May 10, 1938. W. D. KIMBALL ET AL 2,116,793

CAN CASING MACHINE

Filed April 17, 1936 5 Sheets-Sheet 1

Fig. 1.

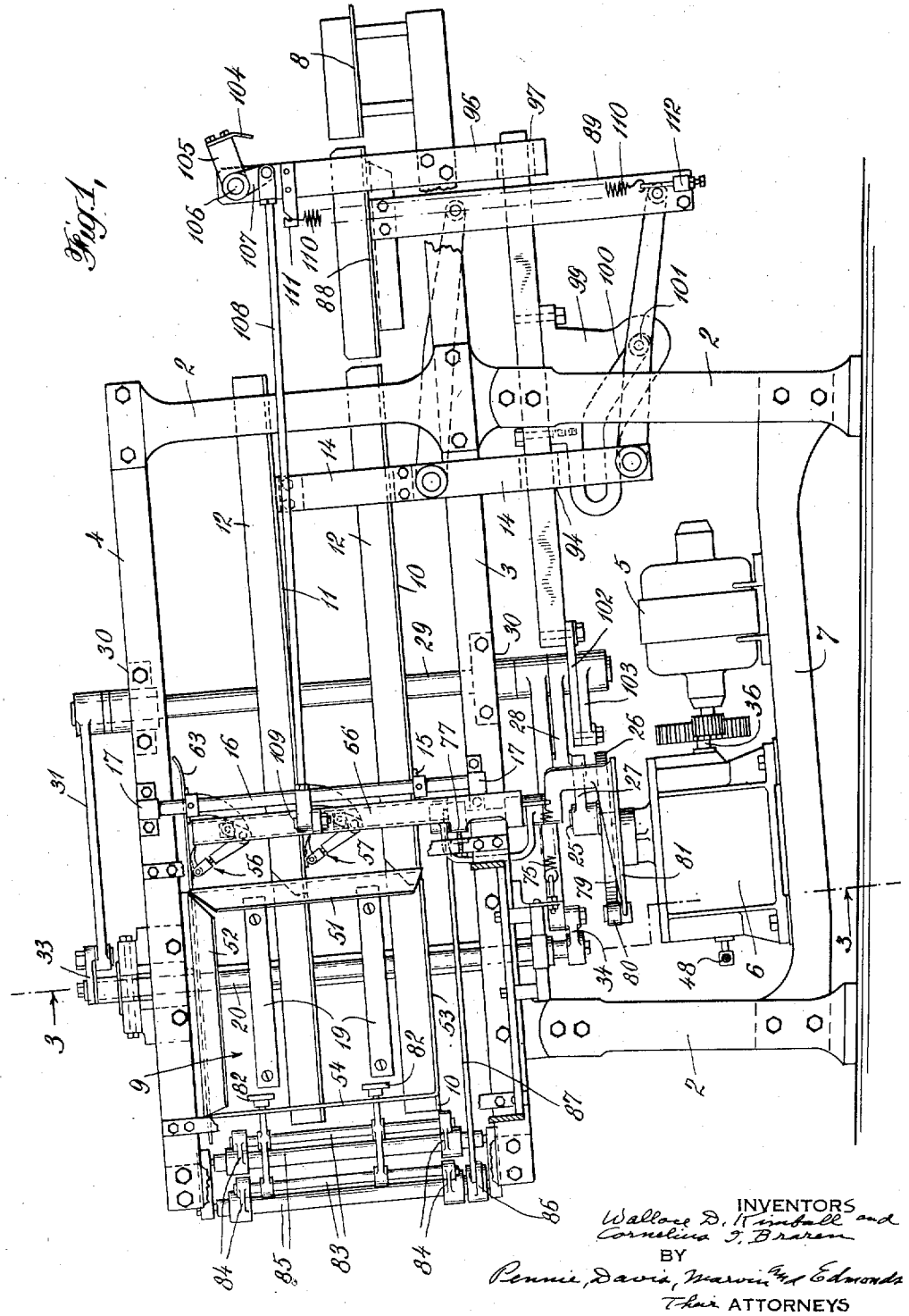

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Fig. 2.

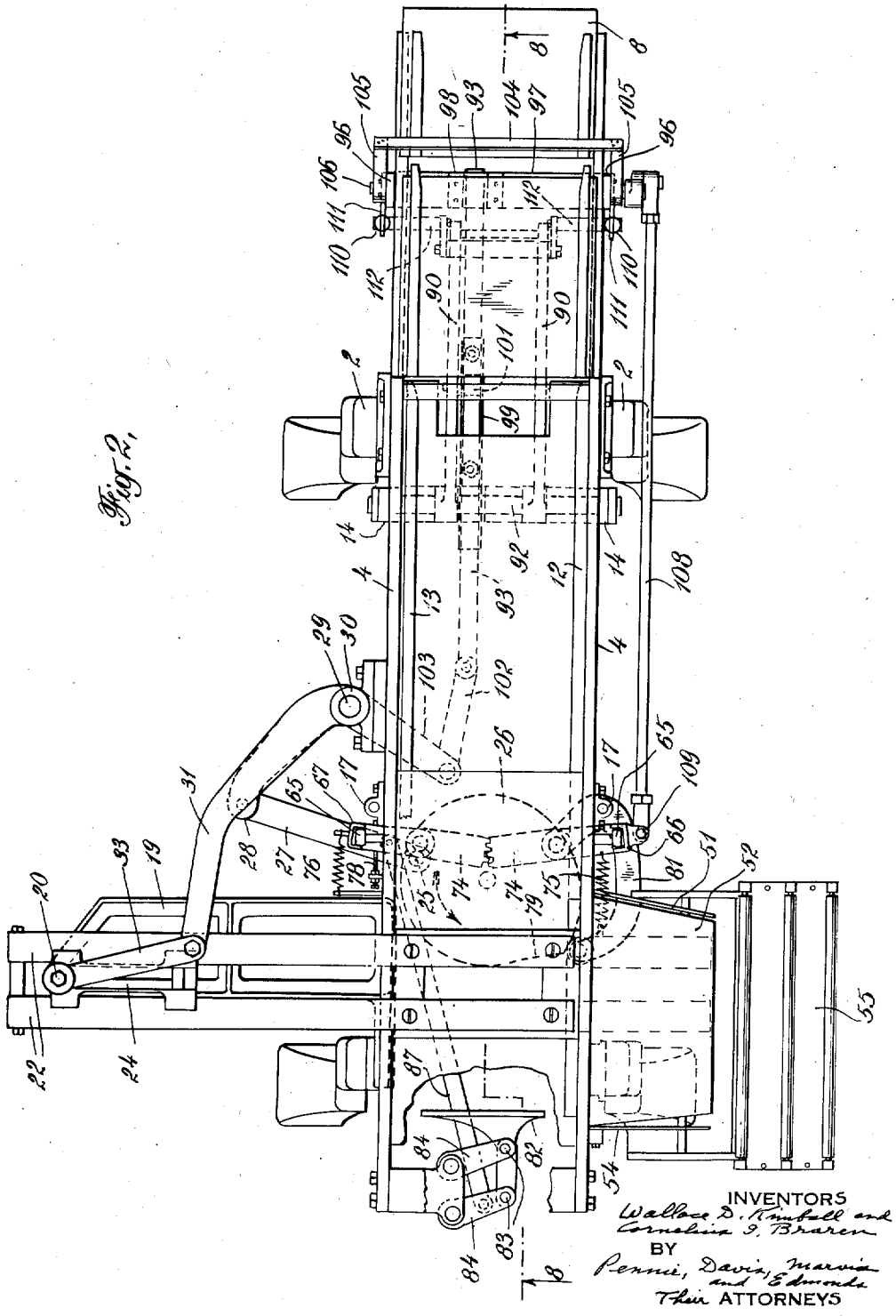

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Fig. 3,

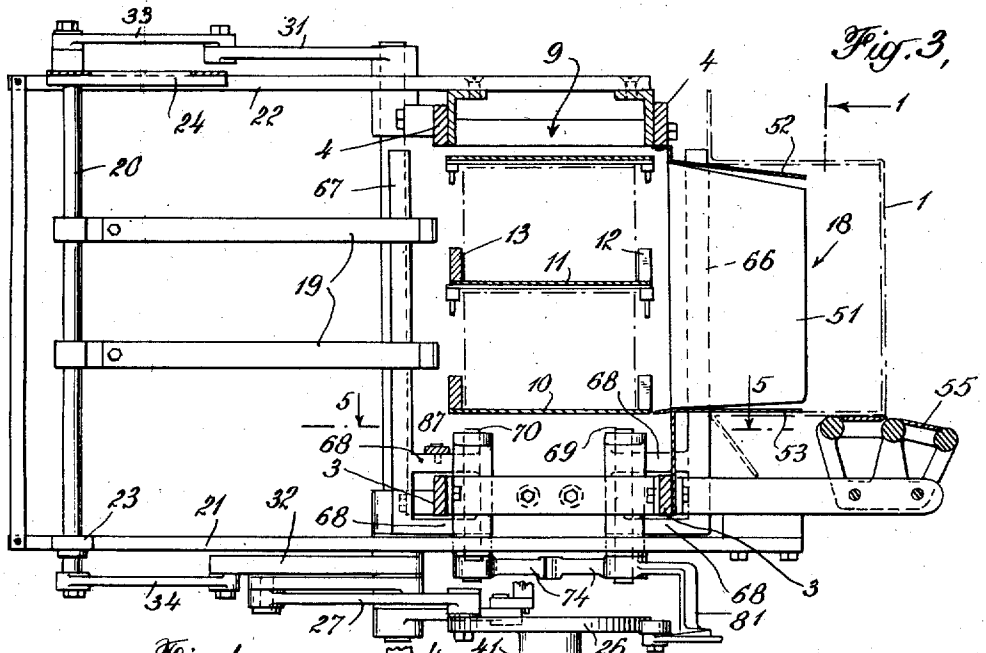


Fig. 4,

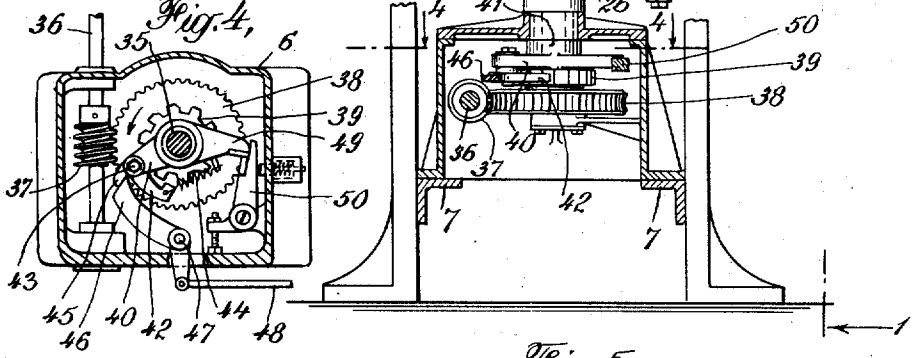


Fig. 5,

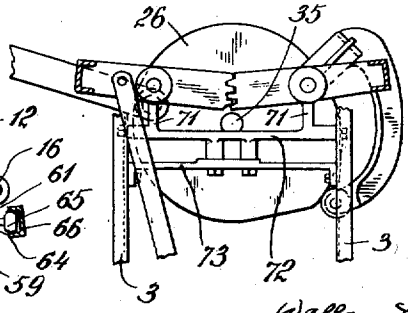


Fig. 6,

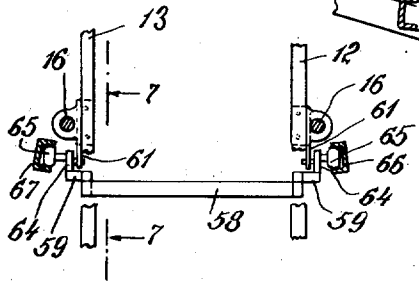
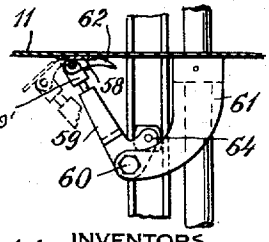


Fig. 7,



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May 10, 1938. W. D. KIMBALL ET AL 2,116,793

CAN CASING MACHINE

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Fig. 8,

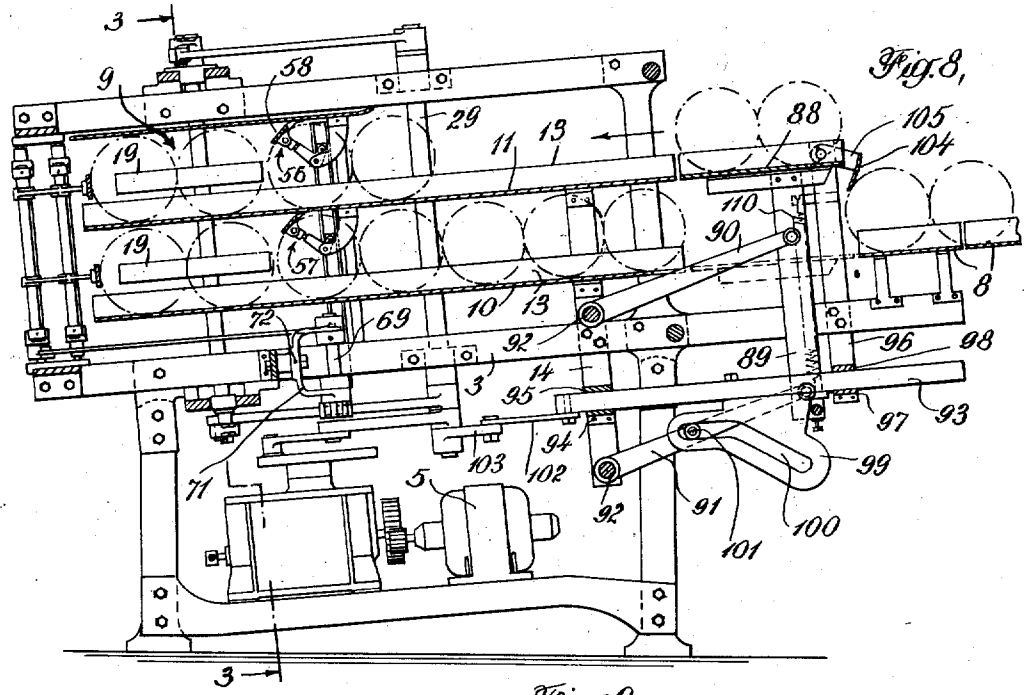

Fig. 9,

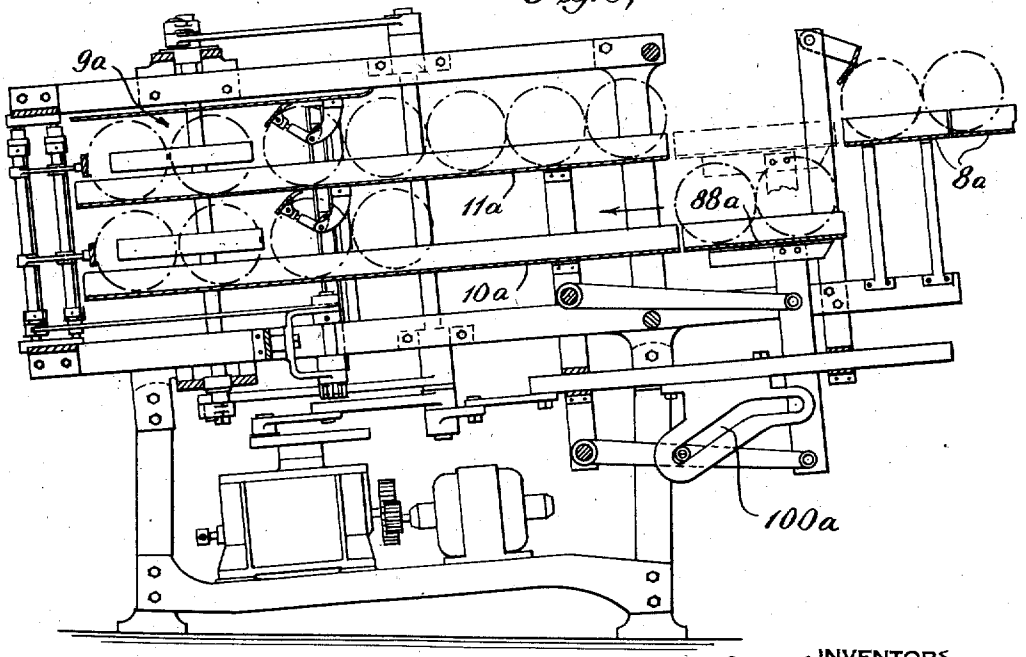

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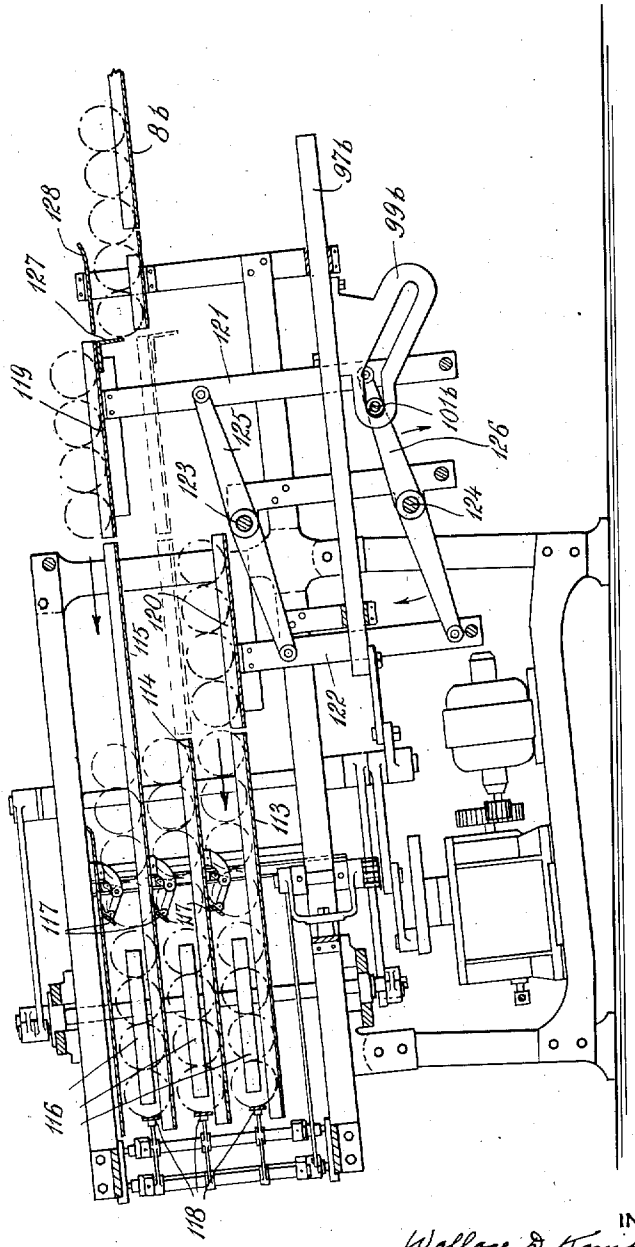
Fig. 10.



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Patented May 10, 1938 2,116,793

UNITED STATES PATENT OFFICE

2,116,793

CAN CASING MACHINE

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Application April 17, 1936, Serial No. 74,840

18 Claims. (Cl. 226—15)

This invention relates to can casing machines, that is to say, to machines which are adapted to place or pack cans, or other round containers, in shipping cases, such, for example, as cartons made of corrugated board or of other fibrous material, or in boxes or the like.

The cans are usually fed to such machines rolling on their sides in a single line coming from the labelling machine or from some other previous operation. In order to form a group of the cans into a charge suited to the size and shape of the packing case or carton, the cans from the feed line are rearranged, in a load-forming enclosure, or charge-holding frame, into a convenient number of superposed rows, each containing the requisite number of cans. The charge of cans is then ejected from the charge-holding frame into the case.

In can casing apparatus as heretofore constructed, the mechanism for rearranging the cans and forming the charge permitted the cans to strike one another or parts of the machine with considerable force. With cans of moderate diameter, and particularly of moderate weight, the impact is not sufficient to damage the cans. With cans of large diameter, however, especially filled cans whose contents are heavy, difficulty has been experienced in constructing casing apparatus on the principles heretofore followed in building machines for handling cans of small or moderate size and weight.

The object of the present invention is to provide a can casing machine of improved construction which may, if desired, be used for cans of all sizes, and particularly to provide a machine which is adapted to pack large, heavy cans, such, for example, as five quart cans of lubricating oil. Such cans are from six to eight inches in diameter and from ten to twelve inches in length, and weigh in the neighborhood of ten to fifteen pounds each.

Stating the object of the invention in a somewhat different way, it is to construct a case packing machine in such a way that the cans from the feed line are rearranged in superposed rows of the desired number of cans without damaging or marring the cans.

It is also important, under certain conditions, to place the cans in the cases in numerical order. Another object of the present invention is to provide a can casing apparatus which will deposit the cans in the cases in sequence so that, for example, the first group of cans in the feed line consisting of the number of cans required for a charge, will all be placed in the same case and not be divided between two or more cases.

An additional object of the invention is to provide a simple compact mechanism having few parts, for actuating the charge-forming and ejecting mechanism of the apparatus.

The invention will be understood from the following description taken in connection with the accompanying drawings which illustrate by way of example a number of embodiments of our improved can casing machine.

In these drawings:

Fig. 1 is a view of the machine in side elevation looking from the front, that is to say, from the side of the machine on which the operator stands and toward which the filled cartons or the filled cases are ejected;

Fig. 2 is a plan view of the machine of Fig. 1;

Fig. 3 is a view in transverse vertical section taken on the plane indicated by line 3—3 of Fig. 1;

Fig. 4 is a horizontal section taken on the plane indicated by line 4—4 of Fig. 3 showing the details of the one revolution clutch for controlling the operation of the machine;

Fig. 5 is a transverse section taken on the plane indicated by line 5—5 of Fig. 3 illustrating details of the gate controlling mechanism;

Fig. 6 is a fragmentary transverse sectional view, partially diagrammatic, showing further details of one of the gates for controlling admission of the cans to the charge-holding frame, and the gate operating mechanism;

Fig. 7 is a vertical section taken on the plane indicated by line 7—7 of Fig. 6 showing the gate in both its raised and lowered positions;

Fig. 8 is a vertical transverse section taken on the line 8—8 of Fig. 2 drawn to a somewhat smaller scale and showing the gates in their lowered or closed positions;

Fig. 9 is a view similar to Fig. 8 illustrating a modification; and

Fig. 10 is a view similar to Fig. 8 illustrating a further modification.

Referring now to the accompanying drawings, the machines illustrated in Figs. 1 to 9, inclusive, are intended for packing five quart cans containing heavy material, such as lubricating oil, the cans being arranged in two superposed rows of two cans each, as shown in chain lines in Figs. 8, 9 and 3, and then slid lengthwise into the carton 1 shown in Fig. 3 also in chain lines.

The frame of the machine comprises four upright members 2 and longitudinally extending bars 3 and 4, these bars being tied together at

their ends and at appropriate intermediate points by suitable cross pieces. In the space in the center of the machine below the longitudinal bars 3 is a driving motor 5 and housing 6 for a speed reducing gear and one revolution clutch to be described later. These are supported upon members 7 attached to the uprights 2.

The cans approach the machine on an inclined feed line or runway 8 at its right hand end. The load-forming enclosure, or charge-forming frame, indicated generally by 9 is at the left hand end of the machine and is adapted to contain four cans, as shown in Fig. 8. In order to deliver the cans to the charge-forming frame in two superposed rows, two runways 10 and 11 are provided. These runways consist of steel plates forming floors upon which the cans may roll. These plates have guide rails 12 and 13 along their sides for guiding the ends of the cans. These runways are supported near their right hand ends on upright bars 14 secured to the lower longitudinal members 3. At about their longitudinal centers these runways are supported by brackets 15 which are pinned to vertical rods 16 attached at their upper and lower ends to the longitudinal members 4 and 3 by any suitable means, such, for example, as the brackets 17.

Runways 10 and 11 extend beyond the supporting rod 16 and constitute supports for the cans in the charge-holding frame 9. The guide rails 12 on the front edges of the runways terminate, as shown in Fig. 1, at the entrance to the guide holding frame so as to permit the cans to be slid in the direction of their axes across the supporting plates of runways 10 and 11 and through the funnel 18 into the carton 1, as shown in Fig. 3.

The cans are ejected from the can holding frame into the carton by means of pushers 19 which are adapted to reciprocate horizontally. These pushers consist of framelike members, as shown in Fig. 2 and have faces of an appropriate length, as shown in Fig. 1, to push the cans into the carton. These faces are preferably lined with a cushioning material such, for example, as hard fiber, or rubber, to prevent the marring of the cans.

Pushers 19 are secured in fixed spaced relation upon a vertical rod 20 constituting their support and arranged to slide horizontally between the pairs of guide bars 21 and 22. A slide 23 which fits between the guide bars 21 is mounted near the lower end of rod 20, and a slide member 24 having sufficient length to firmly hold the pushers 19 and rod 20 against rotational movement is fixed near the upper end of rod 20. This guide member has vertical surfaces engaging the inside faces of guide rods 22, and horizontally projecting flanges shown in Fig. 2 which engage the upper faces of these guide bars and support the plunger or pusher structure as a whole.

The reciprocation of pushers 19 is accomplished by means of a crank and linkage mechanism shown to advantage in Fig. 2. The crank pin, which is indicated by 25 is mounted in the upper face of a disc 26. A connecting rod 27 joins the crank pin with the outer end of a lever arm 28 which is fixedly secured near the lower end of a vertical rod 29 which is mounted for oscillation in suitable brackets 30 which are secured to frame members 3 and 4. Adjacent the upper and lower ends of rod 29 are mounted swinging arms 31 and 32 which are connected to the upper and lower ends of plunger rod 20 by means of links 33 and 34.

The crank disc 26 is mounted upon the upper end of a shaft 35 which is vertically mounted within the housing 6, and the driving mechanism for this shaft comprises the reducing gear and one way clutch mechanism illustrated in detail in Figs. 3 and 4. The horizontal driving shaft 36 of this mechanism is connected in any suitable manner, as by means of the gearing shown in Fig. 1, to driving motor 5. The speed reducing gear consists of a worm 37 which drives a worm gear 38. Mounted adjacent worm gear 38 and arranged to rotate therewith is a toothed wheel 39. Gear 38 and toothed wheel 39 are mounted loosely on vertical shaft 35 and rotate continuously so long as motor 5 is energized.

Mounted in fixed relation to shaft 35 is an arm 40 which projects from a hub 41, and near the outer end of this arm a dog 42 is pivoted at 43. This dog has a nose at its outer end which is adapted to enter between the teeth of toothed wheel 39 and cause the shaft 35 to be driven thereby. A spring 44 biases the nose of the dog toward the toothed wheel. Dog 42 has a tail 45 which, when shaft 35 is stationary, is engaged by pawl 46 pivoted at 47 and actuated by a rod 48 which is attached to a pedal (not shown) arranged in a convenient position for the operator near the front of the machine.

When the operator depresses the pedal, the outer end of pawl 46 is pulled downwardly, releasing the tail 45 and allowing spring 44 to pull the dog into engagement with toothed wheel 39. If the operator releases the pedal immediately after depressing it, shaft 35 will make one revolution only, and will be stopped abruptly as soon as the tail 45 again engages the end of pawl 46. This not only removes the dog from engagement with toothed wheel 39, but forcibly stops the rotation of arm 40 and shaft 35.

It will be understood that whenever the operator is ready to have a charge of cans ejected into a case such as the carton 1, he presses down the pedal as above described and shaft 35 and crank pin 25 are caused to make a single revolution. This causes plungers 19 to move forward from the position shown in Fig. 3 and engage the ends of the cans in the load-forming enclosure 9 and slide them into the carton. Upon the return stroke of pushers 19 they will be stopped in the position shown in Fig. 3.

The abrupt stopping of the rotation of the crank disc and shaft 35 by the engagement of pawl 46 with the tail of dog 42, as above described, prevents the overruning of the crank disc which might advance the ends of pushers 19 into the path of the next charge of cans as they roll into the charge-holding frame from runways 10 and 11 under the control of the gate mechanism which will be described presently. On account of the abrupt stopping of the rotation of shaft 35 and its connected parts, there is a tendency for the arm 40 to rebound after engagement of the tail 45 of the dog with the end of the pawl 46. As this might cause the backward rotation of the crank disc 26 far enough to move pushers 19 into the path of the oncoming cans, a second arm 49 is provided on hub 41 approximately opposite arm 40. The end of this arm has a rounded forward corner and a sharp rearward corner. Coacting with this arm is a spring pressed pawl 50 having a shoulder which snaps into engagement with the sharp rear corner of the end of arm 49 at approximately the same instant that the engagement of tail 45 engages the end of pawl 46 and releases pawl 42. When shaft

35 is stopped it is therefore locked against movement in either direction, and it is impossible for pushers 19 to be left in the path of the oncoming cans.

It will be understood that if the operator replaces carton 1 with successive cartons with sufficient rapidity, there is no necessity for the reciprocation of pushers 19 to be interrupted. It will be understood that by keeping the pedal depressed and pawl 46 withdrawn out of the path of tail 45, shaft 35 will rotate continuously.

In order to facilitate the placing of cartons over the funnel structure 18, this structure is provided with two tapering sides 51 and 52 constructed of flexible resilient material to permit them to be flattened out between the sides of the cans and the walls of the carton as the cans are pushed forwardly. The two opposite sides of the funnel structure, however, shown at 53 and 54 in Fig. 1 are substantially rigid and parallel to the path of travel of the cans as they slide into the carton.

The cartons are supported on their side during the ejection of the cans into them by means of a support 55 preferably provided with rollers, as indicated in Fig. 2. The operator during the ejecting operation stands directly in front of the funnel and receives the loaded carton with his hands as it is pushed forward by the charge of cans, and he lowers and turns the carton as it moves over the support 55 and eases it into upright position onto a suitable support which is usually a travelling conveyor which carries the filled carton to a carton flap-closing, gluing and sealing machine.

The admission of the cans from the cans stored in the storage runways 10 and 11 into the charge-holding frame 9 is controlled by gates indicated generally by 56 and 57. In Fig. 1 these gates are in the raised position allowing the cans in the storage runways to advance into the load-forming enclosure. In Fig. 8 the gates are in the lowered position where they engage the first can in each row outside of the charge-holding frame and prevent the advance of the cans. When the pushers 19 are at the back end of their stroke, as shown in Fig. 9, gates 56 and 57 are raised, and as soon as the pushers commence to move on their forward stroke the gates are lowered, and remain in lowered position until the plungers 19, on their return stroke clear the path of the cans. This gate mechanism will now be described:

Gates 56 and 57 are identical in construction. Each consists of a thin, flat strip, or blade 58 (see Figs. 6 and 7) extending across the runway and supported at each end by arms 59 pivoted at 60 to a bracket 61 which is mounted upon the machine frame. Brackets 61 are of such a length as to position pivots 60 about midway between the surface of the runway and the top side of the can as it rolls along the runway, for a purpose which will appear later on. In order to reduce to a minimum the necessary movement of arms 59 from open to closed position, blades 58 are turned or "feathered" as the gates are moved upward from the closed to open position.

For this reason the blades are pivotally mounted on the ends of arms 59, as shown in Fig. 7, and are provided at each end with a cam 62. The cams of gate 57 engage the lower surface of the plate or runway 11, while the cams of gate 56 engage the lower surface of a guard plate 63 which is provided to define the upper limits of the load forming enclosure 9. The pivot mountings of blade 58 and cams 62 are carried by small blocks 59' which have rounded stems that are slidably received in the ends of arms 59 and are provided with springs (not shown) which resist the outward movement of the stems. Cushioning means is thus provided allowing the cans which are in contact with the gates to move forward slightly as succeeding cans roll against them.

In order to actuate the gates the gates supporting arms 59 are provided with short extensions 64 to each of which an actuating block 65 is pivoted. The actuating blocks of both gates 56 and 57 on the front side of the machine are received within a vertical channeled actuating member 66 and the actuating blocks 65 at the rear of the machine are engaged by channeled actuating member 67. These channeled actuating members 66 and 67 are arranged to be oscillated a small distance longitudinally of the machine in timed relation to the operation of the plunger, as will be presently explained, and this movement rocks the projection 64 and arms 59 about their pivot 60, thereby lowering or raising the gates 56 and 57.

The two channeled actuating members 66 and 67 are each bifurcated at their lower ends to provide two short parallel arms 68. These arms of member 66 are fixed to a short shaft 69 and the corresponding arms of member 67 are fixed to a short vertical shaft 70. These short shafts 69 and 70 are mounted for rotation in the bifurcated arm 71 (see Fig. 8) of a bracket 72 which is bolted to a cross piece 73, as shown in Fig. 5, which in turn is mounted upon the lower side bars 3 of the machine frame.

Shafts 69 and 70 extend below the lower bifurcated arm 71 of bracket 72, as may be seen in Figs. 8 and 3, and fixed to the lower ends of these shafts are a pair of narrow coacting gear sectors 74 which cause the channeled actuating members 66 and 67 to move in unison. The movement of these members 66 and 67 in one direction is produced by means of helical springs 75 and 76, as shown in Fig. 2, one of which is attached to member 66 and the other to member 67. These springs cause the channeled actuating members 66 and 67 to be moved against adjustable stops 77 (see Fig. 1) and 78 (see Fig. 2).

Movement of channeled actuating members 66 and 67 in the opposite direction is accomplished by means of a cam 79 formed on the peripheral surface of crank disc 26. This cam surface coacts with a cam follower roller 80 mounted on the end of a crooked arm 81, which for a distance lies substantially parallel to disc 26, and then turns upwardly, as shown in Fig. 1 and is fixed to the lower end of short shaft 69.

As crank disc 26 rotates in the direction of the arrow shown in Fig. 2, and as the channeled actuating members 66 and 67 are shown in this figure in position to raise the gates 56 and 57 to open position, soon after the crank disc commences its rotation after the clutch shown in Fig. 4 is released, the formation of cam 79 will cause arm 81 to move inwardly, thereby causing channeled arms 66 and 67 to oscillate simultaneously to the left, thus closing the gates. The gates will remain closed until crank disc 26 has made approximately ¾ revolution, and then will again gradually open.

The machine is provided with mechanism for causing the group of cans in the can holding frame 9 to be separated from the cans stored in the runways 10 and 11. This comprises movable stops 82 which are mounted at the left hand side of the can holding frame 9. Stops 82 arrest the

forward movement of the cans when they advance into the load-forming enclosure, and simultaneously with the descent of gates 56 and 57 to closed position, these stops are arranged to recede slightly to the left so as to allow the four cans in the charge-holding frame to move away from the cans in runways 10 and 11 which are held back by the gates.

For this purpose, stops 82 are mounted on two spaced parallel rods 83. These rods are pivotally carried at both their lower and upper ends on pairs of pivoted arms 84. These arms are also mounted on vertical rods 85 so that the arrangement constitutes a parallelogram mounting for the stops 82 so that the faces of these stops are maintained in all positions at right angles to the path of movement of the cans.

For the purpose of causing stops 82 to recede just before the pushers 19 engage the ends of the cans, a short arm 86 is mounted on the lower end of one of the rods 85, and a link 87 is pivoted to the end of this arm. The opposite end of link 87 is pivotally connected to one of the short parallel arms 68 at the lower portion of channeled actuating member 67 on the rear side of the machine.

In order to avoid undue stress on the gates 56 and 57 and their operating mechanism, it is desirable that the movement of the gates toward closed position shall not move the cans in the storage runways 10 and 11 backwards. Also the gates must make contact with the cans immediately beneath them before stops 82 recede an appreciable distance, for otherwise the cans in the storage runways would move forward with the cans in the load-forming enclosure or can-holding frame. Inasmuch as the gates and the can stops are actuated by means of a single cam, that is, cam 79, this presents something of a problem. The solution of this problem is accomplished by the mounting of the pivots 60 of the gate supporting arms 59 (see Fig. 7) approximately midway of the vertical diameter of the cans and causing the pivots to approximately coincide with the center of the can which is to be engaged by the gate. With this arrangement, when each of the gates moves downwardly toward closed position, the inner surface of its blade rotates along the surface of a cylinder which approximately coincides with the surface of the can beneath the gate. Hence the downward motion of the blade, after making contact with the surface of the can, is a mere sliding motion around the can which does not impart any appreciable motion to the can.

As mentioned at the beginning of the description, the cans are received by the machine from can feed line 8 which usually conveys the cans by gravity from a labelling machine to the case packing machine. Feed line 8 is in alinement with and forwards the cans to one of the can storage runways of the machine. The machine may be so arranged that the cans from the feed line are fed to the lower storage runway, to the upper storage runway, or in the case of a machine provided with three runways to the intermediate runway. In the form of our invention shown in Fig. 8, the feed line 8 is in alinement with the lower storage runway 10, and elevating mechanism is provided for separating and elevating to the storage runway 11 a group of cans corresponding to the number of cans in the upper row of the charge-holding frame, in this case, two cans. The elevating mechanism is actuated in timed relation to the operation of the pushers 19 so that while the pushers are ejecting the cans into the carton from the can-holding frame, the group of cans referred to is elevated and discharged onto the upper runway 11, and by the time the pushers return to their original position, the elevating mechanism has also returned to its lowermost position in alinement with the runway 8.

As shown in Figs. 1, 2 and 8, this elevating or transferring mechanism includes a short platform 88 comprising a section of runway similar to runways 10 and 11 and mounted between the right hand end of the lower runway 10 and the discharge end of the feed conveyor 8. This elevating platform 88 is provided in each side of the machine with vertical supporting bars 89. For controlling the movement of the elevating device a parallelogram linkage mechanism is provided which comprises two pairs of arms 90 and 91 pivoted at their right hand ends to the uprights 89. At their left hand ends each pair is fixed rigidly to one of two transverse shafts 92. Each of these shafts is pivoted in bearings carried by upright bars 14. The surface of elevating device 88 is thus maintained parallel with the surface of lower runway 10 and the end of feed conveyor 8, as it is raised to lift a group of two cans, as shown in Fig. 8, and discharge them on the upper runway 11.

For the purpose of raising and lowering the elevating device 88 in timed relation to the operation of pushers 19, a bar 93 is mounted for sliding movement beneath the runway 10. The forward end of this bar is supported on cross piece 94 which extends between upright bars 14. A guiding bearing on this cross piece is furnished by means of a strap 95. In order to support the rear portion of bar 93 a pair of uprights 96 are bolted to the lower frame bars 3, as shown in Fig. 8, and a cross piece 97 is mounted between the lower portions of these uprights. A second strap 98 forms the guiding bearing.

On the lower side of this sliding bar 93 there is bolted a cam member 97 having a closed cam slot 100 which is arranged to engage a roller 101 which is pivotally mounted on one of the lower arms 91 of the parallelogram linkage. Hence, as the bar 93 is moved to the left, the elevating platform 88 will be raised, and when the bar is moved in the opposite direction the platform will be lowered.

The reciprocation of actuating bar 93 is accomplished by means of a link 102 connecting the left hand end of the bar with a lever arm 103, which is fixed to the lower end of shaft 29 which carries arms 31 for actuating pushers 19. It will be remembered that shaft 29 is oscillated for actuating the pushers by means of the crank pin 25 on disc 36.

The position and the shape of cam groove 100 are such that during about the first 1/8 of the revolution of the crank pin 25, elevating platform 88 remains in its lowered position in alinement with feed line 8 and runway 10. During this period, pushers 19 have advanced into contact with the ends of the cans and have begun to shove them toward the funnel 18.

When the machine is first placed in operation it is "primed" with cans. That is to say, four cans are placed by hand, two on the lower row and two on the upper row of the charge-holding frame, and cans are also placed in the storage space on runway 10 from gate 57 back to the elevating platform 88, as shown in Fig. 8. Two cans for the next succeeding charge are also

placed on upper runway 11 adjacent gate 56. During the period that platform 88 is in alinement with runway 10, two cans will advance from the feed line 8 onto the elevating platform. As the crank disc 26 continues to revolve, the sloping portion of cam slot 100 will engage roller 101 and lift the elevating platform 8. By the time the crank pin has rotated about 180° from its original position, thereby carrying pushers 19 to the end of their outward stroke, platform 88 has reached a position even with the upper runway 11 and the two cans thereon roll forward against the two cans already on this runway.

During the further rotation of crank disc 26, platform 88 is lowered back to its original position in alinement with runway 10, and two more cans from runway 8 roll forward onto platform 88. Soon after the ends of plungers 19 have been withdrawn on their inward stroke out of the path of the cams in runways 10 and 11, as shown in Fig. 3, the gates 56 and 57 are raised by the mechanism previously described, thereby permitting the rows of cans in runways 10 and 11 to advance until the foremost can of each row is in contact with the stops 82, thus bringing a second charge of cans into the charge-holding frame 9.

By always having a full charge of cans on runway 11 as well as on runway 10 at the time of the opening of gates 56 and 57, the charge-holding frame will be filled promptly and the pushers 19 can again move forward without delay.

During the time that the platform 88 is elevated out of its lowermost position, it is necessary to hold back the cans on feed line 8. There are different ways of holding these cans back, one of which is shown in Figs. 1, 2 and 8. As here shown, an auxiliary gate 104 is provided which consists of a metal bar extending crosswise of runway 8 and supported at each end by arms 105 which are fixed to the opposite ends of a cross shaft 106 which is mounted at the upper ends of the uprights 96. On the front end of this shaft is mounted a lever arm 107 to which a link 108 is connected. The opposite end of this link is pivoted at 109 to the channeled actuating member 66. As stated previously, this channeled actuating member 66 is oscillated from right to left, as shown in Fig. 2 when crank pin 25 commences its rotation. Hence, simultaneously with the lowering of gates 56 and 57 to closed position, and the retraction of stops 82, auxiliary gate 104 is also lowered. In this lowered position, gate 104 is in contact with the first can in feed line 8 ahead of platform 88.

In order to reduce the wear on the cam slot 100 and other parts of the machine, and also for the purpose of reducing the load on the driving motor 5 to a minimum, means are provided in our improved machine for counterbalancing the weight of elevating platform 88, its connected parts and the cans thereon. As shown in Figs. 1, 2 and 8, this counterbalancing means comprises a pair of long helical springs 110, one on each side of the machine. These springs are attached at their upper ends to hooks 111 which are attached to the uprights 96. At their lower ends, springs 110 are secured to extensions 112 of a cross structure shown in dotted lines in Fig. 2 for tying together the lower ends of supporting bars 89 of the elevating device.

In the modified form of our invention shown in Fig. 9, the feed line 8_a, instead of being in line with the lower runway 10_a, as in the form of machine previously described, is in line with the upper runway 11_a. The elevating platform 88_a is, therefore arranged to lower instead of raise a group of cans, in this case, two, from the upper runway to the lower runway in timed relation to the operation of the pushers for pushing the charge of cans in the load-forming enclosure 9_a into the carton. All parts of the modification shown in Fig. 9 are constructed like those shown in Figs. 8, 1 and 2, except for the fact that the cam slot 100_a is reversed in its position, as may be seen from comparing Figs. 8 and 9, so as to cause the lowering of the platform during the advance of the pushers instead of the raising of the platform.

In the modified form of our improved packing machine shown in Fig. 10, the charge of cans consists of three superposed rows, and the feed line 8_b is arranged in line with the intermediate or central runway of the three runways 113, 114 and 115. A double transferring device is employed arranged to elevate one group of cans forming a complete row of the charge and delivering it to the upper runway 115, and simultaneously lowering a second group of cans from feed line 8_b and delivering it to the lowermost runway 113. This machine is arranged to handle cans of somewhat smaller diameter than the machine shown in the other figures of the drawings, and there are four cans in each row instead of three. It will be understood, however, that the machine is adapted to work equally well with cans of both smaller and larger diameter than those indicated in Fig. 10, and any desired number of cans may be arranged in each row of the charge.

In the machine of Fig. 10, the pushers 116 are mounted and operated in a similar manner to the pushers 19, the only difference being that there are three pushers instead of two. The same is true of the gates 117 and the can stops 118. Almost any desired number of can stops can be actuated simultaneously by the channeled actuating members 66 and 67.

The double transfer mechanism comprises an elevating device or platform 119 and a lowering device or platform 120. Each of these platforms has an understructure similar to the understructure of elevating platform 88 and consisting of a pair of uprights 121 and 122, respectively. When in their normal position, both of the platforms 119 and 120 are in alinement with each other, with the feed line 8_b and with the intermediate storage runway 114, and the platforms are adjacent one another and form a bridge for conveying cans from the feed line 8_b to the runway 114.

Midway between the two transferring devices, as shown in Fig. 10, there are two horizontal shafts 123 and 124 which are pivotally mounted in the frame structure of the can casing machine. Fixedly mounted on shaft 123 is a pair of spaced arms 125 extending equal distances on either side of the shaft 123 and pivoted at their ends to the spaced uprights 121 and 122, respectively. Shaft 124 is provided with similar arms 126 which are pivoted in a similar manner to these uprights so that the structure as a whole forms a double parallelogram linkage in which the weight of the elevating device 119 with its load of cans is substantially equally balanced by the weight of the lowering device 120 together with its cans.

The double transferring mechanism is operated by means of a reciprocating rod 97_b which is similar to rod 97, although somewhat longer, and which is reciprocated by means similar to that described in connection with Figs. 1, 2 and 8. The cam member 99_b is provided with a cam slot which

is very similar to the cam slot 100 and which coacts with a roller 101b pivotally mounted on the side of one of arms 126.

A different form of mechanism for holding back the line of cans in feed line 8b is shown in Fig. 10. This consists of a plate 127 which is arranged to extend downwardly beneath the right hand end of elevating device 119. As the device is raised, plate 127 remains in the path of the cans in the feed line and prevents them from moving forward. In order to prevent the cans from piling up at the lower end of the feed line, a guard plate 128 is mounted in fixed position parallel to the floor of the feed conveyor and slightly spaced above the tops of the cans.

In the machine of Fig. 10, the distance between gate 117 of the middle storage runway 114 and the end of the first transfer conveyor 120 is chosen so as to accommodate the same number of cans which constitutes a row of the charge, in this instance, four cans. Alternatively the length of this storage runway can be made to contain any multiple of the number of cans required to form a row or layer of the charge. It will be understood also that the machine shown in Figs. 1, 2, 8 and 9 can also be constructed in this manner, if desired. When so constructed, the cans will be packed by the casing machines in the successive cartons in sequence. That is to say, referring to the machine of Fig. 10, the first 12 cans to enter the machine from the feed line 8b will be packed in the first carton placed upon the funnel of the machine, the second 12 cans in the second carton and so on. In this way, if the cans are serially numbered, as is desired in certain instances, the numbers of the cans in each carton may, if desired, be stamped upon the carton as it is packed. Alternatively, if, at the commencement of packing of a particular batch of serially numbered cans, the cases or cartons are also serially numbered, the numbers of the cans which are contained in any particular carton can be readily ascertained after the carton is sealed without opening the carton.

In the machines herein described, the groups of cans to form additional layers or rows in the charge are bodily transferred from the feed line to the superposed row, or rows, instead of permitting the cans to roll individually through some form of guide device, as in the case packing machines as heretofore constructed. By bodily transferring the cans in groups, cans of considerably larger diameter and weight than heretofore can be operated on and placed in cartons by our improved machine without fear of denting or otherwise damaging the cans. The speed of operation, that is, the rapidity with which cases can be packed, is as high or higher than the speed of operation of the former machines in packing smaller cans. The mechanism which we have provided for operating the packing pushers, the gate mechanism, the can stops and the transfer conveyors is simple, not apt to get out of order, and occupies little space. This desirable feature of compactness is in no small degree brought about by the crank and cam arrangement which we employ.

It will be understood that changes may be made in the details of our improved machines without departing from the spirit of our invention, the scope of which is set forth in the appended claims:

What we claim as new and desire to secure by Letters Patent of the United States is:

1. In a can casing machine the combination of a charge-holding frame for receiving at least two superposed rows of cans and from which the cans can be ejected into a case, a plunger for pushing a charge of cans in said frame into the case, two conveyors along which the cans move by gravity leading to the respective rows of said frame, a can feed conveyor connected to one of said conveyors, and means for bodily transferring as a group a plurality of cans from said feed conveyor to said other conveyor while maintaining substantially constant the application of gravitational force to the cans tending to cause them to roll.

2. In a can casing machine the combination of a charge-holding frame for receiving at least two superposed rows of cans and from which the cans can be ejected into a case, a plunger for pushing a charge of cans in said frame into the case, two conveyors along which the cans move by gravity leading to the respective rows of said frame, a can feed conveyor connected to one of said conveyors, means for bodily transferring as a group a plurality of cans from said feed conveyor to said other conveyor while maintaining substantially constant the application of gravitational force to the cans tending to cause them to roll, and means actuated in timed relation to said transferring means for preventing the forward movement of the cans in the feed conveyor during said transfer.

3. In a can casing machine the combination of a charge-holding frame for receiving at least two superposed rows of cans each consisting of a predetermined number of cans and from which the cans can be ejected into a case, a plunger for pushing a charge of cans in said frame into the case, two conveyors along which the cans move by gravity leading to the respective rows of said frame, a can feed conveyor connected to one of said conveyors, and means operated in timed relation to the advance of said plunger for simultaneously displacing to substantially the same extent and in an approximately vertical direction from said feed conveyor to said other conveyor a plurality of cans in number corresponding to the cans in a single row within the charge-holding frame.

4. In a can casing machine the combination of a charge-holding frame for receiving a plurality of superposed rows of cans each consisting of a predetermined number of cans and from which the cans can be ejected into a case, a plunger for pushing a charge of cans in said frame into the case, conveyors leading to the respective rows of said frame, a can feed conveyor connected to one of said conveyors, and means operated in timed relation to the advance of said plunger for elevating from the feed conveyor to one of said other conveyors a plurality of cans equal in number to those contained in a single row within the charge-holding frame.

5. In a can casing machine the combination of a charge-holding frame for receiving a plurality of superposed rows of cans each consisting of a predetermined number of cans and from which the cans can be ejected into a case, a plunger for pushing a charge of cans in said frame into the case, two conveyors along which the cans move by gravity leading to the respective rows of said frame, a can feed conveyor connected to one of said conveyors, and means operated in timed relation to the advance of said plunger for lowering from the feed conveyor to one of said other conveyors a plurality of cans equal in number to those contained in a single row in the charge-holding frame while maintaining substantially

constant the application of gravitational force to the cans tending to cause them to roll.

6. In a can casing machine the combination of a charge-holding frame for receiving a plurality of superposed rows of cans each consisting of a predetermined number of cans and from which the cans can be ejected into a case, a plunger for pushing a charge of cans in said frame into the case, conveyors leading to the respective rows of said frame, a can feed conveyor connected to one of said conveyors, means operated in timed relation to the advance of said plunger for elevating from the feed conveyor to one of said other conveyors a plurality of cans equal in number to those contained in a single row within the charge-holding frame, and means also operated in timed relation to the advance of said plunger for lowering from the feed conveyor to another of said conveyors a plurality of cans equal in number to those contained in a single row in the charge-holding frame.

7. In a can casing machine the combination of a charge-holding frame for receiving a plurality of superposed rows of cans each consisting of a predetermined number of cans and from which the cans can be ejected into a case, a plunger for pushing a charge of cans in said frame into the case, conveyors leading to the respective rows of said frame, a can feed conveyor connected to one of said conveyors, and means operated in timed relation to the advance of said plunger for elevating a group of cans from the feed conveyor to one of said other conveyors and simultaneously lowering a second group of cans from the feed conveyor to another of said conveyors, each of said groups of cans being equal in number to those contained in a single row within the charge-holding frame.

8. In a can casing machine the combination of a charge-holding frame for receiving a plurality of superposed rows of cans and from which the cans can be ejected into a case, a plunger for pushing a charge of cans in said frame into the case, conveyors leading to the respective rows of said charge-holding frame, a can feed conveyor connected to one of said conveyors, and a vertically reciprocating transfer conveyor for transferring cans from the feed conveyor to each of the remaining conveyors.

9. In a can casing machine the combination of a charge-holding frame for receiving a plurality of superposed rows of cans and from which the cans can be ejected into a case, a plunger for pushing a charge of cans in said frame into the case, conveyors leading to the respective rows of said frame, a can feed conveyor connected to one of said conveyors, a vertically reciprocating transfer conveyor for elevating a group of cans from said feed conveyor to one of said conveyors, a second vertically reciprocating transfer conveyor for lowering a group of cans from said feed conveyor to another of said conveyors, and means for supporting and operating said transfer conveyors whereby the weight of one of said transfer conveyors substantially balances the weight of the other.

10. In a can casing machine the combination of a charge-holding frame for receiving a plurality of superposed rows of cans and from which the cans can be ejected into a case, a plunger for pushing a charge of cans in said frame into the case, conveyors leading to the respective rows of said frame, a can feed conveyor, and a vertically reciprocating transfer conveyor for transferring cans from said feed conveyor to each of said conveyors.

11. In a can casing machine the combination of a charge-holding frame for receiving a plurality of superposed rows of cans and from which the cans can be ejected into a case, a plunger for pushing a charge of cans in said frame into the case, a can feed conveyor for supplying cans to said charge holding frame, a second conveyor leading to one of the rows of said charge-holding frame and disposed above the feed conveyor, and a vertically reciprocating transfer conveyor for transferring cans from the feed conveyor to said second conveyor.

12. In a can casing machine the combination of a charge-holding frame for receiving a plurality of superposed rows of cans and from which the cans can be ejected into a case, a plunger for pushing a charge of cans in said frame into the case, conveyors along which the cans move by gravity leading to the respective rows of the charge-holding frame, a can feed conveyor connected to one of said conveyors, means for bodily transferring as a group a plurality of cans from said feed to said other conveyor or conveyors while maintaining substantially constant the application of gravitational force to the cans tending to cause them to roll, gate mechanism for controlling the entrance of the cans from said conveyors to the charge holding frame, gate mechanism for controlling the advance of the cans in the can feed conveyor, and means for operating said gate mechanisms in timed relation to said plunger.

13. In a can casing machine the combination of a charge-holding frame for receiving a plurality of superposed rows of cans and from which the cans can be ejected into a case, a plunger for pushing a charge of cans in said frame into the case, conveyors along which the cans move by gravity leading to the respective rows of the charge-holding frame, a can feed conveyor connected to one of said conveyors, means for bodily transferring as a group a plurality of cans from said feed to said other conveyor or conveyors, while maintaining substantially constant the application of gravitational force to the cans tending to cause them to roll, gate mechanism for controlling the advance of the cans in said superposed conveyors, into the charge-holding frame, gate mechanism for holding back cans in the feed conveyor during the operation of said can transferring means, and means for actuating said respective gate mechanisms simultaneously.

14. In a can casing machine the combination of a charge-holding frame for receiving a plurality of superposed rows of cans and from which the cans can be ejected into a case, a plunger for pushing a charge of cans in said frame into the case, conveyors along which the cans move by gravity leading to the respective rows of the charge-holding frame, a can feed conveyor connected to one of said conveyors, means for bodily transferring as a group a plurality of cans from said feed to said other conveyor or conveyors while maintaining substantially constant the application of gravitational force to the cans tending to cause them to roll, and means for actuating said transferring means comprising a bar adapted to be reciprocated in timed relation to the operation of said plunger, and cam means operatively connecting said reciprocating bar with said transferring means.

15. In a can casing machine the combination of a charge-holding frame for receiving a plu-

rality of superposed rows of cans and from which the cans can be ejected into a case, a plunger for pushing a charge of cans in said frame into the case, conveyors leading to the respective rows of said charge-holding frame, a can feed conveyor connected to one of said conveyors, a vertically reciprocating transfer conveyor for transferring cans from the feed conveyor to each of the remaining conveyors, and parallelogram-linkage supporting means for said conveyor.

16. In a can casing machine the combination of a charge-holding frame for receiving a plurality of superposed rows of cans and from which the cans can be ejected into a case, a plunger for pushing a charge of cans in said frame into the case, conveyors leading to the respective rows of said charge-holding frame, a can feed conveyor connected to one of said conveyors, a vertically reciprocating transfer conveyor for transferring cans from the feed conveyor to each of the remaining conveyors, parallelogram-linkage supporting means for said conveyor, a substantially horizontally reciprocating bar arranged to reciprocate in timed relation to the advance of said plunger, and cam means operatively connecting said bar and said parallelogram-linkage supporting means to cause the actuation of said transfer conveyor.

17. In a can casing machine the combination of a charge-holding frame for receiving a plurality of superposed rows of cans and from which the cans can be ejected into a case, a plunger for pushing a charge of cans in said frame into the case, conveyors leading to the respective rows of said charge-holding frame, a can feed conveyor connected to one of said conveyors, a vertically reciprocating transfer conveyor for transferring cans from the feed conveyor to each of the remaining conveyors, and means for at least in part counterbalancing said vertically reciprocating conveyor.

18. In a can handling machine, a can runway and a gate mechanism associated therewith comprising a pivoted supporting arm and a can engaging blade member pivoted thereto, said supporting arm being pivoted above the centers of the cans rolling on the runway and the blade member including cam means for feathering the blade on its upward stroke, and means associated with said runway for engaging said cam means whereby in the raised position of the gate mechanism the blade is feathered substantially into parallelism with the runway and in its lowered position the flat side of the blade engages the surface of the adjacent can on the runway above the horizontal diameter thereof.

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CERTIFICATE OF CORRECTION.

Patent No. 2,116,793. May 10, 1938.

WALLACE D. KIMBALL, ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 6, second column, lines 35 and 36, claim 3, strike out the words "along which the cams move by gravity"; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 28th day of June, A. D. 1938.

Henry Van Arsdale,
Acting Commissioner of Patents.

(Seal)

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17. In a can casing machine the combination of a charge-holding frame for receiving a plurality of superposed rows of cans and from which the cans can be ejected into a case, a plunger for pushing a charge of cans in said frame into the case, conveyors leading to the respective rows of said charge-holding frame, a can feed conveyor connected to one of said conveyors, a vertically reciprocating transfer conveyor for transferring cans from the feed conveyor to each of the remaining conveyors, and means for at least in part counterbalancing said vertically reciprocating conveyor.

18. In a can handling machine, a can runway and a gate mechanism associated therewith comprising a pivoted supporting arm and a can engaging blade member pivoted thereto, said supporting arm being pivoted above the centers of the cans rolling on the runway and the blade member including cam means for feathering the blade on its upward stroke, and means associated with said runway for engaging said cam means whereby in the raised position of the gate mechanism the blade is feathered substantially into parallelism with the runway and in its lowered position the flat side of the blade engages the surface of the adjacent can on the runway above the horizontal diameter thereof.

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