractible mandrel, means for placing over the mandrel while collapsed a carton having a foldable end portion with such end portion projecting beyond the end of the mandrel, mechanism for expanding the mandrel to closely engage the inner wall of the carton, and means for folding down said end portion upon the expanded mandrel.

5. An automatic cartoning machine comprising, in combination, an expansible and contractible mandrel, means for placing over the mandrel while collapsed a carton having a foldable end portion with such end portion projecting beyond the end of the mandrel, mechanism for expanding the mandrel to closely engage the inner wall of the carton, mechanism for applying adhesive to said foldable end portion of the carton while the carton is positioned on the mandrel, and means for folding down said end portion upon the expanded mandrel.

6. In a container fabricating machine, in combination, means for supporting a collapsed tubular blank, means for partially opening the blank, means for thereafter fully opening the blank, and means for rotating the blank about a transverse axis and placing it upon a mandrel.

7. In a container fabricating machine, in combination, means for supporting a collapsed flat walled tubular blank, a device for receiving and retaining a partially opened blank, means for partially opening a blank and placing the same within said receiving device in partially opened condition, means for fully opening said blank after thus placed within said device, and means for actuating said device to rotate the opened blank about an axis and to thereafter discharge the same.

8. In a container fabricating machine, in combination, a device for releasably holding a fully opened horizontally disposed container blank, means for rotating said device to dispose the container in an upright position with the axis thereof vertically disposed, and means for causing said device to release the container to cause the same to fall.

9. In a container fabricating machine, in combination, means for supporting a collapsed tubular container blank with the long axis thereof horizontally disposed, a device for retaining a fully opened blank with its axis horizontal, mechanism for removing a blank from said means, opening the same and placing it within said device, a chute below said device, and means for rotating said device to bring an opened blank into alignment with said chute and to thereafter release said blank to permit the same to fall into said chute.

10. In a container fabricating machine, in combination, means for supporting a collapsed tubular container blank having foldable end flaps, a mandrel for interiorly supporting an open blank, and mechanism for removing a blank from said means, opening the same, folding two opposed end flaps at one end thereof and, subsequently to the opening and flap folding operations, placing the same upon said mandrel.

11. In a container fabricating machine, in combination, means for engaging a collapsed tubular container blank and opening the same, a stationary guide or chute for the opened container, a mandrel in register with one end of the guide or chute, mechanism for transferring a tubular blank, after having been opened by said means, to said stationary chute, and means movable in a closed path fixed with respect to the chute for positively forcing a blank positioned within said chute onto said mandrel.

12. The combination set forth in claim 11 in which said last mentioned means comprises a pusher member, means for reciprocating said member axially of the chute, and means for projecting the pusher into the chute prior to the commencement of its working stroke and retracting it therefrom during its return stroke.

13. In a container fabricating machine, in combination, a fixed guide or chute for open ended tubular containers, a series of movably mounted mandrels adapted to successively register with the discharge end of the chute, means for forcing an open ended container out of the chute and onto a registering mandrel, and mechanism for successively presenting mandrels in container receiving position.

14. The combination set forth in claim 13 in which the mandrels are expansible and collapsible and in which means is provided for effecting the collapse of each mandrel prior to loading thereof and thereafter expanding the same to cause it to tightly engage the inner surfaces of the container.

15. In a container fabricating machine, in combination, means for supporting a pack of collapsed tubular blanks, a blank opening and transferring device including two blades adapted to be successively introduced endwise into single blanks at the end of the pack, and actuating means for said device whereby the blades are moved axially into a collapsed blank, thereafter moved laterally relatively to each other to open the blank, and then moved laterally simultaneously to separate the blank from the pack and move it bodily to a further position to be acted upon.

16. In a container fabricating machine, in combination, means for supporting a pack of collapsed tubular blanks, a blank opening and transferring device including two blades adapted to be successively introduced endwise into single blanks at the end of the pack, and actuating means for said device whereby the blades are moved axially into a collapsed blank, thereafter moved laterally relatively to each other to open the blank, and then swung simultaneously about a fixed axis to separate the blank from the pack and move it bodily to a further position to be acted upon.

17. In a container fabricating machine, in combination, means for supporting a pack of collapsed tubular blanks with individual blanks disposed with their longitudinal axes horizontal, a substantially horizontal table adjacent the discharge end of the pack, mechanism for detaching a blank from the end of the pack, partially opening the same, and depositing it on said table, and means associated with the table for gripping the ends of the blank to secure the same in position to be further acted upon.

18. In a container fabricating machine, in combination, means for supporting a pack of collapsed tubular blanks with individual blanks disposed with their longitudinal axes horizontal, a substantially horizontal table adjacent the discharge end of the pack, mechanism for detaching a blank from the end of the pack, partially opening the same, and depositing it on said table, means associated with the table for gripping the ends of the lowermost side of a blank thus deposited upon the table, and means for fully opening the blank while thus gripped.

19. In a container fabricating machine, in com-

bination, means for partially opening a collapsed tubular open ended blank, and mechanism for thereafter fully opening the blank, said last mentioned mechanism including means for maintaining in fixed position one side of the blank and a member movable along a predetermined path for contacting with and rocking another side of the carton.

20. In a carton fabricating machine, in combination, means for supporting a pack of collapsed tubular blanks with individual blanks disposed with their longitudinal axes horizontal, a device for holding a fully opened blank with axis horizontal, rotating said blank into vertical position and releasing the same to permit the blank to fall, and mechanism for detaching blanks singly from the pack, partially opening the same, introducing the partially opened blank into said device, and fully opening the blank.

21. The combination set forth in claim 20 in which said device includes four horizontally disposed parallel rotatable spindles between pairs of which the carton is retained, the carton contacting surface of one of said spindles being movable out of contact with the carton to release the same, and means for rotating said spindles.

22. In a container fabricating machine, in combination, means for supporting a collapsed open ended tubular blank having relatively movable side wall panels, and blank opening means including two flat blade members adapted to be thrust axially into a blank while in parallel relationship, and to be thereafter moved relatively to each other into angular relationship, one of said blades being a panel holding or retaining blade and the other a panel deflecting or moving blade, said last mentioned blade being relatively wide so as to bear upon substantially the entire area of the panel to be deflected.

23. In a container fabricating machine, container opening mechanism including means for securing one wall of a container in fixed position, means for moving the remaining walls to and through the positions which they normally occupy when the container is fully open, and latching means for preventing return movement of the container walls past their fully open positions.

24. In a container fabricating machine, container opening mechanism including means for securing one wall of a container in fixed position, means for moving the other container walls to and through the positions which they normally occupy when the container is fully open, latching means for preventing return movement of the deflected container walls past their fully open positions, and a pusher for effecting the return of the deflected walls to their fully open positions.

25. In a container fabricating machine, in combination, means for supporting a pack of collapsed tubular blanks, means insertable endwise into the outermost blank of such pack, and operating mechanism for said means whereby it may be inserted into a blank, actuated to open the blank, and moved to bodily transfer the opened blank to further means for acting upon the same.

26. In a container fabricating machine, in combination, a chute for guiding a tubular blank along a predetermined path, means for inserting tubular blanks singly into said chute at one end, a series of movably mounted mandrels adapted to be into registration with the discharge end of the chute, a pusher, and means positioned laterally of the chute for operating the pusher, said means causing the pusher to move through the chute toward the discharge end thereof to move a container before it and out of the chute and onto a registering mandrel, and then withdrawing the pusher from the chute and returning the same into position to engage a container newly inserted into the chute.

27. The combination set forth in claim 26 in which the pusher comprises a member extending transversely to the axis of the chute and in which the chute is longitudinally slotted to permit the passage of said pusher on its working stroke.

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