

March 5, 1935.

C. H. WILD

1,993,079

CARTON FILLING MACHINE

Filed April 6, 1931

19 Sheets-Sheet 1

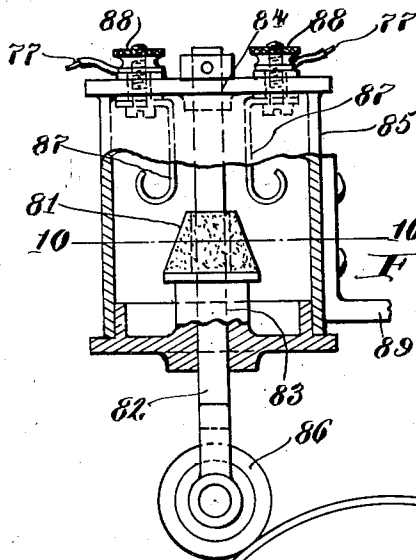


Fig. 9.

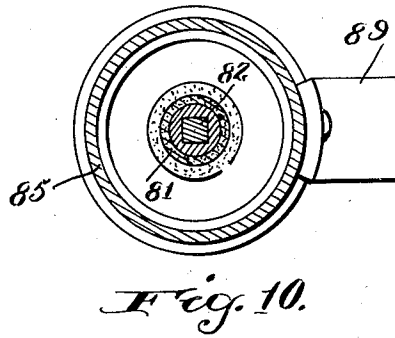


Fig. 10.

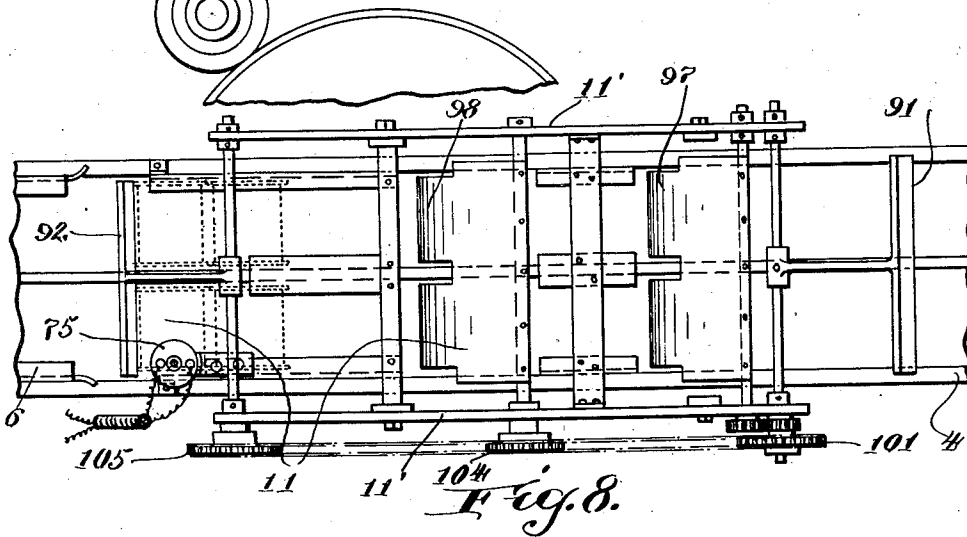


Fig. 8.

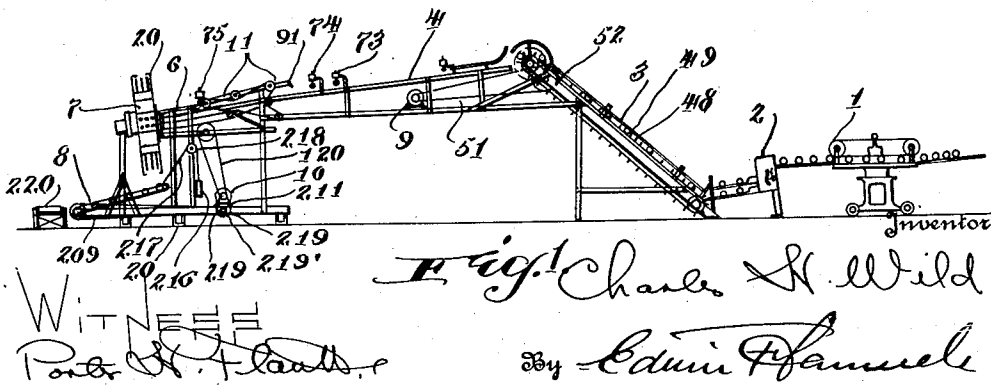


Fig. 1 Charles H. Wild

By Edwin F. Samuel

Attorney

March 5, 1935.

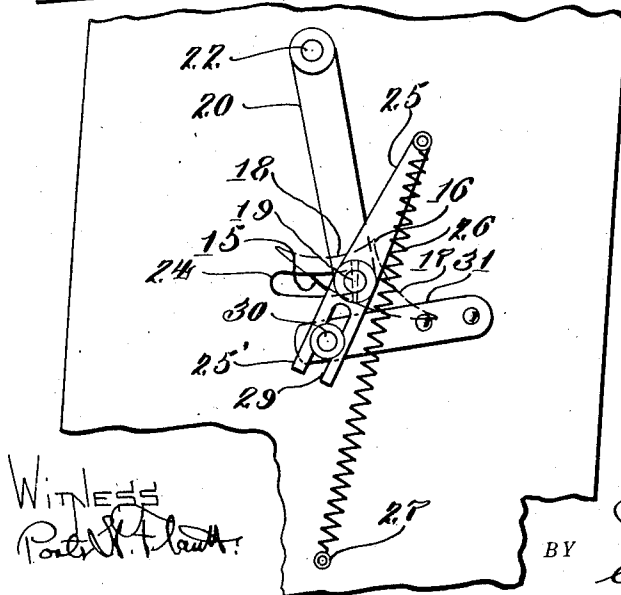
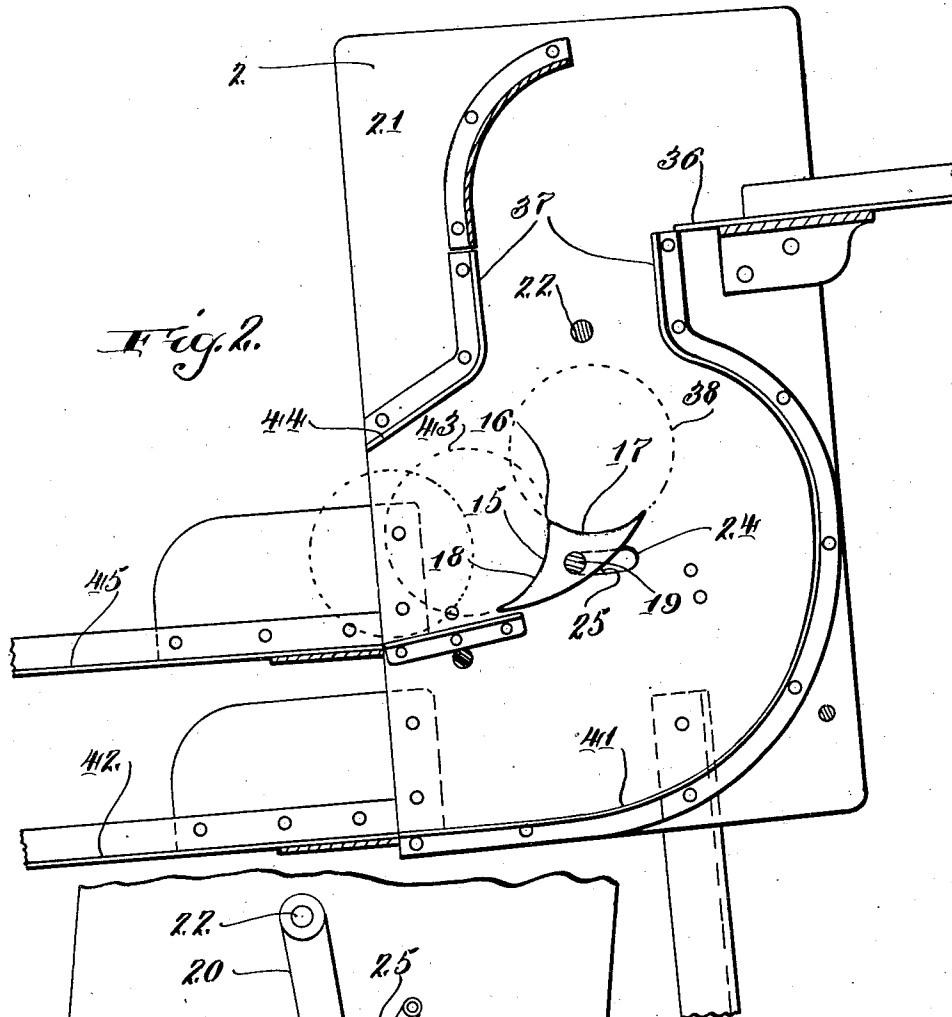
C. H. WILD

1,993,079

CARTON FILLING MACHINE

Filed April 6, 1931

19 Sheets-Sheet 2



WITNESS
R. H. F. Law

BY

Charles H. Wild, INVENTOR
Edwin F. Daniels, ATTORNEY

March 5, 1935.

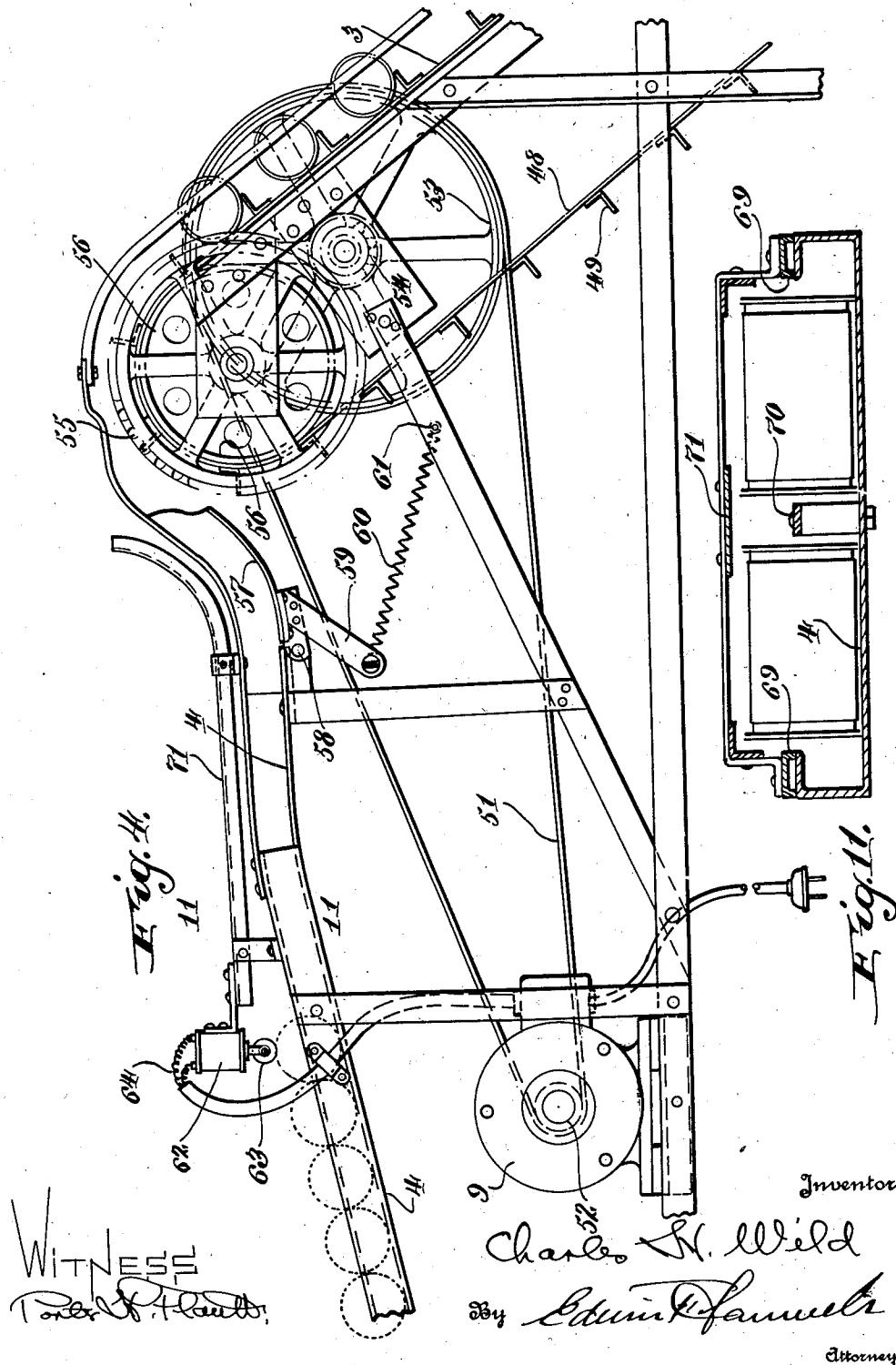
C. H. WILD

1,993,079

CARTON FILLING MACHINE

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March 5, 1935.

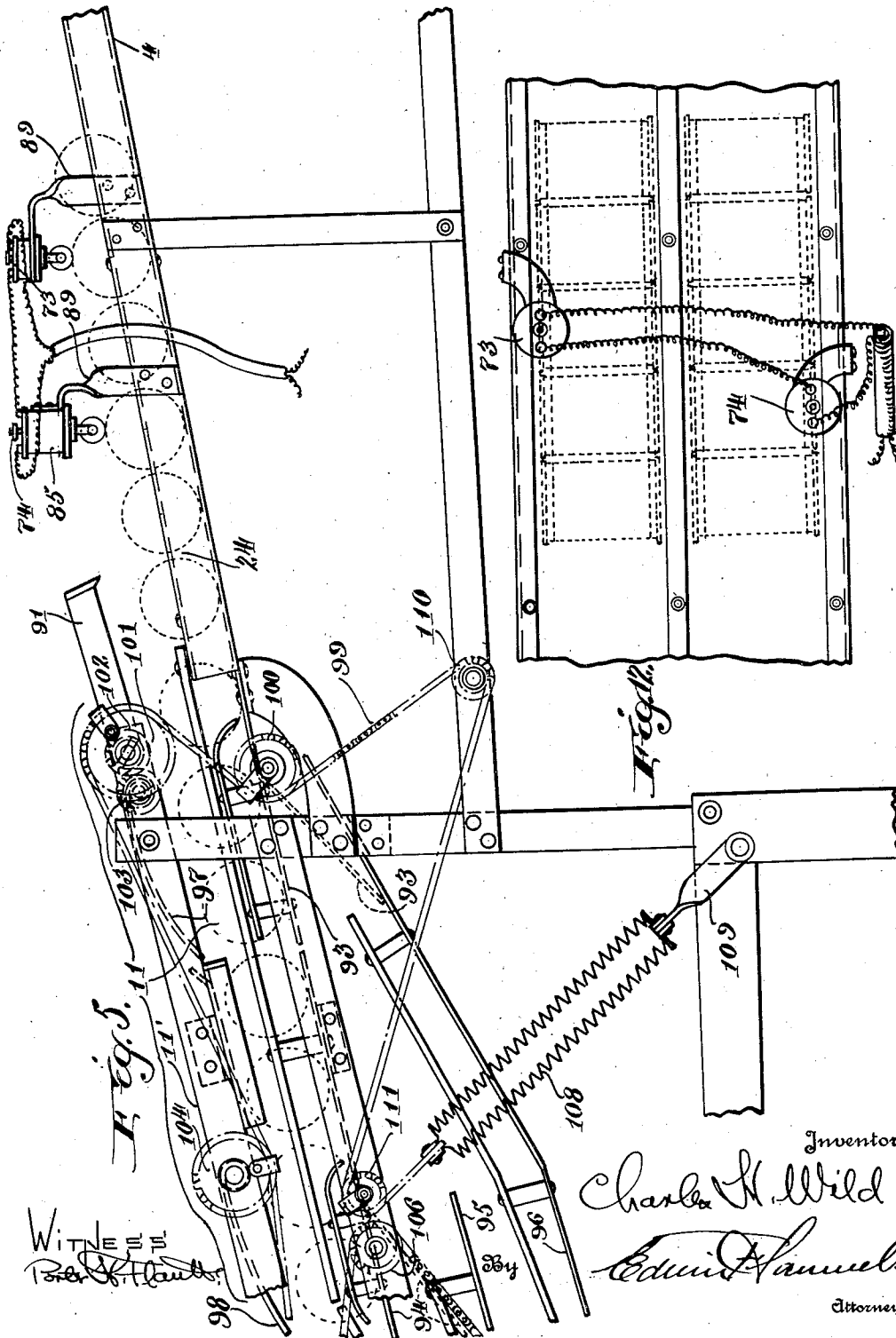
C. H. WILD

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CARTON FILLING MACHINE

Filed April 6, 1931

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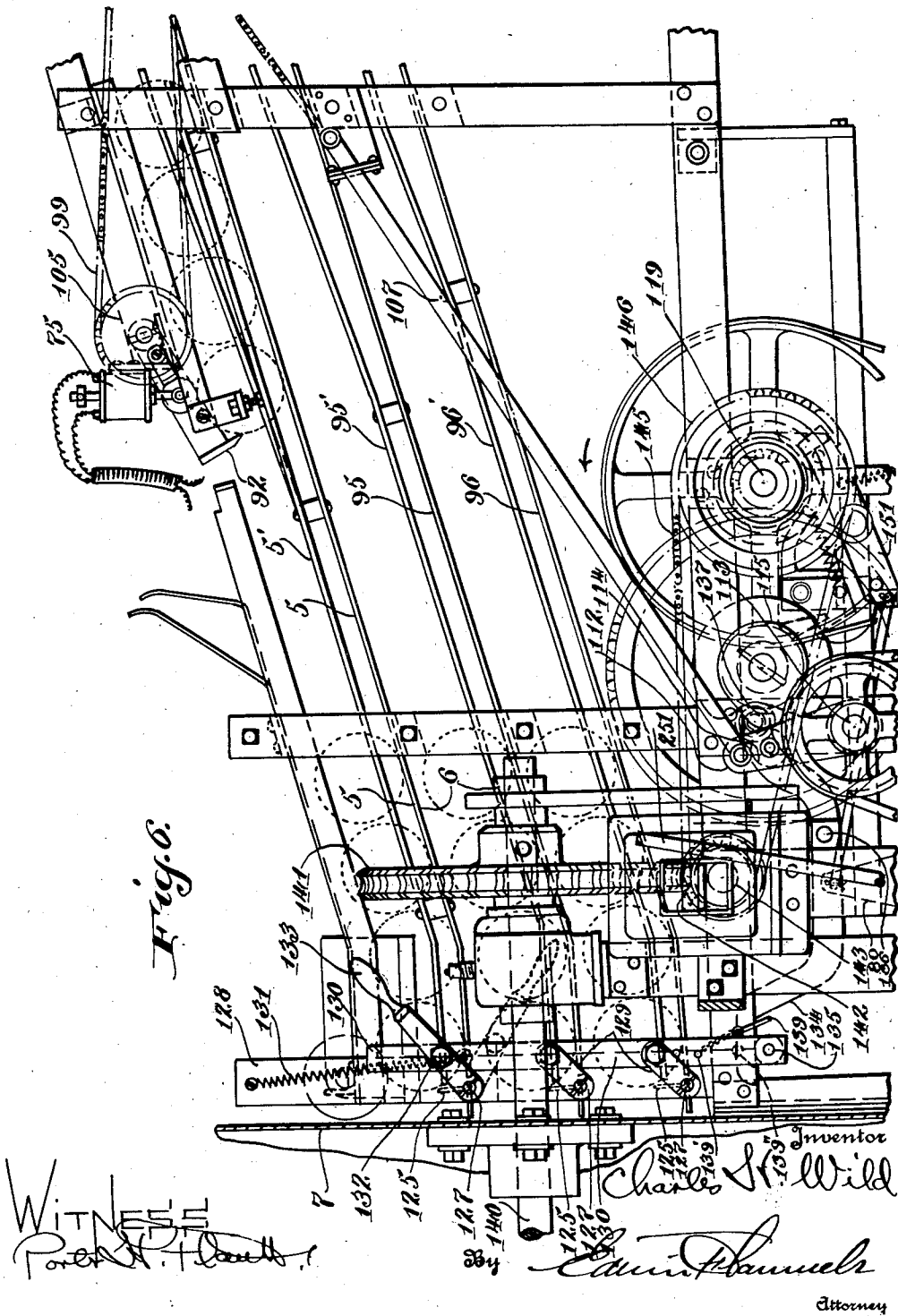
C. H. WILD

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CARTON FILLING MACHINE

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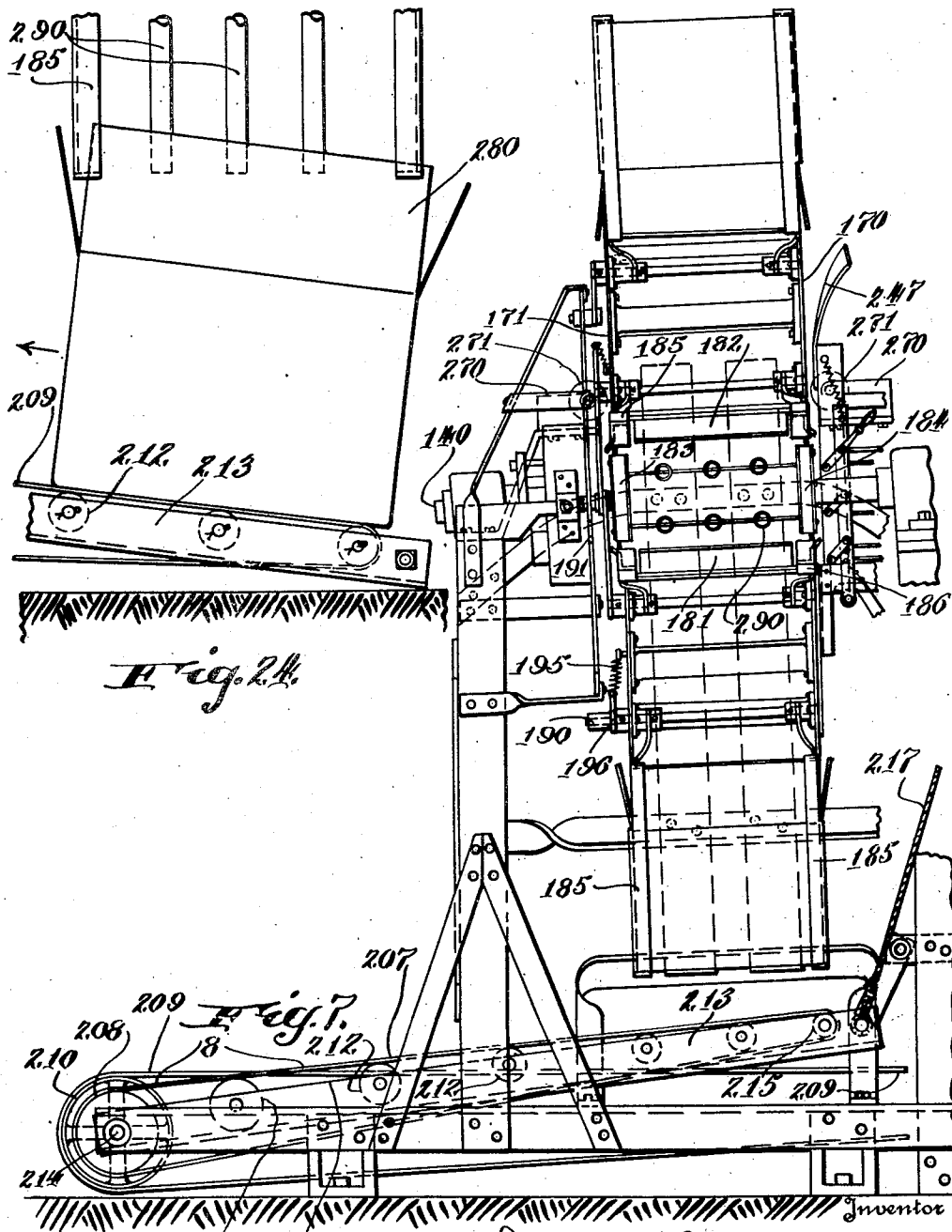
C. H. WILD

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CARTON FILLING MACHINE

Filed April 6, 1931

19 Sheets-Sheet 6



WITNESSES
J. H. H. H. H. H.

Charles H. Wild,
by Edwin J. H. H.

Attorney

March 5, 1935:

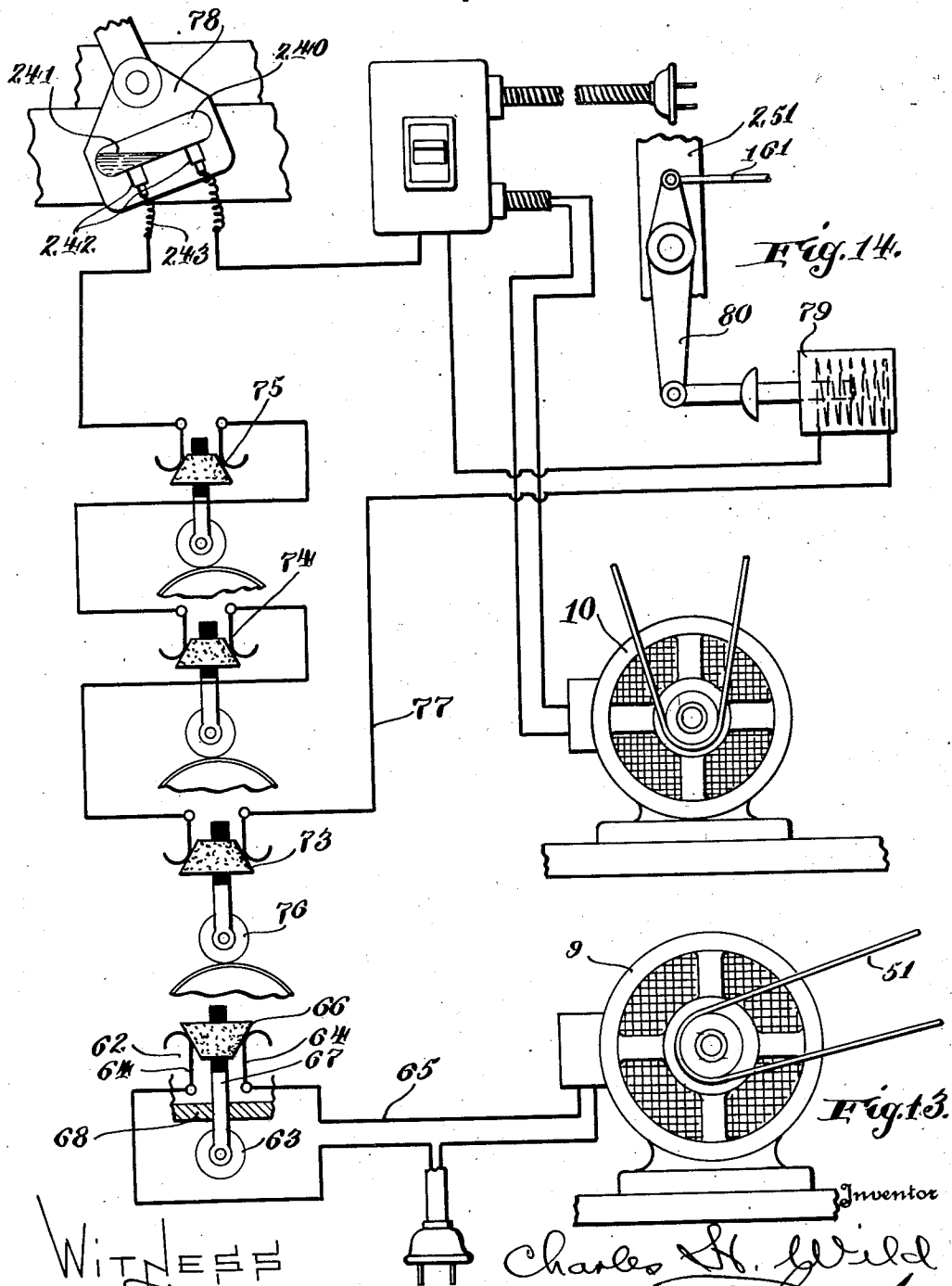
C. H. WILD

1,993,079

CARTON FILLING MACHINE

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19 Sheets-Sheet 7



WITNESS
T. K. Lamb.

 Inventor
Charles H. Wild
By Edwin F. Hamme

Attorney

March 5, 1935.

C. H. WILD

1,993,079

CARTON FILLING MACHINE

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19 Sheets-Sheet 8

Fig. 15.

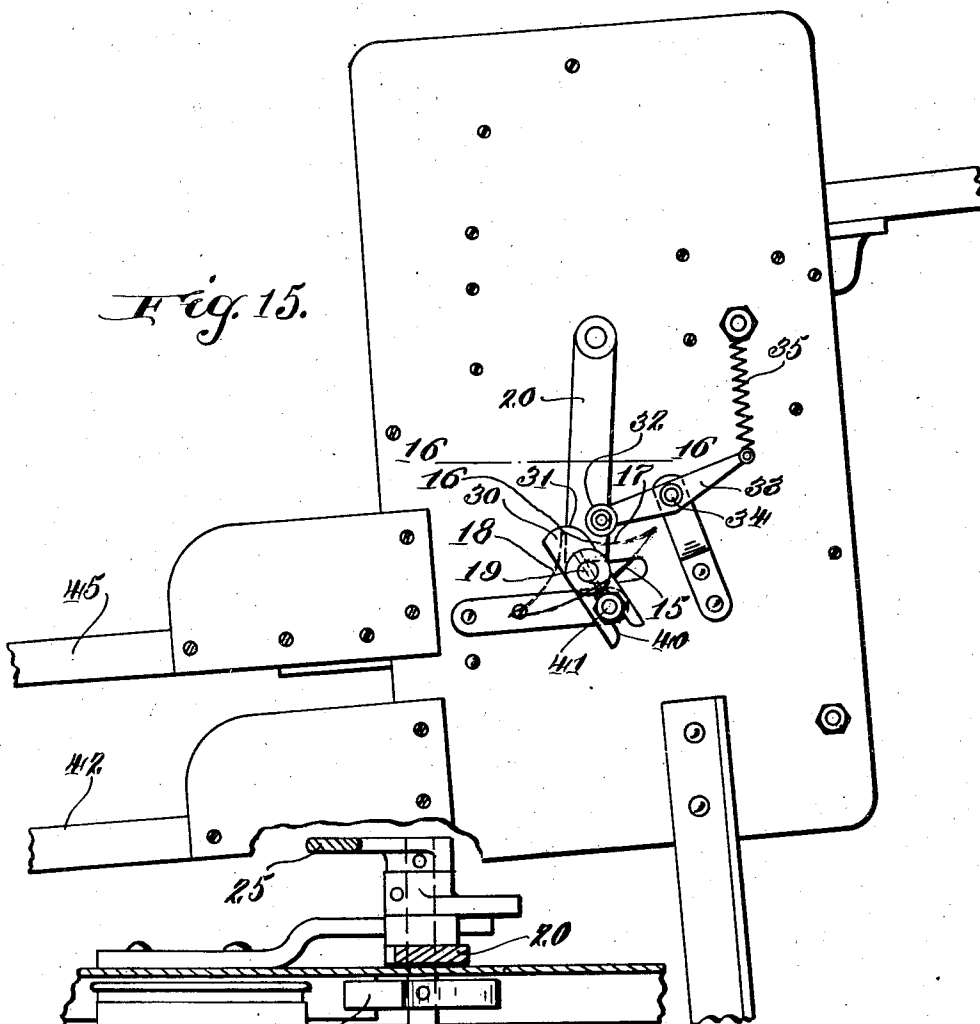
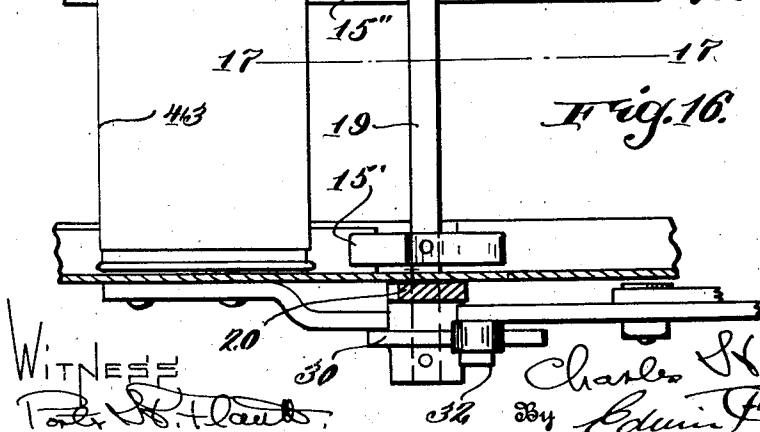


Fig. 16.



Inventor

Charles H. Wild

Edwin F. Hammele

Attorney

March 5, 1935.

C. H. WILD

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CARTON FILLING MACHINE

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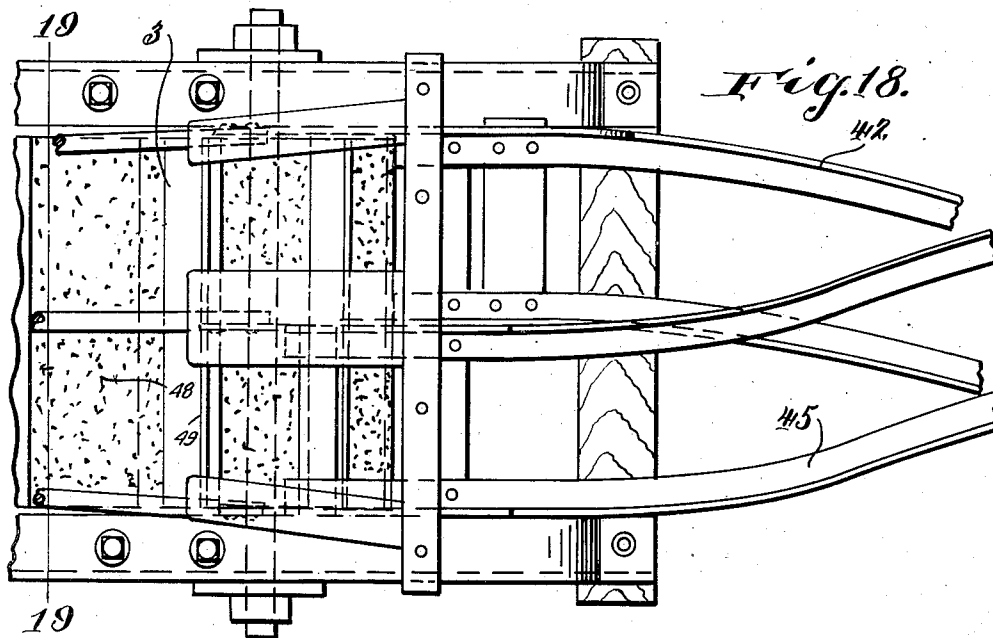


Fig. 18.

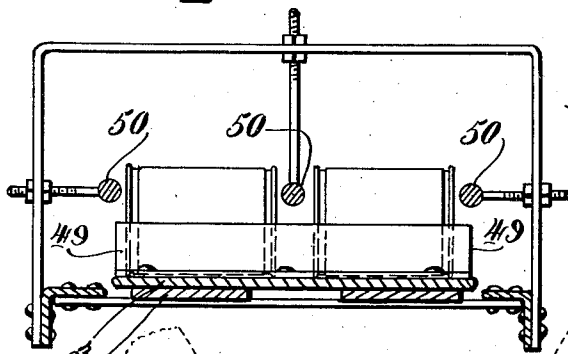


Fig. 19.

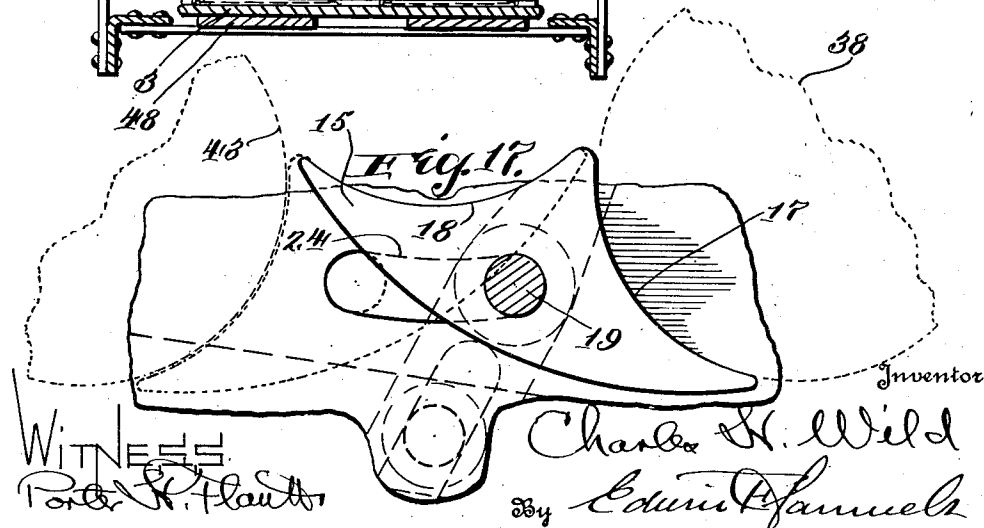


Fig. 17.

Inventor

Charles H. Wild

By Edwin P. Samuels

Attorney

WITNESSES
R. H. Hault

March 5, 1935.

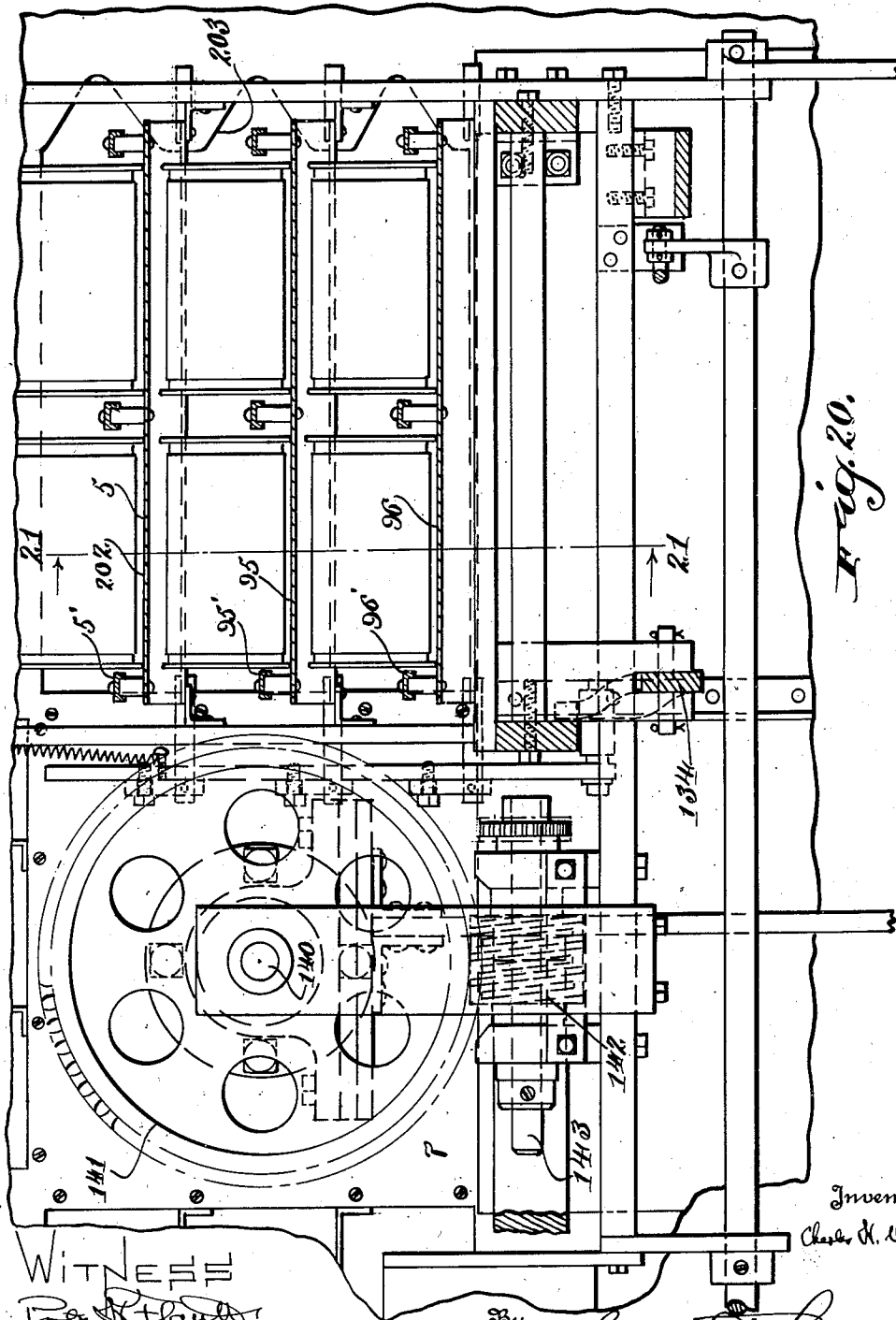
C. H. WILD

1,993,079

CARTON FILLING MACHINE

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19 Sheets-Sheet 10



Inventor

Charles H. Wild

WITNESSES

Per R. H. L. L.

By

Edmund H. L. L.
Attorney

March 5, 1935.

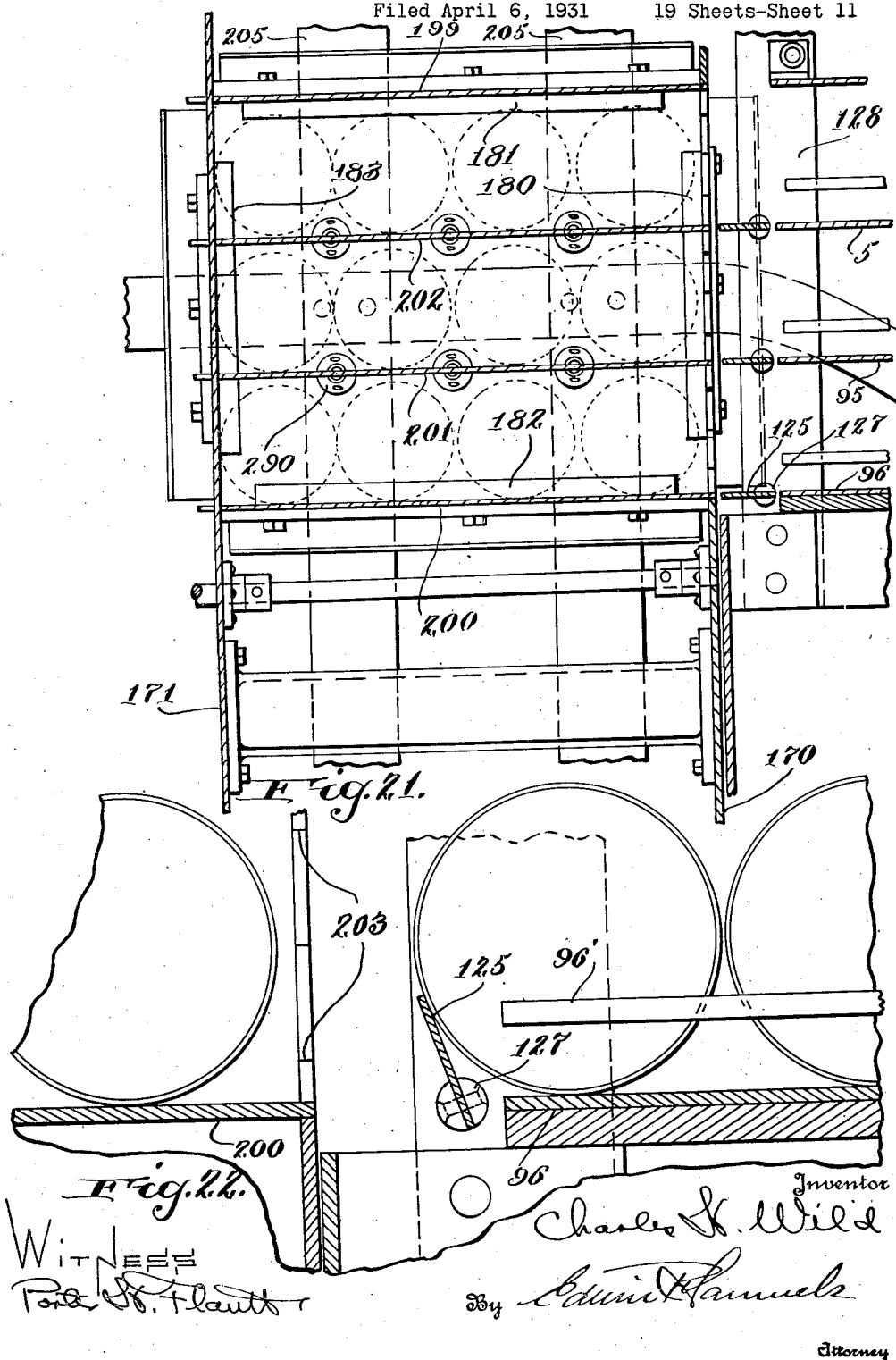
C. H. WILD

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CARTON FILLING MACHINE

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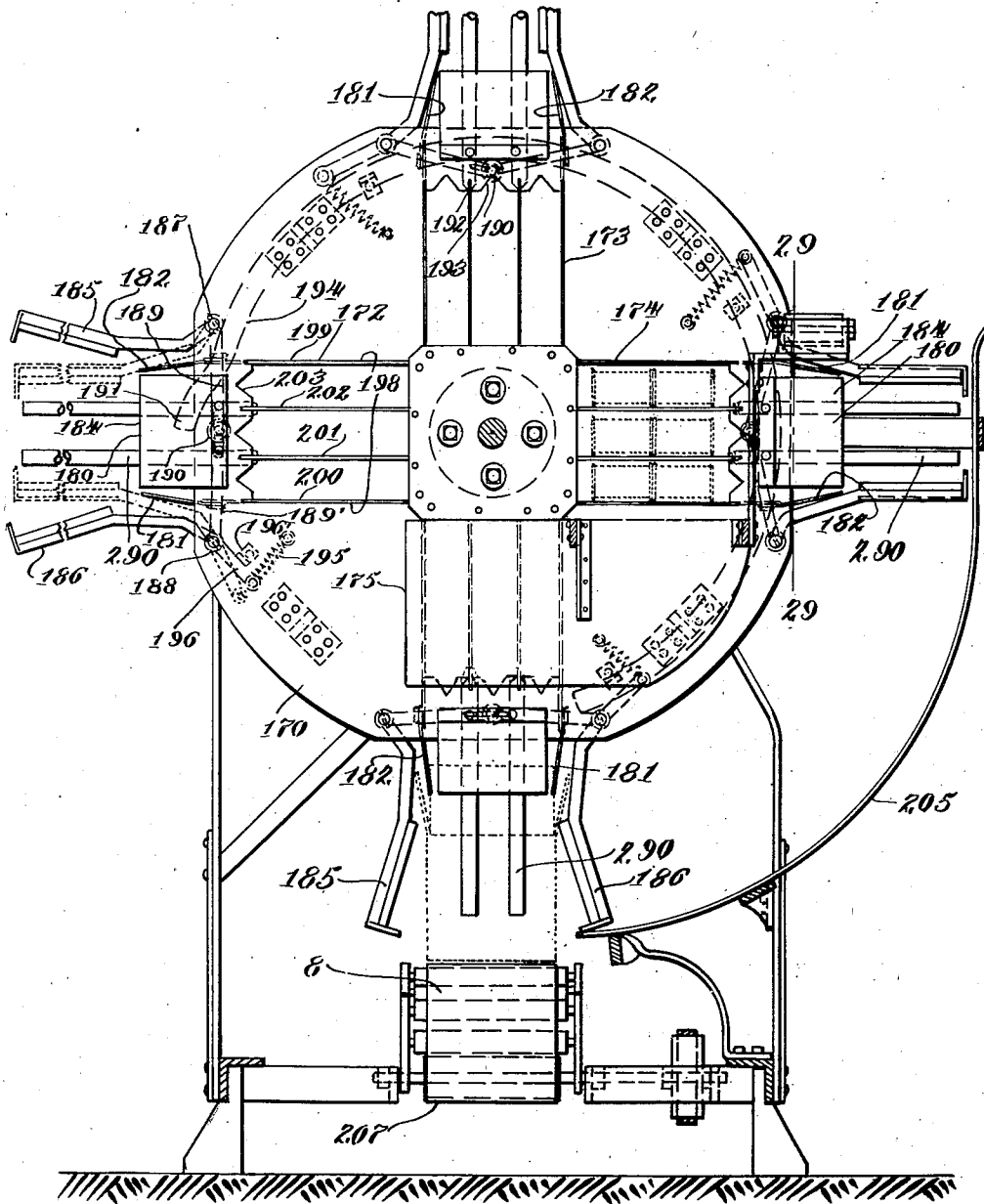


Fig. 23.

WITNESSES
R. H. H. H.

Inventor
Charles H. Wild
By E. H. H. H.

Attorney

March 5, 1935.

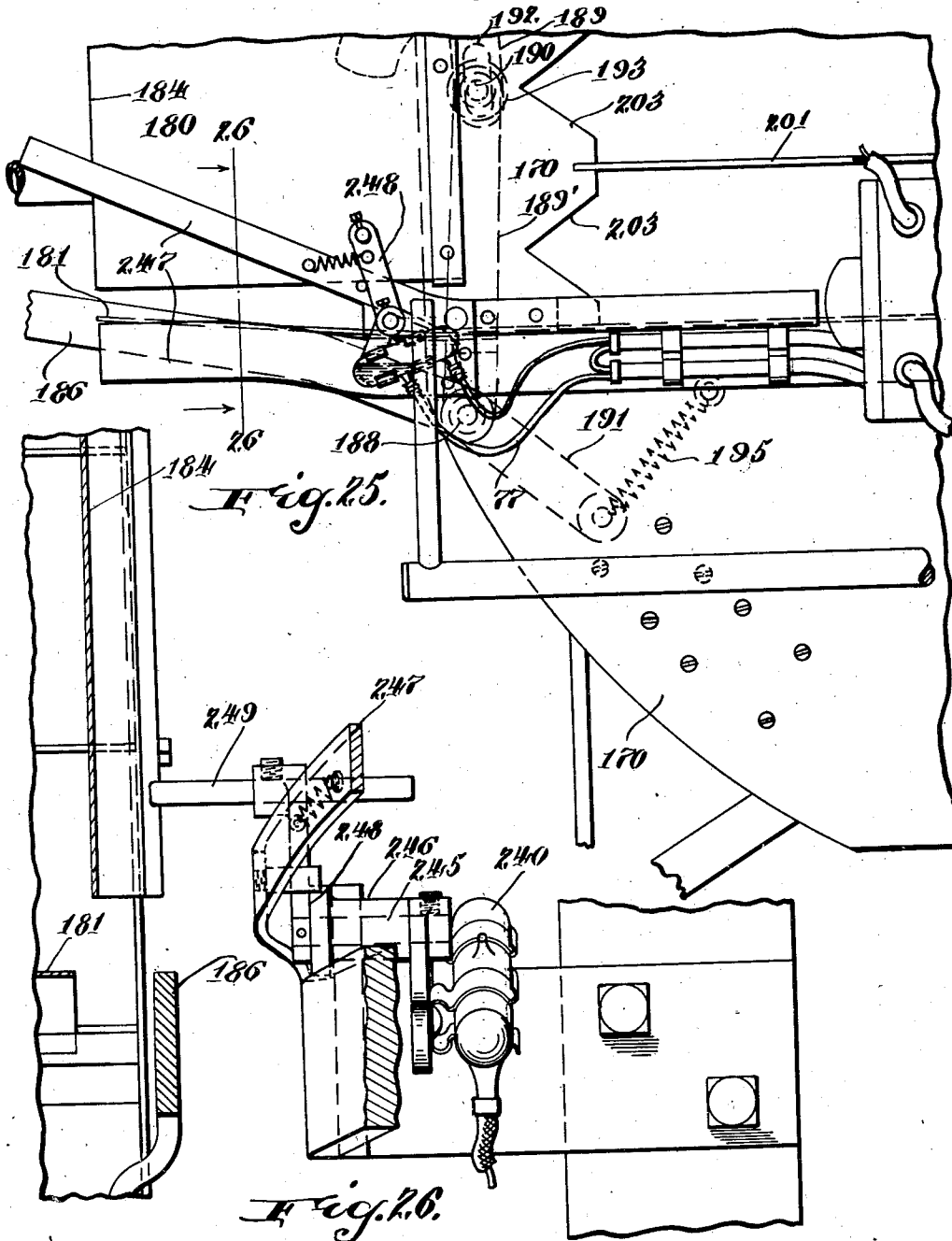
C. H. WILD

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CARTON FILLING MACHINE

Filed April 6, 1931

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WITNESS
R. H. F. Smith

Charles H. Wild INVENTOR
BY Edmund Hammele ATTORNEY

March 5, 1935.

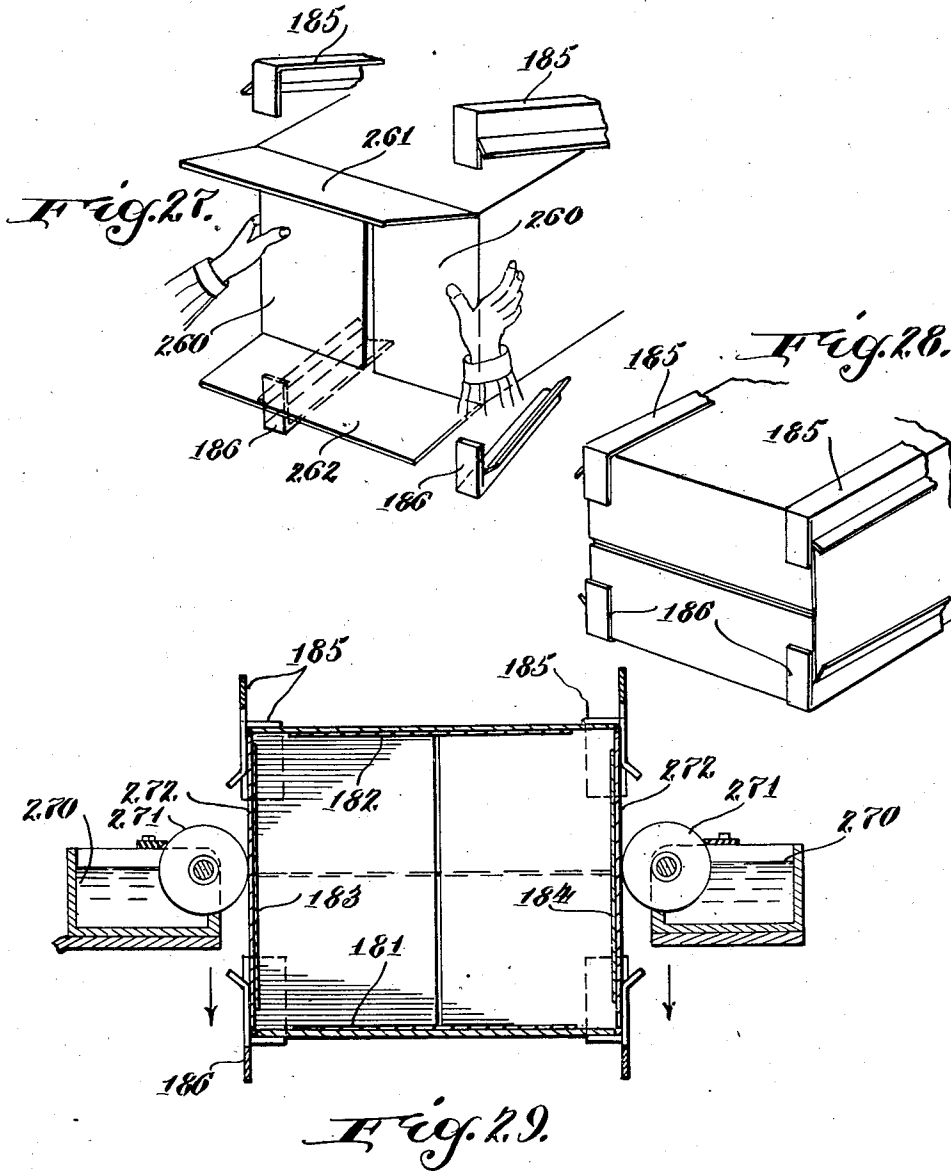
C. H. WILD

1,993,079

CARTON FILLING MACHINE

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WITNESS
R. W. A. Lewis

Inventor
Charles H. Wild
By Edwin H. Lammie
Attorney

March 5, 1935.

C. H. WILD

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CARTON FILLING MACHINE

Filed April 6, 1931

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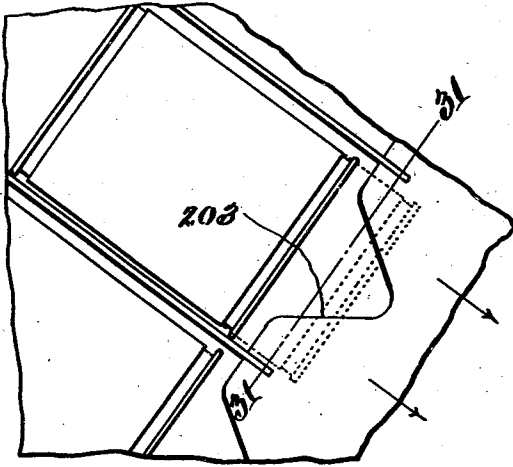


Fig. 30.

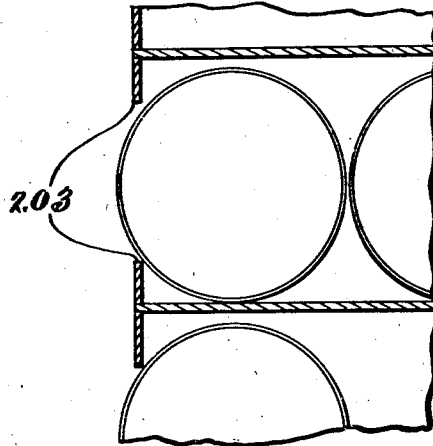


Fig. 31.

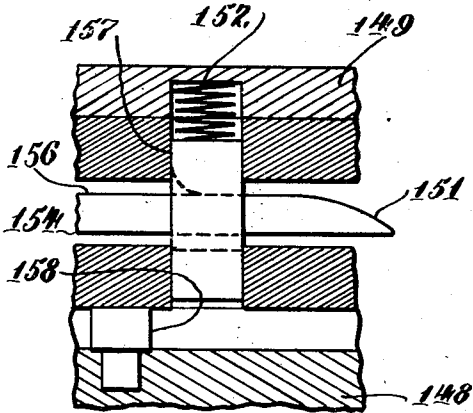


Fig. 32.

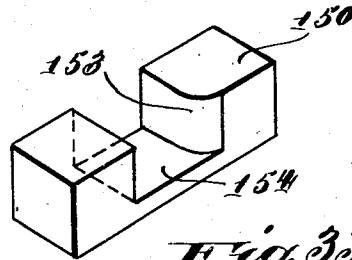


Fig. 33.

WITNESSES
T. H. H. H. H. H.

Inventor
Charles H. Wild
By Edmund C. C. C. C.

Attorney

March 5, 1935.

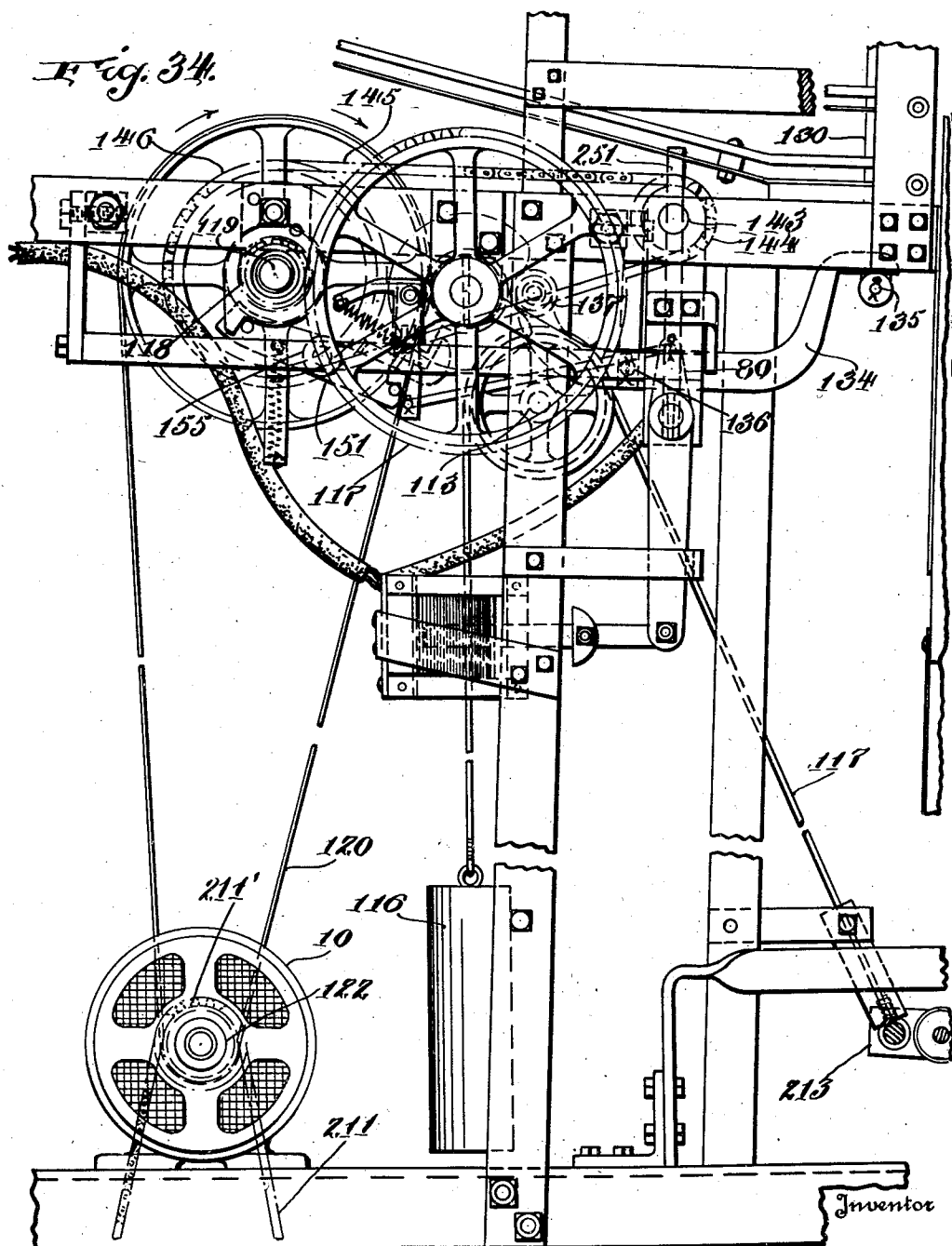
C. H. WILD

1,993,079

CARTON FILLING MACHINE

Filed April 6, 1931

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WITNESS
Robert H. Lamb

Charles H. Wild
By *Edwin H. Lamb*

Attorney

March 5, 1935.

C. H. WILD

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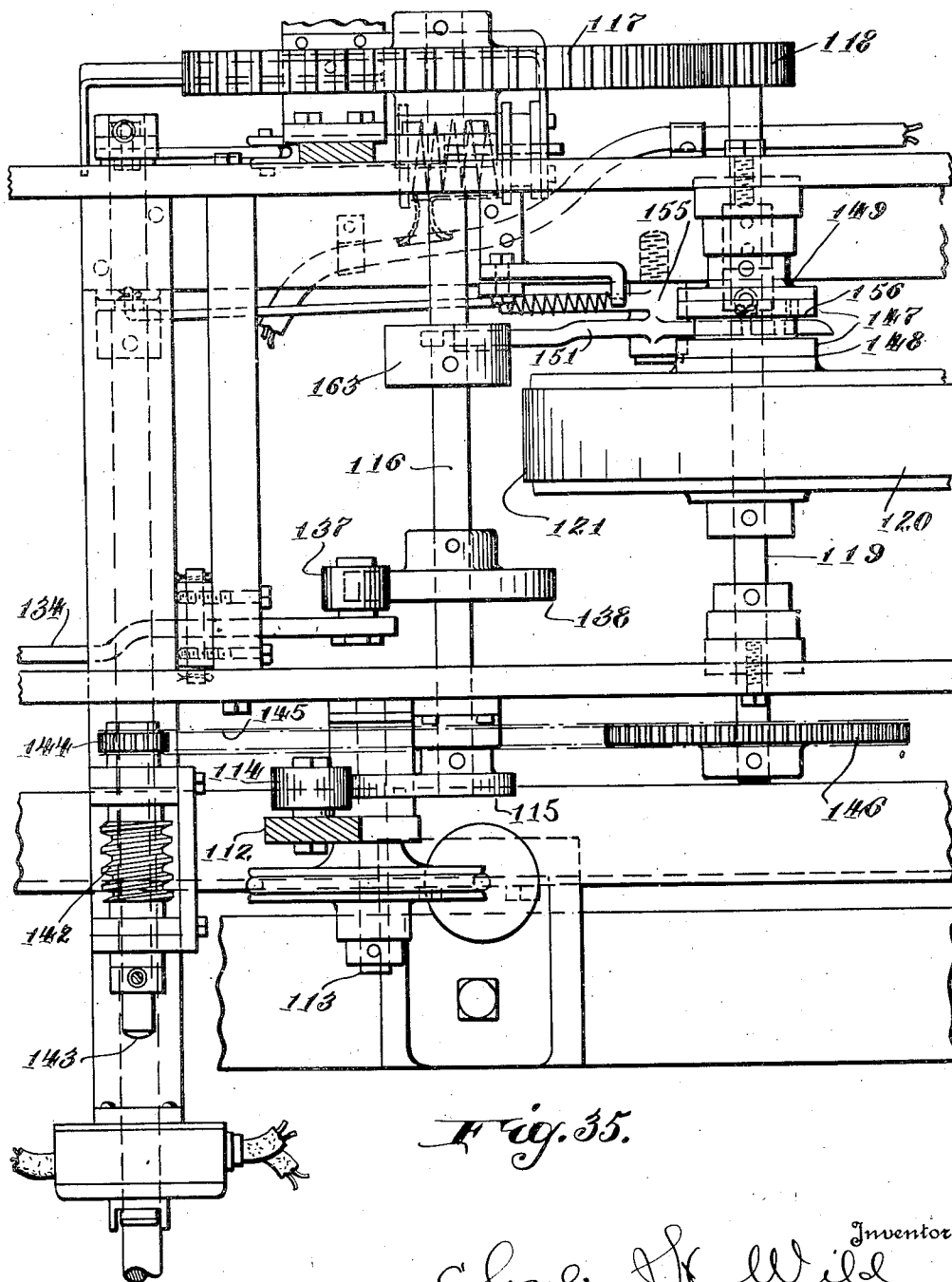


Fig. 35.

Charles H. Wild

Inventor

By *Edwin P. Smith*

Attorney

WITNESSES
John H. Smith

March 5, 1935.

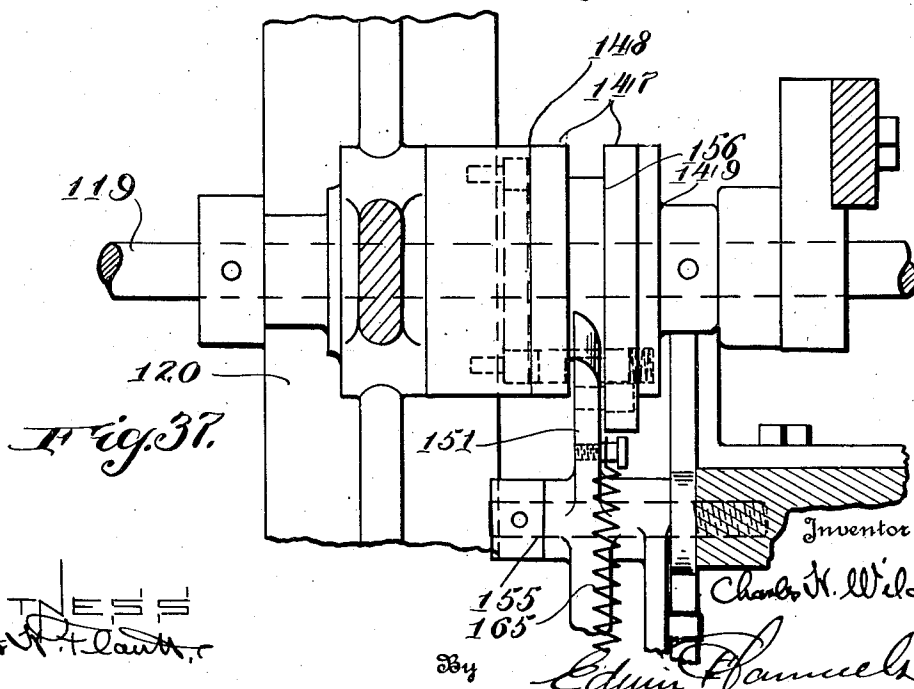
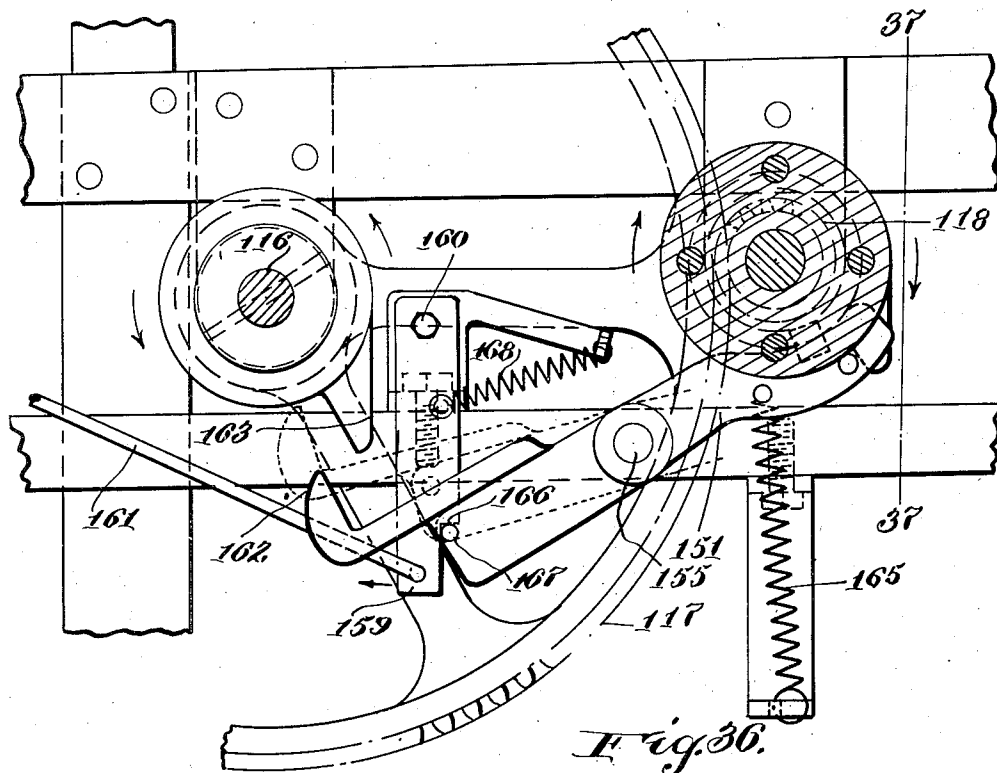
C. H. WILD

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CARTON FILLING MACHINE

Filed April 6, 1931

19 Sheets-Sheet 18



WITNESS
R. H. F. Lamb, Jr.

By

Edwin F. Daniels

Attorney

Inventor

Charles H. Wild

March 5, 1935.

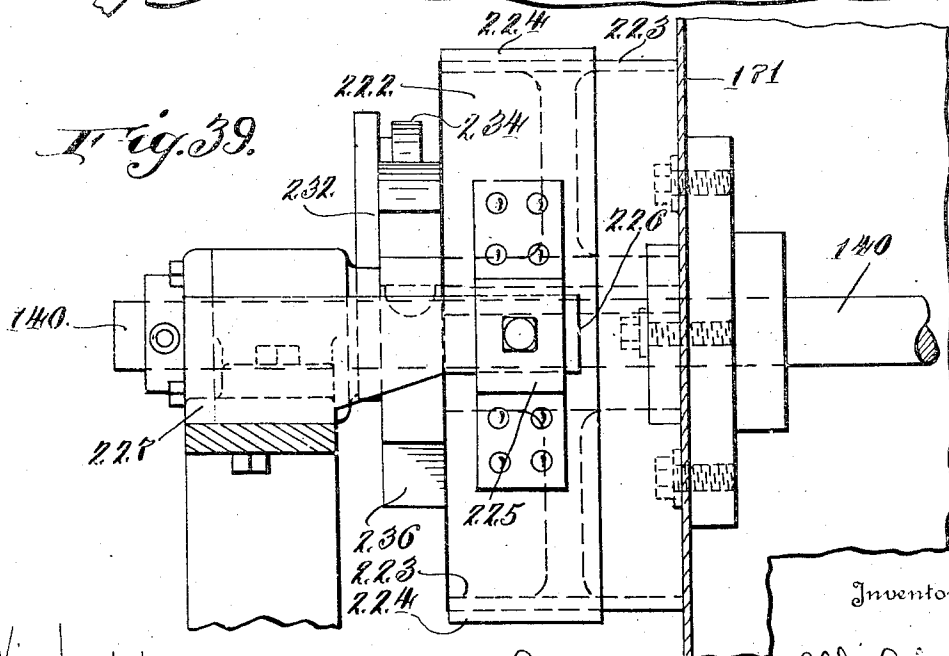
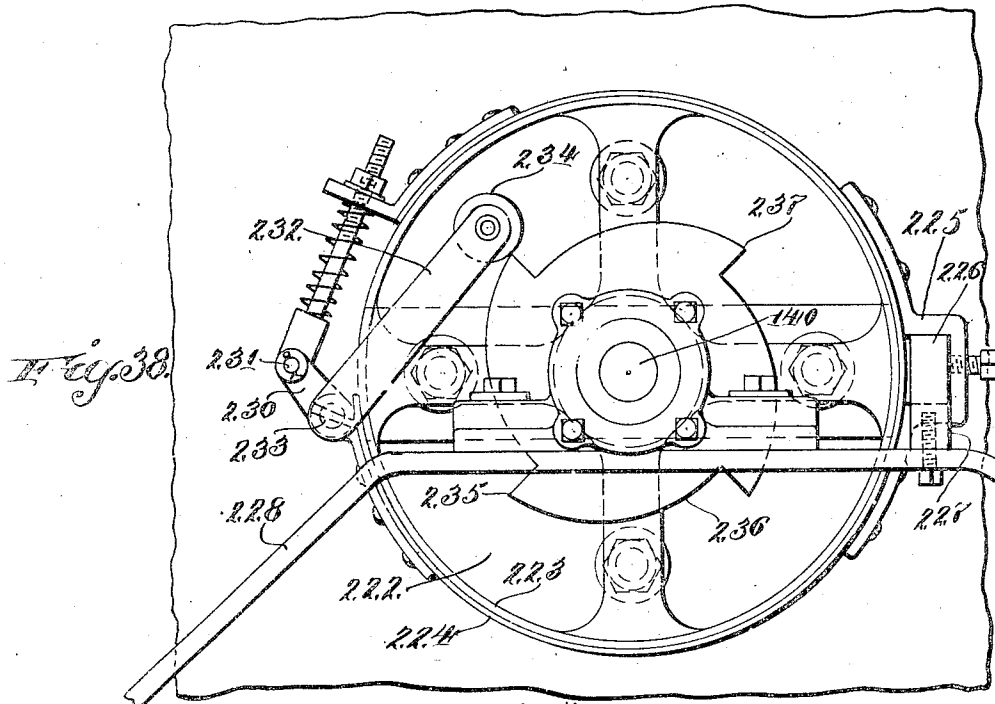
C. H. WILD

1,993,079

CARTON FILLING MACHINE

Filed April 6, 1931

19 Sheets-Sheet 19



WITNESS
Robert H. Lamb

Charles H. Wild
by Ernest H. Lamb

Inventor

Attorney

UNITED STATES PATENT OFFICE

1,993,079

CARTON FILLING MACHINE

Charles Henry Wild, Baltimore, Md., assignor to
Burt Machine Company, Incorporated, Balti-
more, Md., a corporation of Maryland

Application April 6, 1931, Serial No. 528,034

46 Claims. (Cl. 226—15)

The invention relates to a machine for filling cartons with cans. While numerous features of the machine are capable of general application, an important object of the present invention is to provide improved means whereby cans fed in a single line are assembled to form a load of cans comprising a plurality of layers and a plurality of tiers, so that the entire contents of a full carton are introduced therein at a single operation.

In assembling the cartons as above outlined and suggested, it has been found desirable to provide a plurality of ways, one over the other, in order to provide for arranging the load in a plurality of tiers, and in filling these ways successively, the cans are led at intervals downwardly from the main or top way. To this end the can supporting elements of the ways are formed with moveable sections which swing downwardly or are otherwise opened after the manner of a gate, transferring the proper number of cans from the upper to the respective lower ways whereby the cans are arranged in tiers.

In the preferred form of the machine, to prevent interference with the operation of these gates, the cans or other cylindrical packages are so controlled that after the machine is once primed with cans and ready for operation, a number of cans corresponding to a load or charge is segregated or grouped on the ways, or more particularly on the main or top way, and the group is released when and not until when it is required for the replenishment of the cans in the load-forming mechanism. By this method of operation the complete filling of the ways on the intake side of the load-forming enclosure and consequent interference with the operation of the gates is prevented.

The machine also includes, as a feature of the invention, a system of can stops for grouping and controlling the individual loads of cans as thus described, and a series of feelers and detectors whereby the introduction into a carton of a portion of a load, i. e., the delivery of partially filled cartons is prevented. The machine is also provided with a can feeler controlling the elevator and preventing the choking of the machine with cans.

The machine further relates to the provision of a rotary drum which receives the empty cartons and presents them in turn to the charge delivery mechanism, dropping each charge in turn into a corresponding carton, eliminating the necessity for a reciprocating plunger in the pre-

ferred form of the machine, though certain elements of the machine may be utilized in a plunger machine.

The machine in the preferred form in its operation receives corresponding loads or charges of cans in registration with the cartons, and swings each carton with the corresponding load into a position in which the load overlies the open end of the carton, whereby the load being duly released is introduced into the carton by gravity.

The invention also relates to a delivery means for the filled cartons whereby the cartons being released from the drum by gravity, are caught by a resiliently or yielding supported conveyor which meets the carton at the point of release from the drum and yields downwardly, gradually checking the momentum of the filled carton, so that the delivery is effected quietly and without shock or any possibility of injury to the containers.

The invention also includes braking means for the drum, whereby the speed of the drum as it approaches the end of each step in the rotation of the drum is gradually checked and the drum is brought to a stop in receiving and delivering position, and to improved means for holding and controlling the cartons in receiving relation to the drum, and to means for automatically coating the side flaps of the cartons with paste.

In the form of machine shown, the front or receiving end of the machine is provided with improved means for diverting the alternate cans forming two lines containing equal numbers of cans. These two lines of cans are presented to the shelves side by side, the cans of the respective lines being end to end, and they are thus deposited in the cartons as two layers, the cans being in the preferred arrangement of the invention first progressed immediately after dividing in two lines one over the other.

The dividing mechanism previously in use has consisted of a rocking vane or wedge which not infrequently failed to divert the cans, and at times injured some cans which landed on the point of the vane.

The dividing mechanism shown in connection with the machine of the invention is of an improved form in that it is more certain in its operation than those previously in use, its operation resulting in a uniform division of the cans which prevents accumulation of an excess of cans in either line with a resulting unequal delivery of the load and consequent stopping of the machine. This result is attained by increasing

the motion of the vane beyond mere rocking, and transferring the vane or dividing member between each two successive operations from one position to the other in addition to rocking it, so that it is definitely and positively and invariably shifted from one side of the path of the descending cans to the other, so that there can be no possible failure of the apparatus to deflect the alternate cans into the proper paths, and further, so that there can be no impact of any can on the point of the dividing vane whereby the can might be injured as to its appearance or even caused to leak and result not only in the loss of a single can but in disfiguring the entire contents of a carton.

The improved form of machine also includes means whereby the feeding of cans to the load-forming mechanism is controlled by the insertion or placing of the cartons on the drum to receive the cans, so that in the automatic operation of the machine it is impossible to discharge the groups of cans otherwise than into an empty carton ready on the machine to receive them, and this carton control co-operates with the grouping mechanism and detectors, so that the carton filling elements of the machine proper cannot be operated either without a carton ready in position to receive the cans or without a full and proper load of cans to fill the carton.

The invention also relates to numerous features and details of the construction thus outlined, which are, as is well known to this inventor, capable of more general application, though they are disclosed in the particular type of carton-filling machine, in connection with which the inventor of this machine has developed them.

In the accompanying drawings I have illustrated a machine for filling cartons with cans or other cylindrical or rollable packages embodying the features of my invention in the preferred form.

In the drawings:

Figure 1 is a fragmentary front elevation on a reduced scale of the entire machine also including a labelling machine in feeding relation thereto. Figure 2 is a fragmentary section taken in the vertical plane of the path of the cans showing the intake end of the machine and particularly the can separator.

Figure 3 is a fragmentary rear elevation showing the separator mechanism as it appears from the outside of the machine.

Figure 4 is a fragmentary front elevation showing the upper end of the can elevator and the canways leading from the elevator in the direction of feed to and beyond the first detector switch.

Figure 5 is a fragmentary front view continuous with Figure 4 and showing the central portion of the can track or ways beginning at the right where Figure 4 terminates.

Figure 6 is a fragmentary front elevation beginning at the right where Figure 5 terminates and including a fragment of the drum.

Figure 7 is a front elevation of the drum, the entire machine being shown in front elevation in Figures 4, 5, 6 and 7.

Figure 8 is a top plan view of the portion of the machine adjacent the grouping mechanism or stops and deflectors.

Figure 9 is a fragmentary elevation partially broken away showing the details of one of the detector switches.

Figure 10 is a horizontal section on the line 10, 10 in Figure 9.

Figure 11 is a section on the line 11, 11 in Figure 4.

Figure 12 is a top plan view of the can track and ways showing two detector switches which are just to the right of the first cam stop in Figure 5 but arranged in a slightly different manner.

Figure 13 is a circuit diagram showing the can elevator motor and circuit including the detector switch.

Figure 14 is a circuit diagram showing the detector switches, the automatic switch, the solenoid and the motor for the caser proper, meaning the load-forming portion of the machine to which the cans are fed by the elevator and by which the formed loads are presented to the rotary drum and the drum itself by which the cans are finally delivered to the cartons.

Figure 15 is an elevation of the intake end of the machine showing the external portion of the can divider mechanism.

Figure 16 is a horizontal section on the line 16, 16 in Figure 15.

Figure 17 is a section on the line 17, 17 in Figure 16 showing the can divider member on an enlarged scale as compared to Figure 16.

Figure 18 is a fragmentary plan of the ways beyond the can divider where the two tracks between which the cans have been divided are brought into position side by side, whereby the cans having been fed singly are arranged in two lines of cans side by side.

Figure 19 is a section on the line 19, 19 in Figure 18.

Figure 20 is a transverse section through the load forming ways just to the right of the rotary drum in Figure 1, looking to the left in said figure.

Figure 21 is a section on the line 21, 21 in Figure 20.

Figure 22 is a fragmentary elevation on an enlarged scale of one of the can separator members in Figure 21, showing the end portion of the adjacent way or shelf, the cans thereon, and the neighboring portion of the rotary drum with the corresponding shelf and a can thereon.

Figure 23 is an elevation of the rotary drum looking from the right in Figure 1, the front of the stationary frame being removed to avoid confusion.

Figure 24 is a fragmentary elevation of the delivery conveyor in depressed position showing a filled carton thereon just delivered from the drum.

Figure 25 shows a fragment of the drum at the forward side thereof, the same being viewed from the right in Figure 1.

Figure 26 is a section on the line 26, 26 in Figure 25.

Figures 27 and 28 are views of the carton engaging clasps or fingers showing a carton in Figure 27, being placed in position thereon by hand and in Figure 28 the carton is fully engaged ready to be carried by the drum to receiving position.

Figure 29 is a section on the line 29, 29 in Figure 23 taken through the carton flaps and showing the operation of the paste coating rollers on the side flaps of the carton.

Figure 30 is a detail of the drum looking at the same in elevation from the right in Figure 1, and showing a portion of a load of cans swinging downwardly toward delivery position in which they are projected into the cartons.

Figure 31 is a section on the line 31, 31 in Figure 30.

Figure 32 is a section through the periodic clutch on the plane of the releasing dog.

Figure 33 is a perspective view of the clutch bolt.

Figure 34 is a rear elevation of the machine showing the cam shaft and periodic clutch and the motor which drives the drum and adjacent mechanisms of the caser.

Figure 35 is a plan view of the cam shaft on which are mounted the cams which operates the periodic clutch, the can separator and the gates and stops, respectively.

Figure 36 is a detail view of the periodic clutch mechanism, including the tripping cam, looking from the front.

Figure 37 is a section on the line 37, 37 in Figure 36.

Figure 38 is an elevation looking from the left at the brake mechanism which checks the rotation of the drum toward the end of each quarter revolution.

Figure 39 is an elevation of the same looking from the front.

Referring to the drawings by numerals, each of which is used to indicate the same or similar parts in the different figures, Figure 1 which is a front view taken from the side where the operator stands, shows more or less diagrammatically and on a reduced scale, a machine embodying the various subjects of invention in the preferred form. This figure shows a labelling machine 1 from which the cans are delivered to the dividing mechanism 2, from which they are in turn delivered to the elevator 3, which delivers them to the main way 4 of the caser which is continuous with the top way 5 of the load-forming enclosure 6, by which they are delivered in turn to the rotary drum 7 which receives the charges or formed loads of cans, and inserts the formed loads or charges of cans in the corresponding cartons, delivering the cartons when filled to the yielding delivery conveyor 8.

In the preferred form of the invention shown the elevator 3 is driven by a rotary motor 9 which is most conveniently in the form of an electric motor, and what may be termed the casing mechanism proper is driven by a separate rotary motor also shown in the form of an electric motor 10. The grouping mechanism consisting of co-operating can stops and detectors whereby groups of cans fed periodically to the case-forming mechanism are limited to the number of cans comprising a single load or to a number corresponding to the load is indicated by reference character 11.

Referring now to the dividing mechanism shown in Figures 2, 3, 15 and 16, this dividing mechanism consists in the form of the invention shown of a dividing member or vane 15 shown in the form of a double obtuse wedge or two wedges 15', 15'' spaced apart to engage the cylindrical sides of the cans near the ends. The apex 16 of each said member or of said vane is turned upwardly and the upper converging surfaces 17 and 18 of the vane or wedges are shown as concave, so that they may fit or substantially fit the curvature of the cans.

Referring now to Figure 16, which is a horizontal section taken above the dividing vane member 15 and looking down upon it, it will be noted that the two wedges 15' and 15'' are placed one at each side of the path of the cans, as aforesaid, so that they engage the peripheral surfaces

of the cans, 38, 43, at the ends only. These wedges 15' and 15'' are connected by and secured to a transverse shaft 19, see particularly Figures 2 and 16. This shaft is in turn supported on links or swinging arms 20 pivotally mounted above the wedge in the side plates 21 of the dividing mechanism at 22, so that the wedges are in effect mounted to swing from the bearings or studs 22 in the casing, the shaft 19 passing through and reciprocating in a slot 24 in the casing or side plates 21, though this slot need have no guiding function.

The vane or dividing member 15 is further controlled in its operation by a dividing control arm 25 secured to the shaft 19 and shown as located at the back of the casing 21, see Figure 3, which is a back view. This control arm 25 projects upwardly above the shaft 19 in the direction of the vertex 16 of the vane 15, and at its upper end it is connected to a tension spring 26 which extends downwardly well below the shaft 19, being normally under tension and connected at its lower end at 27 to the side plate 21, preferably in line with the central position of the swinging arms 20, so that it tends to hold the arm 25 in either one of its extreme positions to the right or to the left of the shaft 19, the spring being elongated in its central position in which the control arm 25 is in alignment with the swinging arms 20. The spring tension thus serves whenever the arm 25 passes the central position in either direction to swing the arm to the extreme position in that direction.

The arm 25 is also extended below the shaft 19 at 25', and its lower end is slotted at 29 in the direction of its length, the slot being engaged by a stationary pin 30 mounted on a bracket 31 secured to the casing. This furnishes a guiding means for the arm 25, which in connection with the links or swinging arms 20, limits its extreme positions, though these positions might also be limited by the slot 24, and assists in swinging the vane.

The disclosure includes in Figure 15 additional means which may be treated as alternative with the means shown in Figure 3 or co-operating therewith to control the operation of the divider 15. This means consists of a cam dog 30 secured to the shaft 19 shown on the front end of the same outside the casing. This dog projects upwardly in the direction of the point of the divider 15, as does the arm 25, and is provided at its upper end with a cam surface 31 which co-operates with a cam roller 32 carried by a suitable rocking lever 33, the centre or an intermediate point on the lever being pivoted at 34 on a suitable bracket and the end opposite to the roller 32 being given an upward tendency by a spring 35. This tendency has the effect of keeping the roller 32 in contact with or in the path of the cam surface 31. As shown in Figure 15, the spring 35 being fully contracted, the roller 32 rests in the path of the cam. The dog 30 is in the form of a lever, having its lower end slotted longitudinally at 40 to engage a stationary pin 41 on a suitable bracket.

In operation the cans being introduced in suitable succession at the intake end of the machine by the ways 36, they are dropped successively through the downwardly disposed intake opening 37, coming in contact as they descend with the vane or dividing member 15. In the position shown, a can 43 has just dropped on the left or forward side of the divider and is rolling off of the same, leaving it in its lefthand position. The next can 38 will then contact the divider in the

position shown, striking the concave surfaces 17 of the two wedge members 15' and 15". The impact of the can tends to rock the vane to the right, swinging the cam dog 30 and/or the control arm 25 to the righthand position, as indicated in Figures 3 and 15. Under these circumstances the forked end of the control lever at 25' and/or the slotted end of the dog 30, will swing to the left as seen from the front, and the upper end of lever 25 and of dog 30 will swing to the right in Figures 1, 2, 15 and 16, also swinging links 20 to the right carrying the vane 15 and shaft 19 with them. The path of the vane will be determined by the links 20 and the swinging of the vane is assisted or completed and determined by the rocking of the control arm 25 and/or the cam dog 30, the motion of one said member being checked and assisted by the spring 26, and of the other by the spring 35 and the roller 32. In both instances the result is substantially the same, the motion of the divider vane being first initiated and the parts being moved through the central position by the impact of the can. The movement is at first checked and then accelerated by the action of the springs, the divider being finally held at the end of its righthand path by the springs 26 and 35. The divider thus has a marked and definite translatory motion in addition to the rocking motion, carrying with it the can 38 which is thus swung to the right and discharged downwardly into the lower path 41 which leads to the lower dividing way 42, the first can 43 having been delivered to the left by way of the upper path 44 on the upper dividing way 45.

It will be easily understood that in this way the point of the vane is carried by each can completely across and beyond the path of the cans, and that the next can dropping through the intake opening 37 will contact the concave surfaces 18 at the left of the vane, swinging the vane to the left and causing it to shift to the left.

The translatory motion of the vane whereby it is transferred bodily with each can which it engages from one position to the other, giving a wide and definite separation of the cans thus directed to the different paths, which separation is thus effected uniformly without intermission or variation during the presentation of cans, and the consequent uniform division of the cans and avoidance of contact of the cans with the point 16 of the vane eliminating injury to the cans, are important improvements in this portion of the machine.

Referring now particularly to Figures 18 and 19, it will be noted that the divider ways 42 and 45 together deliver two lines of layers of cans side by side to the elevator 3 which consists of a chain or belt 48 having transverse vanes 49 for engaging the cans to advance the cans and prevent backward motion. The elevator is also provided with suitable can guides 50 at each side and at the centre for handling two layers or lines of cans side by side. This elevator 3 with its conveyor 48 is operated by the motor 9 already specified, or in any suitable manner through and by way of a suitable belt or chain 51 driven by a small pulley 52 on the motor shaft, the belt passing over and engaging a pulley 53 adjacent the upper end of the elevator, which pulley carries and drives a pinion 54 which meshes with a large gear 55 which carries and drives the elevator pulley 56.

The elevator 3 delivers at its upper end to the main way 4 of the caser which is provided immediately adjacent the delivery end of the ele-

vator with a yielding gate 57 consisting of a section of the way pivotally mounted at 58 and provided with a depending arm 59 to the lower end of which is connected a tension spring 60 which is led to the right, i. e., oppositely to the direction of feed and secured to the frame of the machine at 61. It will be understood that the tension of the spring which is comparatively slight, tends to hold the gate in supporting or closed position, but when and if there is a tendency of a can to jam between the conveyor and the elevator, or a can becomes jammed and possibly slightly injured, it is immediately discarded by the downward swing of the gate, due to the yielding of the light tension spring, which is sufficient only to support the cans under normal conditions.

From the gate 57 the cans advance along the main way 4, passing a feeler or detector switch shown at 62 in Figure 4. This switch is provided at its lower end with a can feeler in the form of a roller 63 which is adapted to engage the top surfaces of the cans. In the position shown, the switch has been opened by contact with a can. Such a switch is shown in detail and more or less diagrammatically in Figure 13, which also includes a diagram of the elevator motor circuit. The switch includes two spaced contacts 64 included in the elevator motor circuit 65, and a moving switch member 66 shown in the form of a wedge which is normally supported by and between the contact members 64 spanning the same. This moving contact member 66 is provided with a depending shank 67 which is duly insulated and carries the can engaging roller 63, the shank 67 being guided in any suitable and convenient manner, as by means of guide bearings 68 which may be also of insulating material.

This switch 62, as will be noted from the diagram, is opened by contact of the roller 63 with a stationary can beneath the switch member, and the switch is so located that whenever the main can way 4 of the casing machine is filled up to the switch, the can elevator motor 9 is thrown out of circuit and the feeding of cans is stopped.

Figure 11 which is a cross-section on the line 11, 11, Figure 4, shows the main way 4 with side guides 69, centre guides 70 and top guide 71 which serves as a support for the switch 62 and is discontinued beyond the switch, there being no further tendency of the cans to leave the way on account of the sudden drop from the elevator or for any other reason.

Beyond the elevator stop switch 62, in the direction of feed, the main way 4 is provided with two detector switches 73 and 74 immediately beyond which is the grouping mechanism 11, and at the far end of the grouping mechanism in the direction of feed is still another can detector switch 75. Of these the second and third are on the side of the machine adjacent the operator, i. e., at the front, so as to engage the line of cans at the front, and the first in the direction of feed, i. e., the switch 73, is on the far side of the machine engaging the further line of cans. Figures 5 and 12 show switches 73 and 74 in slightly different relation illustrating the fact that their location may be varied to suit conditions and the will of the designer. These switches 73, 74 and 75 are shown diagrammatically in the circuit plan, Figure 14, which includes solenoid 79. While the switch 62 is normally closed, being opened by contact with a can so as to prevent feeding when the cans accumulate on the main way 4 up to this point the detector switches 73, 74 and 75 are nor-

mally open, being closed tending to complete the circuit when the roller 76 which is an element of each of the detector switches 73, 74 and 75 is engaged and raised by contact with a can on the ways beneath the switch. In other words, the solenoid circuit 77 is normally open and is only permitted to be completed or closed to energize the solenoid 79 and throw in the periodic clutch to be described, to operate the caser when there are sufficient cans in or on the main way 4 to close all three of these detector switches. The caser motor circuit is indicated by reference character 68. This motor runs continuously during the working hours of the machine.

As will be more fully hereinafter described, the solenoid circuit also includes a switch 78, also normally open, to be operated or closed by contact with an empty carton placed in filling position on the drum, and the solenoid 79 which operates the periodic clutch lever 80, placing the machine in operation for a single cycle or period of operation whenever it is suitably supplied with cans and a carton is placed in filling position on the drum as hereinafter described. This period of operation constitutes a quarter turn of the drum or a corresponding turn depending upon the number of delivery units. During this time a charge is formed on the ways and the grouping mechanism is returned to accumulating position, as in Figure 5.

Referring again to the switches 73, 74 and 75, Figures 9 and 10 show a switch of this type in detail. Each said switch as shown includes a moving contact member 81 carried on a suitable vertically sliding guide rod 82 which is mounted to slide in suitable guide bearings 83 and 84 in the switch casing or housing 85. This guide rod 82 carries at its lower end a can feeler roller 86 to be contacted by the cans and raised as the cans pass beneath it, and held permanently in raised position when a can stops in operative relation thereto, as best shown in Figure 5, it being understood that the parts are spaced in correspondence with the diameter of the cans, so that in normal operation when the cans are properly grouped on the main way 4 ready for feeding to the load forming mechanism, there is a can directly beneath each of the caser switches 73, 74 and 75.

The construction, Figures 9 and 10, further includes stationary spaced contacts 87 suitably located in the path of the moving contact member 81, and adapted to be spanned by the same, so that the switch is closed when this contact member is raised by engagement of a can with the roller 86. These stationary contact members 87 are secured to binding posts 88 included in the circuit 77 of the caser motor, and the switch casing 85 is suitably supported on the frame of the machine by means of a bracket 89.

The grouping mechanism 11, see particularly Figures 5 and 6, consists of vertically and oppositely swinging can stop members 91 and 92 spaced apart as shown. This mechanism may also include detector means for insuring proper grouping of the cans. The can stop 92 at the delivery end of the group is lowered into the path of the cans during the formation of the group to be fed into the load-forming enclosure, this stop being raised to release the group of cans, the can stop 91 at the intake end of the group being lowered to prevent the admission of additional cans while the group which preferably constitutes a single charge for the caser is fed forward. The stop 92 is then lowered to accumu-

late a new group, the stop 91 being raised to admit the cans. The load-forming mechanism, broadly considered, includes drop gates 93 and 94 whereby predetermined numbers of the cans in the group on the main way 4 are passed downwardly to the lower ways or shelves 95 and 96 of the load forming device, and deflectors 97 and 98 which simultaneously with the opening of the gates 93 and 94 swing downwardly into the path of the cans, eliminating any possibility that the cans intended to be passed downwardly through the gates may pass over the gaps in the ways provided by the opening of the gates, changing the intended arrangement of the charge.

The grouping mechanism and the load-forming gates and shields 91, 92, 93, 94, 97, 98 may be operated simultaneously or in the necessary sequence in any preferred manner. In the form of the invention shown, these members are moved simultaneously or nearly so, and in the proper relation and co-ordination by means of a single chain or belt 99. To this end the first drop gate 93 is rigidly connected to the shaft of sprocket 100 mounted in suitable bearings on the frame of the machine adjacent to the way 4 and on an axis transverse to the same. This sprocket is engaged by the sprocket chain 99. The upper can stop 91 which is at the upper end of the group and first encountered by the cans in moving from right to left in the direction of feed, is carried by the sprocket 101, mounted on a bracket 11' and engaged by chain 99. This sprocket carries on its hub a pinion 102 which meshes with a pinion 103 which carries the deflector 97 which extends to the left in the direction of the feed and overlies the gate 93. The arrangement of the pinions 102 and 103 and the sprocket 101 permits the deflector 97 to move downward to the left as the can stop 91 moves downward to the right into the path of the cans, the gate 93 being opened at the same time, and the reverse operations are similarly timed. The deflector 98 is secured to the hub of a sprocket 104 engaged and operated by the chain 99. The lower can stop 92 at the forward or delivery end of the group of cans to be fed to the load forming mechanism is secured to a sprocket 105 also engaged and operated by the chain 99. From this sprocket the chain is led backwardly contrary to the direction of feed and around a sprocket 106, from which point it is led downwardly and in the direction of feed, being secured at its end to a pull rod 107 which may be operated in any suitable manner, preferably as hereinafter described. U-shaped members 99' pivotally connected to the sprockets 100, 101, etc. and straddling the chain 99, prevent its displacement from operative engagement with the sprockets.

The chain 99 is connected at its opposite end to a tension spring 108 which is connected by means of a bracket 109 to a fixed point on the machine frame, permitting the chain to yield in the direction of the pull of the rod 107 and to be drawn backwardly by the spring 108. The chain also passes over an idler pinion 110 on the frame of the machine and over a pinion 111 to which the gate 94 is secured at its pivotal end, swinging downwardly therefrom when the chain is operated as hereinafter described, and simultaneously with the operation of the other gate 93 and particularly with deflector 98, the gates being opened when stop 91 is in the path of the cans.

The pull rod 107 is led downwardly and to the left, i. e., in the direction of the feed, see Figure 6, being pivotally connected at its lower

end to a swinging arm 112 which is in turn pivotally mounted on a stud 113, mounted in suitable bearings in the machine frame, see particularly Figure 35, which swinging arm carries a cam roller 114 which engages a cam 115 on the cam shaft 116 which operates the chain 99, and the co-operating, grouping and load-forming members 91, 92, 93, 94, 97, 98.

In the position shown, the roller 114 is engaging the high point of the cam 115, holding the stop 92 in front of the group to prevent their release, and holding the gates 93 and 94 closed and the deflectors 97 and 98 raised out of the path of the cans, the stop 91 at the intake end of the group being likewise raised. This is the assembling or grouping position of the parts. In the position shown, the roller is about to encounter the steep incline of the cam by which the pull rod 107 will be permitted to yield to the tension of the spring 108, and the chain 99 will be drawn backwardly to discharge position. In and by this operation the stop 92 will be raised, and the stop 91 will be lowered into the path of the cans, cutting off twenty-four cans or any number previously chosen to constitute the load, and permitting them to roll down the ways toward the load-forming enclosure. However, in addition to the motion of the can stops, the gates 93 and 94 are lowered simultaneously or nearly so, and the deflectors 97 and 98 are likewise lowered, deflecting four or any suitable number of cans shown above the opening of 93 gate, by way of gate 93 into the lower ways 96 of the load-forming enclosure, and four cans shown above opening of gate 94 and below gate 93 by way of the gate 94 into the middle ways 95 of the load-forming enclosure. The cam 115 then presents its high point to the roller 114, applying tension to chain 99 oppositely to the spring 108, returning the parts to accumulating position as in Figures 4 and 5.

The cam 115 is carried on a cam shaft 116 which is operated by a gear 117 secured to this shaft and engaged by a pinion 118 on a periodically rotating shaft 119 driven by a belt 120 engaging a pulley 121 on said shaft 119, which pulley is connected to the shaft 119 at predetermined intervals by a periodic clutch 147 to be further described. This belt 120 is in turn engaged and driven by a small pulley 122 on the shaft of the caser motor 10 which runs continuously.

Referring again to Figure 6, it will be noted that as the cans advance along the ways composing the load-forming enclosure 6, their motion is arrested at the ends of these ways by can separators 125, each of which is mounted on a suitable rock shaft 127 which is in turn mounted to rotate or oscillate in suitable gate supports or uprights 128. Each of these shafts 127 is operatively connected by means of an arm 129 to a vertically extending multiple connecting rod 130 adapted to operate all of the gates simultaneously, and this multiple connecting rod 130 is given an upward tendency by tension spring 131 connected to said rod and to the upper end of the gate supporting member 128, one of which said members 128 is provided on each side of the ways to support the shafts 127. These separators 125 are shown in dotted line position in Figure 6 in the closed position in which they check the passage of the cans, the full line position as shown being the open posi-

tion in which they lie horizontally in alignment with the ways, permitting the cans to pass forward into the drum 7 to be more fully described.

These gates 125, while they are normally operated automatically, may, at the will of the operator, be closed by hand as in priming the machine, by means of a hand lever 133 which is pivotally connected to the multiple connecting rod 130 at 132 intermediately of its length, and at its end opposite to the grip it is pivotally mounted on the upper gate shaft 127, and the gates may be locked open for the same purpose by pin 139, inserted in holes 139', 139''.

The automatic operation of the gates is accomplished by means of a cam lever 134 pivotally connected as at 135 to the lower end of the multiple connecting rod 130 and pivotally mounted intermediately of its length at 136 on a suitable bracket on the machine frame, the lever 134 being provided at its end opposite to the end which is connected to the connecting rod 130 at 135 with a cam roller 137. This cam roller 137 engages and is operated by a cam 138, see Figure 6 and also Figure 35.

The rotary drum 7, shown in the general view Figure 1 and in elevation looking from the right, i. e., from the feed end of the machine in Figure 23, is mounted on shaft 140 parallel to the general direction of the load-forming ways or shelves, see particularly Figure 6. To this shaft is secured a worm wheel 141 driven by a worm 142 shown in plan in Figure 35, which worm is mounted on a worm shaft 143, Figures 6 and 35, to which is secured a sprocket 144 driven by a chain 145 which is in turn driven from and by a larger sprocket 146 secured to the intermittent or periodic clutch shaft 119.

The periodic clutch whereby this shaft 119 is connected periodically to the pulley 121, is shown at 147 in Figure 35 and in more or less detail in Figures 32, 33, 34, 36, 37. The periodic clutch 147 consists of a continuously rotating member 148 secured to the pulley 121 and loose on the shaft 119, and a member 149 secured to the shaft 119 to rotate therewith continuously.

To connect the pulley 121 to the shaft 119, so that the periodically operating parts of the machine, i. e., the drum and the load-forming elements, are driven thereby, the clutch member 149 which is secured to the shaft 119, is connected to the pulley 121 periodically by means of a bolt 150 controlled by a cam dog 151 which operates this sliding bolt 150 against the compression spring 152 which urges the bolt into locking and driving engagement with clutch member 148. Bolt 150 is in the preferred form provided with a follower surface 153 formed thereon, located in a notch 154 near the centre of the bolt to contact said dog as hereinafter described. The dog 151, see Figure 36, is pivotally mounted at 155 to swing into and out of a peripheral groove 156, see Figure 35, at the bottom of which it engages the notch 154 in the bolt 150. This bolt is mounted in the hole 157 in the clutch member 149 to be urged by the spring 152 into contact with abutment 158 on the clutch member 148. The cam dog when advanced enters notch 154 engaging cam surface 153, withdrawing the bolt and releasing the clutch and holding it released. This cam dog 151 is controlled and held in operative position in which the bolt is held released by a swinging locking lever 159, see particularly Figure 36, which is pivotally mounted at 160 on the machine frame and adapted to be withdrawn from locking position by a tension member 161

operated by the solenoid 79 through the lever 80, see diagram Figure 14. The cam dog 151 also includes a cam follower member 162 whereby the dog is thrown into engagement with the bolt 150, which is clutch release position at the end of each operating period of the machine by engagement therewith of a cam 163 on the cam shaft 116, which cam shaft is intermittently driven from and with the shaft 119, as already pointed out.

In the operation of the intermittent clutch the solenoid 79 being energized by the closing of the circuit 77, the throw-out dog 151 being in its normal position in which it holds the bolt 150 in the withdrawn or disengaged relation, being locked in said position against the tension of spring 165 which tends to throw it out of engaged position with the bolt 150 by the locking lever 159, notch 166 receiving and engaging a pin 167 on the end of the dog 151, the energization of the solenoid as aforesaid applies tension to the member 161, releasing the locking member 159. Locking member 159 then swings to the left in Figure 36 whereby the dog is swung by the spring 165 in clockwise direction, releasing the bolt 150 and permitting it to advance in response to the thrust of the spring 152, so that in due course it engages the abutment 158 on the continuously rotating clutch member 148, causing the clutch members 148 and 149 to rotate together, operating the shaft 119 and the various elements of the caser for a period determined by the timing of the cam member 163, and the cam shaft 116 on which it is mounted providing for a single operation of the caser. This period of operation normally provides a swing or rotation of drum 7 of 90° or a fraction of a turn corresponding to the number of charge delivering units.

When the cam member 163 which rotates in a counter-clockwise direction, as indicated, engages the follower end 162 of the dog 151, the latter is swung in counter-clockwise direction to the position shown in Figure 36, in which the cam portion thereof enters the path of the corresponding cam portion 153 of the bolt, and with the continued rotation of the shaft 119 and the rotating clutch member 148, the bolt is withdrawn against the tension of the spring 152 and the clutch is released. In this position of the dog 151 the lock-out member 159 which is given a tendency in opposition to the solenoid to swing to the right in Figure 6 by means of spring 168, swings back into locking position, holding the dog 151 in engagement with the bolt, as shown in Figure 36, until the solenoid is again energized.

The rotating drum 7, as already suggested is best illustrated in Figures 7 and 23. It consists of two discs 170 and 171 both concentric with the axis of the drum shaft 140, Figure 6, and secured thereto in any suitable manner. Between these discs are supported four sets of charge delivering units 172, 173, 174 and 175, arranged at 90° to each other within said drum, all the ways of each charge delivering units 172, 173, 174 and 175 being preferably parallel or substantially parallel to the radius through the centre of said unit, and all of said ways being preferably parallel in a lateral direction to the axis of the drum 7. This drum 7 is rotated periodically, i. e., with a step by step motion, bringing the charge delivery units in turn into registration with the load-forming ways, the receiving position being indicated at 174 Figure 23. It is controlled in conformance to the operation of the load-forming mechanism by the periodic

clutch, and at each dwell it is stopped with one of its load-delivering units in registration with the ways or shelves 95, 96 and 5 composing the load-forming enclosure 6, as best shown in Figures 21 and 22, which illustrate the passage of the cans from the ways or shelves to the shelves of the load-delivering units or enclosures 172, 173, 174, 175 of the drum.

In the position of the drum 7, in which it is shown in Figure 23, the charged delivering unit 174 is in registration with the load-forming ways 5, 95, 96.

In addition to the load delivery enclosures 172, 173, 174, 175, the drum includes four can funnels 180, one corresponding to each of the load-delivering enclosures and in alignment therewith, as shown in Figure 23. Each of these funnels is preferably rectangular, as seen in a plane, at right angles to the corresponding radius of the drum, as best shown in Figure 29, which is taken on line 29, 29 Figure 23. Each funnel consists of four plates 181 and 182 at the bottom and top, and 183 and 184 at each side, forming the respective sides of the rectangle and most conveniently spaced away to a slight extent from what would be the corners of the rectangle, leaving the figure open at the corners.

The funnels fit within the cartons or vice versa, and in the operation of the machine each carton in turn is placed in position with its flaps overlying the corresponding sides of the funnel presented in the receiving position, which is at the left in Figure 23. As will be understood the funnels are open at both radial ends.

The drum is further provided with four sets of carton clasps, one set co-operating with each funnel. Each set of carton clasps consists of two upper and two lower fingers or clasps 185 and 186, see Figures 27, 28, 29 and also Figure 23. The clasps composing the upper set or pair of clasps 185 are connected together to operate together in that they are both secured to a shaft 187 to oscillate therewith, and the lower pair of carton engaging fingers or clasps 186 are also connected together to operate together, both being secured to the shaft 188 to oscillate therewith, and these shafts 187 and 188 are mounted to oscillate in suitable bearings in the drum discs 170 and 171, the fingers or clasps 185 of the upper set and the fingers or clasps 186 of the lower set are connected together to oscillate simultaneously and oppositely into and out of engagement with the cartons as presented and released by means of actuating levers 189 and 189', the lever 189 being secured to the shaft 187 and the lever 189' being secured to the shaft 188. These levers 189 and 189' are connected together by a slot and pin connection at their ends remote from said shaft, the slot being indicated at 192 and the pin at 190, as best shown at the top in Figure 23 and in Figure 25, and the pin 190 in turn carries a cam roller 193 which engages the peripheral cam member 194. This cam 194 is engaged by this roller just after the insertion of the carton at the left hand station in Figure 23, as the drum starts to rotate. The roller continues in contact with the cam until the carton approaches delivery position at the bottom in Figure 23, the cam being in the form of a circular arc concentric with the shaft 140 of the drum except as to its outwardly inclined end 191 where it receives the roller and where the cartons are inserted, which end is indicated by reference character 197.

The follower is held in contact with the cam by means of spring 195 which engages an arm 196 which is secured to the shaft 188 of the lower set of clasps extending outwardly from the shaft in the direction opposite to the clasps, and the clasps are located in open position by a stop 196.

The construction shown also includes paste pots 270, see Figure 29, adjacent the receiving position of the cartons at 174 in Figure 23, and paste rollers 271 mounted in paste receiving and applying position relatively thereto. These paste rollers and paste receptacles 270 are located immediately adjacent the path of the open side flaps 272 which overlie the funnels 180, the flaps being at this time supported on the side opposite the rollers by the funnel 180, see Figure 29, and the rollers contact the outside of each flap, so that these flaps are duly coated on the outside by passage of the flaps in contact with the rollers which are rotated by frictional contact with the flaps. The flaps thus paste coated being the inside flaps in the closed position, the operator has merely to close the four flaps in the regular order and press them in closed position to close permanently the corresponding end of the carton.

In order to admit the cans to the charge-delivering units, the disc 170, which is at the right of the observer looking at the front of the machine as in Figures 1 and 7, is formed with an opening 198 registering with each said unit, and each said unit consists of a top plate 199, a bottom shelf or support 200, and intermediate shelves or supports 201, 202. It will also be noted that the edges of these openings 198, which are farthest away from the centre and which are downward in delivering position 175 of each charge delivery unit of the drum 7, are scalloped or otherwise formed with notches 203, one being opposite the centre of the space between each adjacent pair of ways so that the vertices of these notches are in the vertical plane or substantially in the vertical plane of the axes of the cans.

These notches or scallops 203 are of particular advantage in that they assist in the release of the cans from the drum when each particular load delivering unit having a carton placed in registration therewith, is turned downwardly from the horizontal position at the right in Figure 23 to the bottom position, permitting the cans to pass by gravity into the carton. This arrangement or device avoids the presentation to the end edges of the cans of a continuous edge parallel thereto, which if the cans tended to slightly overhang this edge, would interfere with the smooth delivery of the load and would tend to derange the load. By the arrangement shown, if any of the cans tend to slightly overhang this edge, the inclination of the edges of the notches, which are preferably V-shaped or approaching the V, have the effect of a tapering funnel, drawing the cans back into line as they advance.

The drum is further provided with a carton support or supports 205 in the form of circular arcs concentric with the drum and spaced outwardly therefrom to a position slightly beyond the outer wall of the cartons engaged with the drum in receiving position and extending from the position of the unit 174, as shown in Figure 23, where the cans are received from the load-forming ways almost to the bottom position of the carton clasps where the cartons are transferred to the delivery conveyor 8 as shown in Figure 23 the support 205 being discontinued just to the right, as seen in this figure of the line of

these ways, so that they do not interfere with the dropping of the filled cartons on to the ways.

The delivery conveyor 8 is best illustrated in Figures 1 and 7, also in Figure 23. The conveyor, as shown, includes carton carrying belt 207 passing over drive pulley 208, driven by a belt 209 which engages a pulley 210 secured to the shaft 214 to which pulley 208 is secured, and this belt 209 is driven from the caser motor 10, as shown in Figure 1, by way of a pulley 219 engaging the belt 209 and secured to a sprocket 219', and a chain 211 driven by a small pulley 211' on the motor shaft and passed around pulley sprocket.

The carton-carrying belt 207, as aforesaid, is supported by a number of rollers 212 mounted in a conveyor frame 213 which is pivotally mounted at one end on the shaft 214, belt 207 being passed at the end of its traverse opposite to pulley 208 around the roller 215 at the end of the frame 213 remote from the shaft 214, and this end of the frame is supported by a counter-balance weight 216, see Figure 1, connected thereto by a suitable tension member 217 passed over a pulley 218 and connected to the frame 213 near its swinging end.

It will be easily understood that the normal position of the delivery conveyor 206 supported by counterweight 216 is immediately beneath the delivery position of the carton clasps, so that the descent of the filled cartons to the conveyor is extremely short and the impact of the loaded cartons is broken by the inertia of the delivery conveyor and particularly of the counter-balance weight 216, which is displaced and raised as the conveyor yields downwardly on receiving each carton. The motion of the delivery belt delivers the filled cartons to another conveyor 220 or to any suitable receiving member whereupon the delivery conveyor 8 is raised by the action of weight 216 to its original position to receive the next carton.

In addition to the foregoing, the drum is provided with a brake 222, see Figures 38 and 39, which, in the form of the invention shown, comprises a brake drum 223 mounted on the caser drum shaft 140. This brake includes a brake band 224 co-operating with said drum and shown as engaging the same externally. This band is supported in the usual manner by an eye 225 secured thereto and engaging a band supporting bar 226 mounted on a suitable bracket 227 on a frame member 228. The ends of the band are connected to two links 229 and 230 pivotally connected to each other at 231 after the manner of an automobile brake, and the links are operated to apply tension to the band by means of an arm 232 which is secured to the link 230 at right angles thereto, i. e., in the form of a bell crank lever, said link 230 and arm 232, which are integral or secured together, being pivoted at 233, i. e., on one end of the band 224, and this arm 232 carries at its end opposite to the pivot 233, a cam roller 234 which engages a cam 235 on the caser drum shaft, which cam is formed with four operating surfaces 236 each corresponding to a 90° arc of rotation of the drum and to a single period of operation, and each being of an increasing radius, so that the cam has four high points 237 of maximum radius. The cam roller 234 follows each cam surface 236 in turn for each period of operation, the high points being approached in turn and finally engaged by the roller, the roller being forced outwardly, tightening the band gradually until the final braking

force stopping the drum is applied as the roller encounters each of the four high points of the cam 237, and these high points in turn correspond to each dwell or stationary position of the caser drum. During each successive dwell the carton is received and the load of cans is likewise received by the drum at the opposite units in the front and rear, and the filled carton is delivered to the delivery conveyor 8 at the bottom position of the units of the drum, the insertion of a carton, the admission of a load or charge of cans at 174, and the delivery of a filled carton being timed to take place simultaneously.

In addition to the parts and combinations of parts, so far described, an important element of the machine, not previously described, in its operative form, is the carton switch 78 shown diagrammatically in Figure 14. This switch, in the form of the invention shown, Figures 25 and 26 and 14 is of the mercury type, having a container 240 for mercury or similar conducting liquid 241, the container also being provided with two terminals 242 suitably connected to the solenoid circuit 77, the connections at 243 being flexible, so that the switch can be easily moved without injuring the connections.

As has been already explained, when the solenoid circuit 77 is closed by the simultaneous closure of the can detector switches 73, 74 and 75, and the carton switch 78, the solenoid 79 is energized, operating the lever 80 and thereby operating the tension member 161, releasing the cam dog 151, so that it can be withdrawn as by spring 165, engaging the periodic clutch and causing the machine to operate for a cycle or single operation.

The carton switch is illustrated in detail in Figures 25 and 26. The switch member 78 is secured to a stud 245 mounted in suitable bearings 246 on the caser frame or more particularly on the stationary carton guides 247 adjacent the receiving position, and this stud 245 is provided at its opposite end with a feeler arm 248 which carries, projecting therefrom at right angles and into the path of the cartons as they are inserted within the clasps, a carton feeler member 249 which is located at right angles to the path of the cartons as thus inserted and near the bottom of the same, so that as the cartons swing upwardly, they clear the switch almost immediately, but prior to the passing of the cartons out of engagement with the switch, the solenoid circuit 77 is closed by the rocking of the switch 78 in response to contact of the carton with the feeler 249 bringing the mercury into contact with both terminals. When the switch is closed, the solenoid 79 trips the periodic clutch.

The machine also includes funnel guides 290, Figures 21 and 23, projecting outward in a radial direction from the drum unit shelves 201 and 202 of each unit 172, 175 and through the corresponding funnel 180. These serve to guide the cans as they leave the shelves and pass through the funnel into the carton. These guides prevent rubbing, cramping and disfigurement of the cans. Preferably they extend through and beyond the funnel and well toward the bottom of the carton when held in receiving position, as described.

In addition to the automatic means for operating the periodic clutch, the construction includes a hand lever 251 connected to the same stud 245, see Figures 14 and 6, whereby the mechanism for tripping the periodic clutch, as already described, may be operated by hand, and the op-

eration of the machine may be timed and controlled by any available instrumentality in any convenient manner.

The cans being fed from the labeller or any suitable source to the dividing mechanism 2, being under ordinary circumstances most conveniently supplied in a single line, may be divided by this mechanism into an upper line of cans supported on the upper divider ways 45, and a lower line of cans supported on the lower ways 42. As the cans proceed, the ways 42 and 45 are caused to deliver to the elevator 3, forming two lines of cans side by side, so that the load is arranged in two layers or any multiple of two layers if desired. The elevator delivers the cans thus arranged in two lines side by side corresponding to two layers, to the main way 4, where any cans which may in any way be caught between the way and the vanes 49 of the elevator, are released and dropped by the yielding gate 57 whereby any cans thus injured or disfigured are discarded for inspection.

Choking of the machine with cans due to the continuous operation of the elevator is prevented by the stop switch at 62 which opens the circuit 65 of the elevator motor 9 whenever the cans accumulate sufficiently to open this switch by permanent contact of a can with the feeler 63 as shown in Figure 4. Intermittent contact of the cans with the feeler, opening the switch for short periods, does not interfere with the operation of the machinery.

The grouping mechanism whereby a group of cans, in the present instance 24 cans corresponding to a load, is accumulated on the ways to be fed to the load-forming shelves in correspondence to each operation of the drum shown in Figures 5 and 6, comprises the alternately operating can stops 91 and 92, the ways between the stops and preferably the detectors for preventing operation of the machine when grouping is incomplete. The stop 92 is so timed that it is raised when the load of cans in the load-forming mechanism has been passed into the drum, and the can separators 125 have again been raised, and the stop 91 is so timed that having been raised during the feeding of the cans toward the stop 92, it is lowered when the stop 92 is raised. In other words, these stops in the preferred arrangement operate simultaneously and oppositely. The can stops 91 and 92, as well as the can gates 93 and 94, and the defectors 97 and 98, which insure the passage of the cans through the gates, are most conveniently operated simultaneously by the chain 99 which is in turn operated by cam 115 and lever 112, but any suitable means may be substituted therefor. The gates 93 and 94 serve to pass the cans downwardly from the main way 4 to the lower ways 96 and 95, respectively, of the load-forming enclosure 6, and the grouping mechanism 11, consisting of stops 91 and 92, serves to supply just sufficient cans to the load-forming mechanism to feed the drum and prevent choking, which, among other difficulties, would tend to interfere with the operation of the gates.

The caser 7 is operated by and through the mechanism described, including the carton switch 78 or in any convenient manner, to present the cartons in turn at the position of the unit 174 in Figure 23, i. e., in registration with the load-forming shelves, and the charge is accumulated and arranged on the load-forming ways 5, 95, 96, and the separators 125 are opened to discharge the cans into the drum, all in due se-

quence, and the drum is preferably so controlled by means of the switch 78 and the detectors that the machine cannot be operated to form the loads and deliver the loads to the drum unless the loads are properly arranged and presented and the cartons are duly placed in position on the drum to receive the cans.

It will be understood that in the receiving position of the cartons, the front flaps 280, Figure 24, immediately overlie the funnel 180. Referring now to Figure 23, and Figures 27 and 28, it will be noted that each carton as presented to the funnels 180 having the side flaps 260 preferably flattened by the thumbs of the operator into closed position, the top and bottom flaps 261, 262 being open, are engaged by the clasps or fingers 185 and 186 from above and below, and the top and bottom flaps are closed by said clasps holding this end of the carton, which is to be the bottom of the carton, in the delivery position thereof closed. These flaps may if desired be paste coated when the carton is presented. The operation of the clasps by contact of the follower 193 with the cam 194 has been fully described, also the fact that the cam is inclined away from the path of the roller at 197, which is the point of insertion of the cartons.

When the cartons reach receiving position, i. e., at 174 in Figure 23, the side flaps 200 at the front or top are duly coated by means of the paste rollers 271 adjacent this position, and the cans being admitted to the delivery unit 174 of the drum by opening of the separator gates 125, the next rotation of the drum, which in the form shown is a step by step rotation of 90° at a time, as controlled by the intermittent clutch 147, and by the brake 222, swings the unit 174 with the cans therein and the corresponding carton, to the bottom position in Figure 23, the carton being at this time supported by the carton support 205 as well as by the clasps 185 and 186.

As the charge of cans and the carton approach the lowermost position in Figure 23, the charge of cans moves downward by gravity into the carton, and at the same time the clasps being released by the passage of the roller 193 from the cam 194, the filled carton is delivered to the conveyor 106, the yielding action of which easing the carton downward from the point of discharge, has been fully described.

A machine for filling cartons with cans or other cylindrical packages embodying the various improvements which constitute the invention, has been described specifically and in detail and illustrated in the drawings in the form in which it has been constructed and sold in order that the manner of constructing, operating and using the invention in the preferred form may be fully understood by those skilled in the art. It will, however, be appreciated that various means of controlling the machine may be substituted for the preferred ones disclosed by applicant. For example, a different mechanism with or without the periodic operation may be substituted for the periodic clutch disclosed. The carton may be otherwise presented than by the rotary drum. The cans may be otherwise advanced and grouped, and various features and details may be substituted for those illustrated in connection with the preferred form of machine without departure from the spirit of the invention.

Applicant has disclosed and will hereinafter claim not only the combinations of the principal elements of his machine, but various sub-combinations of parts constituting these principal

elements which are in no wise dependent on the construction and operation of the other elements of the machine.

What I claim as new and desire to secure by Letters Patent is:

1. In a carton filling machine having a moving conveyor for cans and a main way receiving cans from the conveyor, a load-forming mechanism connected to said way to receive cans from the way, and an automatic stop for the conveyor in co-operative relation to the way and spaced beyond the conveyor to prevent accumulation and choking of cans on the way and choking of the machine.

2. In a carton filling machine having a moving conveyor for cans and a main way receiving cans from the conveyor, a load-forming mechanism connected to said way to receive cans from the way, and an automatic stop for the conveyor in co-operative relation to the way and spaced beyond the conveyor to prevent accumulation and choking of cans on the way and choking of the machine, an electric motor driving the conveyor, the stop being in the form of a switch in the motor circuit, the same having a feeler in the path of the cans to be engaged by a can, opening the switch when the cans accumulate up to the feeler, so that a can becomes located in fixed position in contact with the feeler.

3. The combination in a machine having load-forming mechanism for cans or similar packages, each load to be fed to a corresponding container, said load-forming mechanism having means for supporting cans in a plurality of tiers, of a main way leading to one tier to which main way a supply of cans is fed and spaced can stops adjacent said main way engaging the cans thereon, said can stops being spaced apart in the direction of feed to provide room on the ways between said stops for a number of cans corresponding to the number comprising a load, ways leading from the main way to each of the remaining tiers and means for operating such stops oppositely and substantially at the same time to alternately accumulate and determine a load of cans and discharge them in the direction of the load-forming mechanism, the stop which is first in the direction of feed serving to cut off the flow of cans to the space between the stops from the supply and determine the load and check the flow from the supply to said space while the determined load of cans is being discharged from said space and means for uniformly dividing each load between the main way and said respective passages.

4. The combination in a machine having load-forming mechanism for cans or similar packages, each load to be fed to a corresponding container, said load-forming mechanism having means for supporting cans in a plurality of tiers, of a main way leading to the upper tier and oppositely disposed can stops adjacent said main way engaging the cans thereon, said can stops being so spaced as to provide room on the ways between said stops for a number of cans corresponding to the number comprising a load, and means for operating such stops oppositely and substantially at the same time to alternately accumulate a load of cans and discharge them in the direction of the load-forming mechanism, the stop which is first in the direction of feed serving to cut off the flow of cans to the space between the stops while the cans are being discharged therefrom, and an electric circuit, an electrical means in said circuit for controlling

the discharge of said loads into the corresponding container, and a detector switch having detector means in the path of the cans controlled by said stops preventing the closing of the circuit and the operation of the switch when the load of can between said stops is incomplete.

5 5. The combination in a machine having load-forming mechanism for cans or similar packages, each load to be fed to a corresponding container, said load-forming mechanism having means for supporting cans in a plurality of tiers, of a main way leading to the upper tier and oppositely disposed can stops adjacent said main way engaging the cans thereon, said can stops being so spaced as to provide room on the ways between said stops for a number of cans corresponding to the number comprising a load, and means for operating such stops oppositely and substantially at the same time to alternately
10 accumulate a load of cans and discharge them in the direction of the load-forming mechanism, the stop which is first in the direction of feed serving to cut off the flow of cans to the space between the stops while the cans are being discharged therefrom, and an electric circuit,
25 electrical means in said circuit for controlling the discharge of said loads into the corresponding container, and a detector switch having detector means in the path of the cans between
30 said stops, and additional detector switches also included in said circuit and arranged in co-operation with the path of the cans approaching the can stops and immediately adjacent the same to prevent the closing of the circuit and
35 the operation of the machine in the absence of a full supply of cans ready to enter the space between the stops.

6. The combination in a machine for filling cartons with cans or similar packages, of load-forming mechanism arranged in a plurality of tiers, a can-way leading thereto delivering cans to one of the upper tiers, an opening in said way leading downwardly to the lower tiers, a moving gate controlling said opening whereby the cans
45 are distributed from the main way to the various tiers, a can stop co-operating with said gate to limit the cans fed along the ways and prevent accumulation of the cans which would interfere with the operation of the machine by choking
50 the gate.

7. The combination in a machine for filling cartons with cans, load-forming mechanism comprising a plurality of shelves one over the other, a can-way leading to an upper shelf, and means for passing the cans downwardly from the upper to the lower shelves comprising a gate in the ways pivoted to swing downwardly, and means timed with the operation of the machine for opening and closing the gate.

80 8. The combination in a machine for filling cartons with cans, load-forming mechanism comprising a plurality of shelves one over the other, a can-way leading to an upper shelf, and means for passing the cans downwardly from the upper to the lower shelves comprising a gate in the ways pivoted to swing downwardly, and a can deflector overlying the gate, and means for controlling the deflector and gate to operate together in passing the cans downwardly distributing them from the way to the various shelves.

9. The combination in a machine for filling cartons with cans, including load-forming mechanism for forming a load to correspond to and to fill each carton, said load-forming mechanism

having shelves one over the other corresponding to tiers, and means for grouping a number of cans corresponding to each load, retaining said cans and releasing them in correspondence with the discharge of each load, comprising two stops spaced apart by a distance corresponding to the load of cans, ways for supporting the cans between the stops and delivering them to the load-forming mechanism, gates and can-conducting means leading from said ways to the lower shelves of the load-forming mechanism, and means for operating the stops and gate in co-ordination to accumulate a number of cans on the ways corresponding to a load, to release the cans thus accumulated at intervals corresponding to the operation of the machine, and to operate the gate in correspondence with the stops to distribute the cans to the lower shelves and accumulate further loads of cans.

10. The combination in a machine for filling cartons with cans including load-forming mechanism for forming a load to correspond to and to fill each carton, said load-forming mechanism having shelves one over the other corresponding to tiers, and means for grouping a number of cans corresponding to each load, retaining said cans and releasing them in correspondence with the discharge of each load, comprising two stops spaced apart by a distance corresponding to the load of cans, ways for supporting the cans between the stops and delivering them to the load-forming mechanism, a gate and can-conducting means leading from said ways to the lower shelves of the load-forming mechanism, and means for operating the stops and gates in co-ordination to accumulate a number of cans on the ways corresponding to a load, to release the cans thus accumulated at intervals corresponding to the operation of the machine, and to operate the gate in correspondence with the stops to distribute the cans to the lower shelves, and deflecting means corresponding to the gate and co-operating therewith to insure the downward passage of the cans through the gate.

11. The combination in a machine for filling cartons with cans including load-forming mechanism for forming a load to correspond to and to fill each carton, said load-forming mechanism having shelves one over the other corresponding to tiers of cans and means for grouping a number of cans corresponding to each load, retaining said cans and releasing them in correspondence with the discharge of each load comprising two stops spaced apart by a distance corresponding to the load of cans, ways for supporting the cans between the stops and delivering them to the load-forming mechanism, gates and can-conducting means leading from said ways to the lower shelves of the load-forming mechanism, and means for operating the stops and gate in co-ordination to accumulate a number of cans on the ways corresponding to a load and to release the cans thus accumulated at intervals corresponding to the operation of the machine, the gate being operated in correspondence with the stops to distribute the cans to the lower shelves, and deflecting means corresponding to the gate and co-operating therewith to insure the downward passage of the cans through the gate, said operating means for the stops and gate comprising an electrical member, tripping means for the machine controlled by said member, and detector means adjacent the way and included in said circuit to engage the cans on the way to prevent the operation of the stops and

gates in the absence of a sufficient supply of cans properly located.

12. The combination in a machine for filling cartons with cans including mechanism for forming a load to correspond to and to fill each carton, said load-forming mechanism having shelves corresponding to tiers, and means for grouping a number of cans corresponding to each load, retaining said cans and releasing them in correspondence with the discharge of each load comprising two stops spaced apart by a distance corresponding to the load of cans, ways for supporting the cans between the stops and delivering them to the load-forming mechanism, gates and can-conducting means leading from said ways to the lower shelves of the load-forming mechanism, and means for operating the stops and gate in co-ordination to accumulate a number of cans on the ways corresponding to a load to release the cans thus accumulated at intervals corresponding to the operation of the machine, the gate being operated in correspondence with the stops to distribute the cans to the lower shelves, and deflecting means corresponding to the gate and co-operating therewith to insure the downward passage of the cans through the gate, said operating means including a sprocket for each said stop and gate, and a chain engaging said sprockets and means timed with the machine for operating said chain to move the stops and gates simultaneously.

13. The combination in a machine for filling cartons with cans, including means for forming a load corresponding to each carton, and in a plurality of tiers, the load-forming means comprising a plurality of shelves one over the other corresponding to the tiers of cans, a way leading to the upper of said shelves, a gate passing the cans down to the lower shelves, a pair of can stops in operative relation to the ways and spaced apart to enclose a number of cans corresponding to the load, and means operatively connecting the gates and the stops to operate the stops in alternate direction and the gates simultaneously with the stops, said means being connected to the remainder of the filling mechanism whereby a number of cans corresponding to the load is delivered to the load-forming shelves in correspondence with each filling operation of the machine.

14. The combination in a machine for filling cartons with cans, including means for forming a load corresponding to each carton, and in a plurality of tiers, the load-forming means comprising a plurality of shelves one over the other corresponding to the tiers of cans, a way leading to the upper of said shelves, a gate passing the cans down to the lower shelves, a pair of cam stops in operative relation to the ways and spaced apart to enclose a number of cans corresponding to the load, and means operatively connecting the gates and the stops to operate the stops together in opposite directions, and the gates simultaneously with the stops, said means being connected to the remainder of the filling mechanism whereby a number of cans corresponding to the load is delivered to the load-forming shelves in correspondence with each filling operation of the machine, electrical means for controlling the machine and means co-operating therewith giving the machine a periodic operation corresponding to the filling of each carton, a switch controlling said electrical means and placed in the path of the cartons when applied to the machine,

so that the machine is automatically operated in response to the insertion of each carton.

15. The combination in a machine for filling cartons with cans, of load-forming mechanism including a plurality of shelves arranged in tiers, one over the other, a way feeding said shelves, a gate in the way passing the cans downwardly, and means leading them therefrom to the lower shelves, can stops spaced apart to accumulate a number of cans on the ways corresponding to the load, means for operating the gates and stops in co-ordination to feed the load to the load-forming mechanism in correspondence with each operation of the machine, means for operating the machine periodically in correspondence with the presentation of each carton.

16. The combination in a machine for filling cartons with cans, a load-forming mechanism including a plurality of shelves arranged in tiers, one over the other, a way feeding said shelves, a gate in the way passing the cans downwardly, and means leading them therefrom to the lower shelves, can stops spaced apart to accumulate a number of cans on the ways corresponding to the load, means for operating the gates and stops in co-ordination to feed the load to the load-forming mechanism in correspondence with each operation of the machine, means for operating the machine periodically in correspondence with the presentation of each carton, said means including a periodic clutch, an electric circuit including means for tripping the clutch.

17. The combination in a machine for filling cartons with cans, a load-forming mechanism including a plurality of shelves arranged in tiers, one over the other, a way feeding said shelves, a gate in the way passing the cans downwardly and means leading them therefrom to the lower shelves, can stops spaced apart to accumulate a number of cans on the ways corresponding to the load, means for operating the gates and stops in co-ordination to feed the load to the load-forming mechanism in correspondence with each operation of the machine, means for operating the machine periodically in correspondence with the presentation of each carton, said means including a periodic clutch, an electric circuit including means for tripping the clutch, a can switch in the path of the cans as inserted, controlling the operation of the circuit, and a feeler-adjacent the ways and in said circuit to prevent the operation of the machine in the absence of a sufficient supply of cans.

18. The combination with load-forming mechanism for cans having ways, means for feeding the cans along ways by rolling, a load forming enclosure comprising means for supporting the cans in a plurality of tiers and means for distributing the cans from said ways to said supports and means for presenting cartons to receive the loads of cans comprising a rotary member mounted with its axis extending in the direction of the ways and having a plurality of load supporting and delivering units adapted to be presented successively to the load-forming enclosure to receive the cans, means for holding the cartons in radial receiving relation to said load supports and gripping them in said relation.

19. The combination with load-forming mechanism for cans having ways, means for feeding the cans along ways by rolling, a load forming enclosure, comprising means for supporting the cans in a plurality of tiers and means for distributing the cans from said ways to said supports and means for presenting cartons to receive

the loads of cans comprising a rotary member mounted with its axis extending in the direction of the ways and having a plurality of load supporting and delivering units adapted to be presented successively to the load-forming enclosure to receive the cans, means for holding the cartons in radial receiving relation to said load supports, the drum being arranged to swing the carton downwardly from the position in which the support is in line with the load-forming mechanism to a position in which the support is over the carton, permitting the cans to pass by gravity into the carton.

20. In a machine for filling cartons with cans, load-forming ways, comprising a plurality of shelves for forming a load in a plurality of tiers a rotary member having its axis parallel to the ways and having a load supporting and delivering unit with a plurality of shelves adapted to receive and support said load in a plurality of tiers, said unit being open in a radial and in an axial direction, and adapted to be presented to the load-forming ways to receive the loads therefrom, means for holding a carton in radial load-receiving relation to said support at right angles to the direction in which the cans are delivered to the support.

21. In a machine for filling cartons with cans, load-forming ways, a rotary member having a load supporting and delivering unit adapted to be presented to the load-forming ways to receive a load therefrom, means for holding a carton in load-receiving relation to said support in radial relation thereto, the unit being open radially, said holding means comprising clasps on opposite sides of the carton, and means for holding the clasps in closed position.

22. In a machine for filling cartons with cans, load-forming ways, a rotary member having a load supporting and delivering unit adapted to be presented to the load-forming ways to receive a load therefrom, means for holding a carton in load-receiving relation to said support with its opening at right angles to the direction at which the cans are delivered to the support, said holding means comprising clasps on opposite sides of the carton, and means for operating the clasps simultaneously and releasing them simultaneously at the end of the filling operation, the unit being open in a radial direction to deliver the cartons.

23. In a machine for filling cartons with cans, load-forming ways, a rotary member having its axis parallel to the ways and having a load supporting and delivering unit adapted to be presented to the load-forming ways to receive a load therefrom, means for holding a carton in radial load-receiving relation to said support which is open radially to deliver the cans, said holding means comprising clasps on opposite sides of the carton, and means for operating the clasps simultaneously and releasing them simultaneously at the end of the filling operation, said operating means consisting of an arm pivotally connected to each holding means, the arms being connected together to operate together, a cam follower and a cam, the latter extending along the path of the follower as the drum rotates for determining the open and closed position of the holding means engaging the carton when presented and releasing it when filled.

24. In a machine for filling cartons with cans, load-forming ways, a drum mounted to rotate about an axis extending in the direction of the ways and having a plurality of load-supporting

and delivering units arranged about its axis and adapted to be presented in turn to the ways, carton-supporting and gripping means in radial alignment with each unit, the same being open radially, and means for automatically operating the gripping means whereby they are opened at a station opposite to the ways where the carton is inserted and are immediately operated to engage the carton and are held in engagement until the unit with which the carton is associated passes the load-forming ways and are thereafter released to deliver the filled carton.

25. In a machine for filling cartons with cans, load-forming ways, a drum mounted to rotate about an axis extending in the direction of the ways and having a plurality of load-supporting and delivering units open radially and toward an axial end arranged about its axis and adapted to be presented in turn to the ways, carton-supporting means in radial alignment with each unit, and means for automatically operating the same whereby they are opened at a station opposite to the ways where the carton is inserted and are immediately operated to engage the carton and are held in engagement until the unit with which the carton is associated passes the load-forming ways and receives its load and thereafter released to deliver the filled carton, the carton being swung downwardly from receiving position to a position in which it is beneath the load-supporting unit, when the cans move by gravity into the carton and the carton is delivered by the opening of the holding means.

26. The combination in a machine for filling cartons with cans, of a drum, ways for forming loads of cartons and delivering them to the drum, said ways comprising a plurality of shelves for supporting the cans in a plurality of tiers the axis of the drum extending in the direction of the ways and the drum having load delivering and supporting units, each having a plurality of shelves adapted to receive and support said load in the form of a plurality of tiers, said units being open at the periphery and adapted to be presented in alignment with the ways in turn as the drum rotates, the drum having an opening on its axial end corresponding to each supporting and delivering unit for the admission of the cans to the unit, said opening having its edge which is nearest the periphery notched providing converging edges opposite the respective lines of cans to facilitate the discharge of the cans from the drum, and means for holding a carton on the drum in registration with each unit.

27. In a machine for filling cartons with cans, load-forming ways, said ways comprising means for arranging and supporting the cans in a plurality of tiers, a rotary drum having its axis extending in the direction of the ways, said drum having a supporting and delivery unit for the cans including shelves extending in the direction of a corresponding radius of the drum and adapted to support said load as arranged in a plurality of tiers, the drum being open for the admission of the cans to said unit in a direction parallel to the axis and for the discharge of the cans in the direction of the radius, and means for holding a carton in registration with the unit in line with the path of delivery.

28. In a machine for filling cartons with cans, load-forming ways, said ways comprising means for arranging and supporting the cans in a plurality of tiers, a rotary drum having its axis extending in the direction of the ways, said drum having a supporting and delivery unit for the

cans including shelves extending in the direction of a corresponding radius of the drum and adapted to support said load as arranged in a plurality of tiers, the drum being open for the admission of the cans to said unit in a direction parallel to the axis and for the discharge of the cans in the direction of the radius, and means for holding a carton in registration with the unit in line with the path of delivery, the drum being adapted to swing the cartons and the load downwardly from the position in alignment with the load-forming ways to a position in which the load-supporting unit is directly over the carton, in which position the load of cans moves by gravity into the carton.

29. In a machine for filling cartons with cans, load-forming ways, said ways comprising means for arranging and supporting the cans in a plurality of tiers, a rotary drum having its axis extending in the direction of the ways, said drum having a supporting and delivery unit for the cans adapted to support said load as arranged in a plurality of tiers, the drum being open for the admission of the cans to said unit in a direction parallel to the axis and for the discharge of the cans in the direction of the radius, and means for holding a carton in registration with the unit and in line with the path of delivery, the drum being adapted to swing the cartons and the load downwardly from the position in alignment with the load-forming ways to a position in which the load-supporting unit is directly over the carton, in which position the load of cans moves by gravity into the carton, and a yielding delivery conveyor beneath the point of delivery of the cartons.

30. In a machine for filling cartons with cans, load-forming ways, a rotary drum having its axis extending in the direction of the ways, said drum having a supporting and delivery unit for the cans including ways extending in the direction of a corresponding radius of the drum, the drum being open for the admission of the cans to said unit in a direction parallel to the axis and for the discharge of the cans in the direction of the radius, and means for holding a carton in registration with the unit and in line with the path of delivery, the drum being adapted to swing the cartons and the load downwardly from the position in alignment with the load-forming ways to a position in which the load-supporting unit is over the carton, in which position the load of cans moves by gravity into the carton, a yielding delivery conveyor beneath the point of delivery of the cartons, said delivery conveyor being pivotally mounted at one end and having a yielding support which causes the conveyor to swing upwardly adjacent to the position of the filled carton on the drum, and yield and swing downwardly in response to the weight of the filled carton.

31. In a machine for filling cartons with cans, load-forming ways, means for controlling the feed of cans to the ways, automatic means for forming a predetermined load arranged in a plurality of tiers and means presenting the cans to said forming means in numbers corresponding to the load, a drum rotating about an axis and having can supporting and delivering units adapted to be presented in turn in alignment with the load-forming mechanism, said units having a plurality of shelves for supporting the load in a plurality of tiers and means for operating the drum periodically, turning it through an arc corresponding to the spacing of the units, said

means also serving to operate the load-forming and presenting mechanism, and means for holding the cartons in receiving relation to the drum.

32. In a machine for filling cartons with cans, load-forming ways, means for feeding the cans and means for controlling the feed of cans to the ways, means for separating a predetermined load from the cans being fed and arranging the load and supporting it in the form of a plurality of tiers, means for presenting the cans to the load forming mechanism in numbers corresponding to the load, a drum rotating about an axis parallel to the motion of the cans in the load-forming mechanism and having can supporting and delivering units adapted to be presented in turn in alignment with the load-forming mechanism, means for holding cartons in receiving relation to said units, and means for operating the drum periodically, turning it through an arc corresponding to the spacing of the units, said means also serving to operate the load-forming and presenting mechanism, the periodic operating means including an electrical tripping member and a switch in the path of the cartons presented to the machine, and means for holding cartons in receiving relation to the drum.

33. In a machine for filling cartons with cans, load-forming ways, means for feeding the cans and means for controlling the feed of cans to the ways, means for separating a predetermined load from the cans being fed and arranging the load and supporting it in the form of a plurality of tiers, means for presenting the cans to the load-forming mechanism in numbers corresponding to the load, a drum rotating about an axis parallel to the motion of the cans in the load-forming mechanism, and having can supporting and delivering units adapted to be presented in turn in alignment with the load-forming mechanism, means for holding the cartons in receiving relation to said unit, and means for operating the drum periodically, turning it through an arc corresponding to the spacing of the units, said means also serving to operate the load-forming and presenting mechanism, the periodic operating means including an electrical tripping member and a switch in the path of the cartons presented to the machine, and detector means also in said circuit and arranged in the path of the cans as accumulated prior to presentation to the drum by the load-forming mechanism.

34. In a machine for filling cartons with cans, load-forming mechanism including ways, a rotary drum having its axis extending in the general direction of the ways and formed with load-supporting and delivering units arranged around its centre, means for operating the drum periodically to present the units in turn to the load-forming mechanism, and means for checking the motion of the drum with the proper unit in registration with the load-forming mechanism, comprising a brake, and means for controlling the brake comprising a cam, means for rotating the cam, a follower engaging the cam and connected to the brake to control the same and means for actuating the brake to apply the same in correspondence with the operation of the cam, stopping the drum at the end of each operation with each unit in turn in registration with the load-forming mechanism.

35. In a machine for filling cartons with cans, load-forming mechanism including ways, a rotary drum having its axis extending in the general direction of the ways and formed with load-supporting and delivering units arranged around

its centre, means for operating the drum periodically to present the units in turn to the load-forming mechanism, and means for checking the motion of the drum with the proper unit in registration with the load-forming mechanism, comprising a brake and means for actuating the brake in the form of a cam, and having a number of high points corresponding to the units, and a follower engaging the cam and controlling the brake to apply the same as the follower reaches the high points of the cam, stopping the drum at the end of each operation with each unit in turn in registration with the load-forming mechanism.

36. The combination in a machine for filling cartons with cans of load-forming mechanism comprising shelves in a plurality of tiers, a way for feeding the shelves, means for grouping the cans on the way in a number corresponding to the load and in timed relation to the operation of the machine, means for operating said means simultaneously, a drum rotatable about an axis extending in the direction of the motion of the cans in the load-forming mechanism, separators for controlling the passage of the cans from the load-forming mechanism to the drum, load-supporting and delivery units spaced around the drum and adapted to be presented in registration with the load-forming mechanism as the drum rotates, means for operating the drum periodically and stopping it with the respective units in turn in registration with the load-forming mechanism, and connections from said periodic operating means to the separators for operating the same at the proper time to admit the cans to the drum unit as presented.

37. The combination in a machine for filling cartons with cans, of load-forming shelves, a rotary drum having its axis extending in the direction of the shelves and having a load-supporting and delivery unit adapted to be presented to the load-forming shelves periodically as the drum rotates, means for rotating the drum periodically, separators for controlling the passage of the cans from the load-forming shelves to the drum, and connections from said separators to the periodic operating means for operating the same in time with the motion of the drum.

38. The combination in a machine for filling cartons with cans, of load-forming shelves, a rotary drum having its axis extending in the direction of the shelves and having a load-supporting and delivery unit adapted to be presented to the load-forming shelves periodically as the drum rotates, means for rotating the drum periodically, separators for controlling the passage of the cans from the load-forming shelves to the drum, and connections from said separators to the periodic operating means for operating the same in time of the motion of the drum, means for accumulating a number of cans corresponding to the load and distributing them over the load-forming shelves, and means for operating said accumulating means from said periodic means to release and distribute the cans thus accumulated in time with the operation of the drum.

39. The combination in a machine for filling cartons with cans of a load-forming mechanism and a rotary drum having a receiving and delivery unit for the loads of cans, said unit having shelves arranged in a substantially radial direction to support the cans, and also being substantially parallel to the axis of the drum and the unit being open in the direction of the axis of the drum to receive the load from the forming mechanism and in a radial direction inserting the cans in the

corresponding cartons, a funnel in registration with the receiving and delivery unit, the funnel having guiding members extending in the general direction of a radius of the drum through the unit, said guiding members being located between the cans to guide the cans in their passage from the unit into the carton.

40. The combination in a machine for filling cartons with cans of a load forming mechanism and a rotary drum having a receiving and delivery unit for receiving the loads of cans, said unit having shelves arranged in a substantially radial direction to support the cans, and also being substantially parallel to the axis of the drum, the unit being open in the direction of the axis of the drum to receive the load from the forming mechanism, and in a radial direction inserting the cans in the corresponding cartons, of a funnel in registration in a radial direction with the receiving and delivery unit, the load forming mechanism being adapted to form loads comprising a plurality of tiers of cans and the funnel having guiding members extending in the general direction of the radius of the drum at the funnel, said guiding members being located between the tiers of cans and between the respective cans of each tier to guide the cans in their passage from the unit into the cartons, the guides extending through the funnel and well into the carton in the receiving position of the latter.

41. In a machine for filling cartons with cans, a rotary drum having load receiving and delivery units with shelves to support the load, means for delivering the cans to said units, said delivering means comprising a plurality of shelves adapted to support the load in a form of plurality of tiers and means for forming the load in a plurality of tiers, each said unit having a plurality of shelves to support the load in the form of a plurality of tiers, the said units being open in the direction of the radius of the drum and having means for holding a carton in registration with said opening whereby on the downward swing of the unit the load is placed over a corresponding carton and moved into the carton through said opening by gravity.

42. In a machine for filling cartons with cans a rotary drum having load receiving and delivery units with shelves to support the load, means for delivering the cans to said units, said delivering means comprising a plurality of shelves adapted to support the load in a form of plurality of tiers and means for forming the load in a plurality of tiers, each said unit having a plurality of shelves to support the load in the form of a plurality of tiers, the said units being open in the direction of the corresponding radius of the drum and having means for holding a carton in registration with said opening whereby on the downward swing of the unit the load is placed over a corresponding carton and moved through said opening into the carton by gravity, the respective units having can guides adapted to enter between the cans and extending in the direction of discharge of the cans into the cartons when in receiving position in registration with the unit.

43. In a machine for filling cartons with cans, load-forming means and a rotary drum having a load receiving and delivery unit, means for delivering cans to said unit, the unit being open outwardly in the direction of the drum radius, and means for holding a carton in registration with said opening, the carton flaps being open toward the unit, the downward swing of the unit serving to bring the load over the carton whereby it is

inserted therein by gravity and paste rollers and paste supplying means therefor in the path of the carton flaps as the carton rotates with the drum for coating the flaps with paste.

5 44. The combination in a machine for filling cartons with cans of a rotary drum, a load receiving and delivery unit supported by the drum, the same having shelves for supporting a plurality of tiers of cans with a plurality of
10 cans side by side on each shelf, the drum being open on one side providing for the admission of the load moving in the direction of the axis, the unit also being open outwardly in the direction of the drum radius and having a funnel in alignment with the unit in that direction, means for
15 holding a carton in registration with the funnel, with the open flaps overlying the funnel, the flaps at the opposite end of the carton being closed, paste rollers with paste supplying means in the path of the open flaps whereby the flaps
20 are coated with paste as the drum rotates.

45. In a machine for filling cartons with cans, means for forming a load in a plurality of layers, and in a plurality of tiers, a drum mounted to
25 rotate about its axis having a load receiving and discharging unit located thereon to rotate about said axis, means for presenting the load as thus

formed to said unit, means for supporting a carton in receiving relation to the unit to receive the load therefrom as the drum rotates to a position in which the unit is disposed downwardly toward the carton, means for rotating the drum from receiving to discharging position and means in the unit for supporting the cans in a plurality of layers and a plurality of tiers as presented.

46. In a machine for filling cartons with cans, means for forming a load of cans comprising a plurality of layers and a plurality of tiers, a rotary drum having a unit radially disposed as to the drum and open in the direction of the axis to receive the load and open outwardly in the direction of the radius to discharge the load, means for supporting a carton on the outward side of the unit in a radial direction to receive the load, means for feeding the load into the unit in the direction of the drum axis and means for rotating the drum from receiving to discharging position in which latter position the radial opening of the unit is disposed downwardly to discharge the load by gravity, the unit having means for supporting the load in a plurality of layers and a plurality of tiers.

CHARLES HENRY WILD.