May 4, 1943. H. W. WILSON 2,318,444

CAN STACKER

Filed May 31, 1940 5 Sheets-Sheet 1

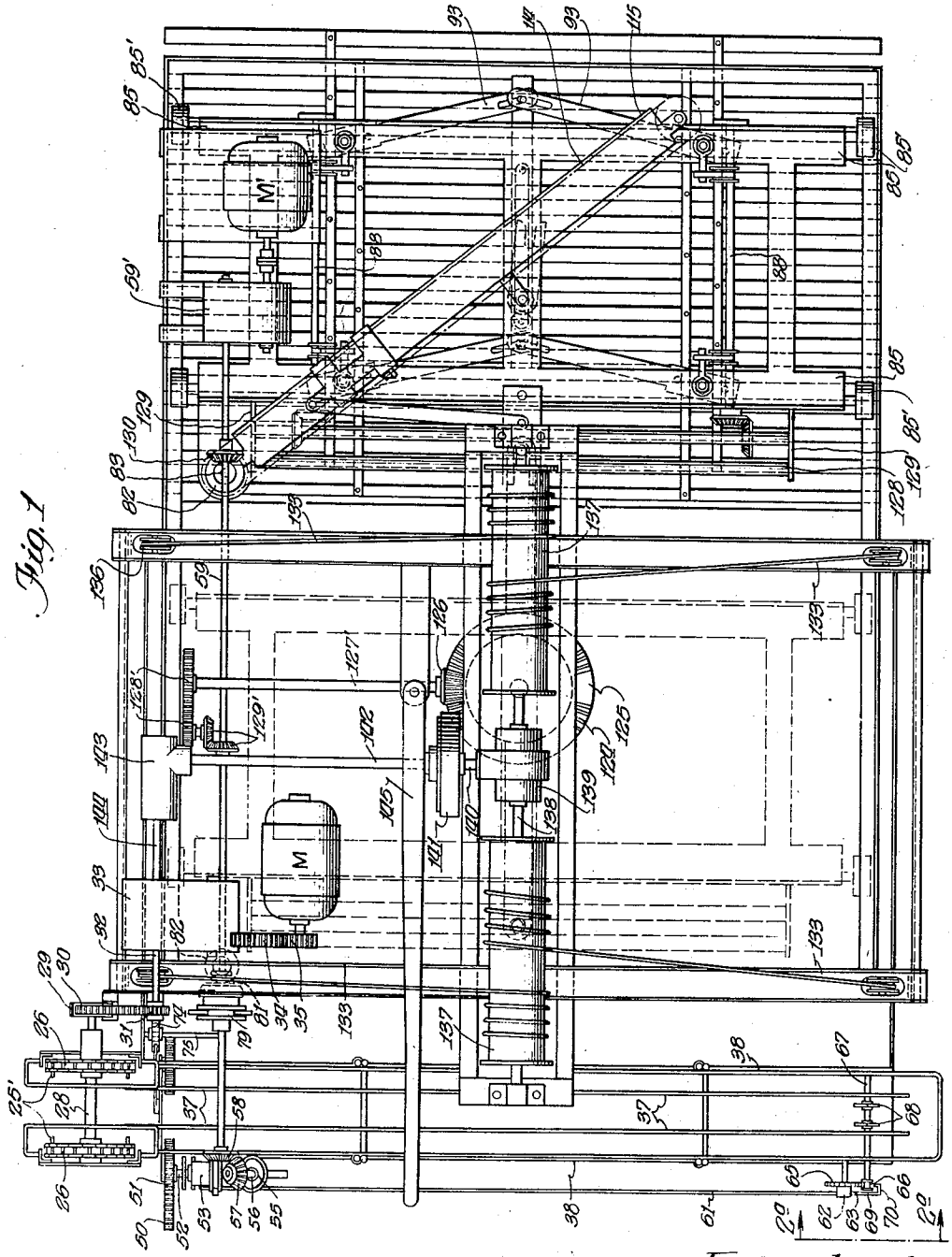

Fig. 1

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Fig. 2

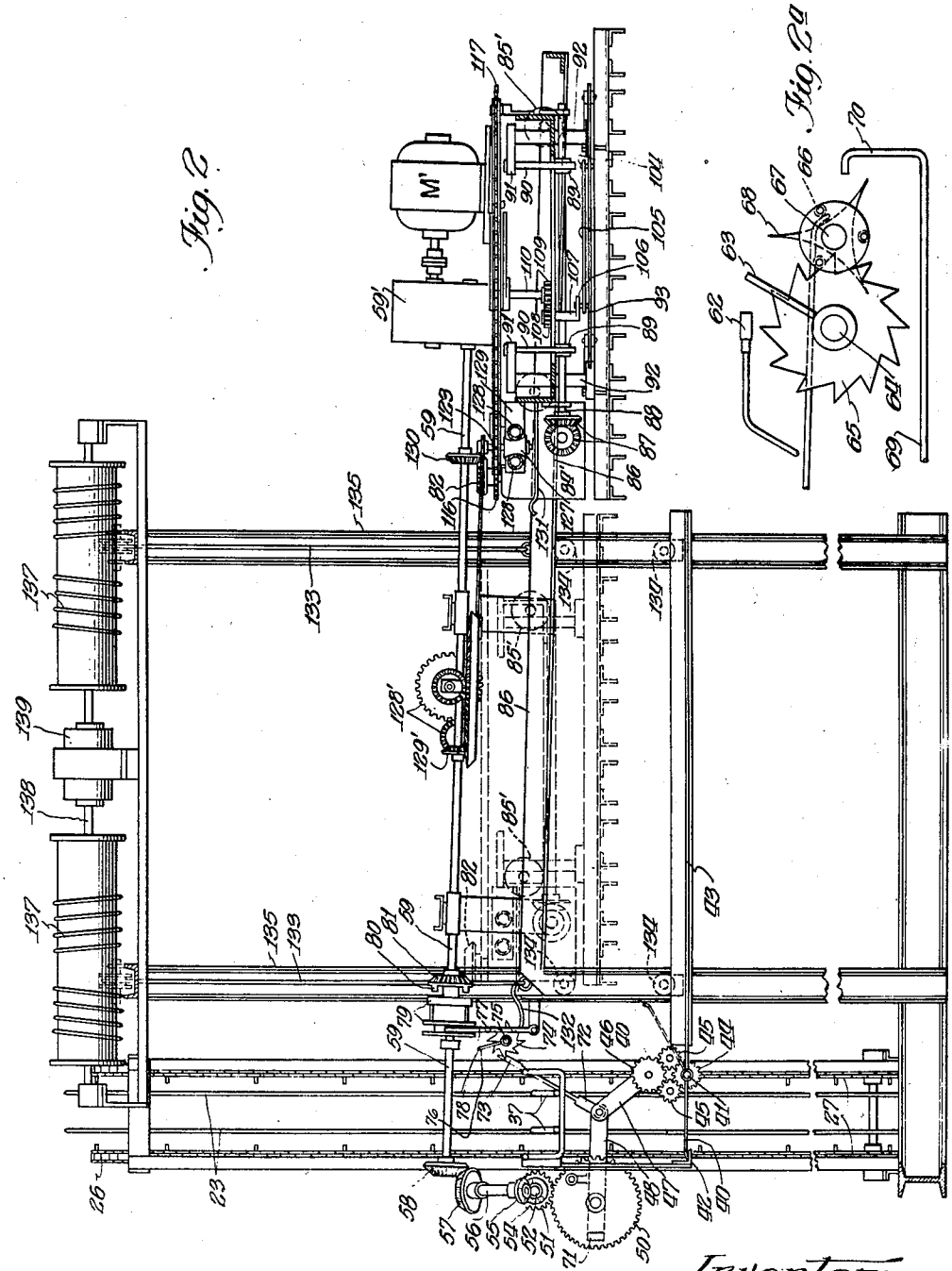

Fig. 2a

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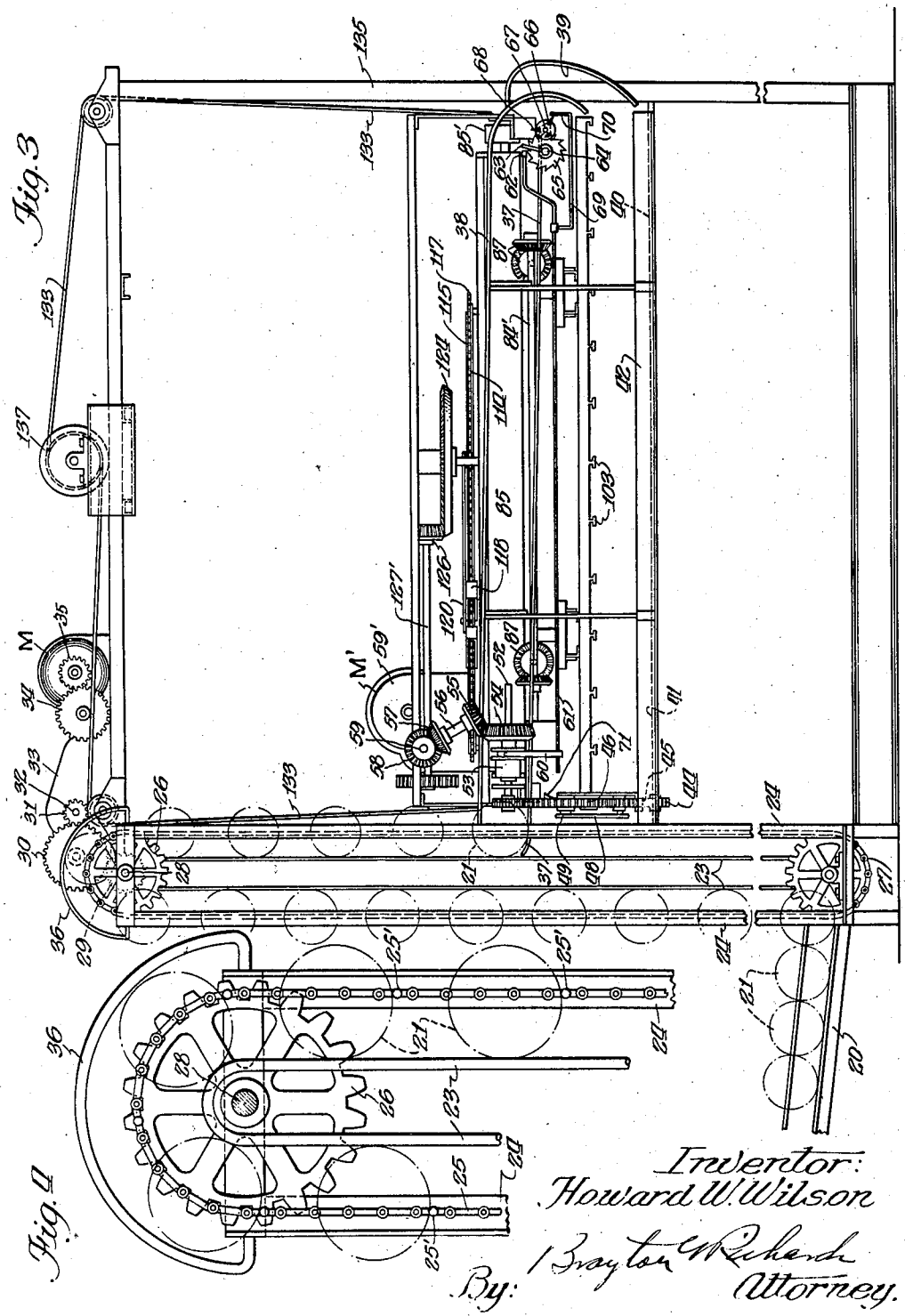

Fig. 3

Fig. 4

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Fig. 5

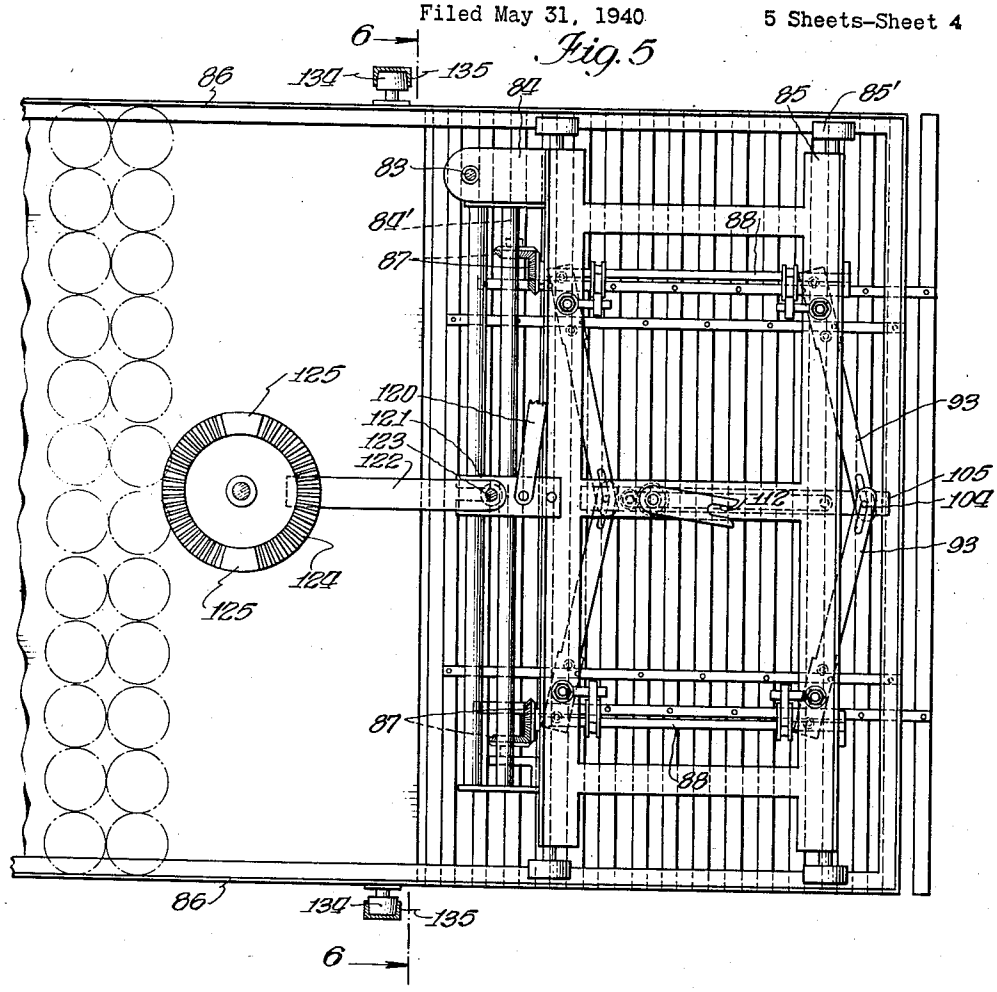

Fig. 6

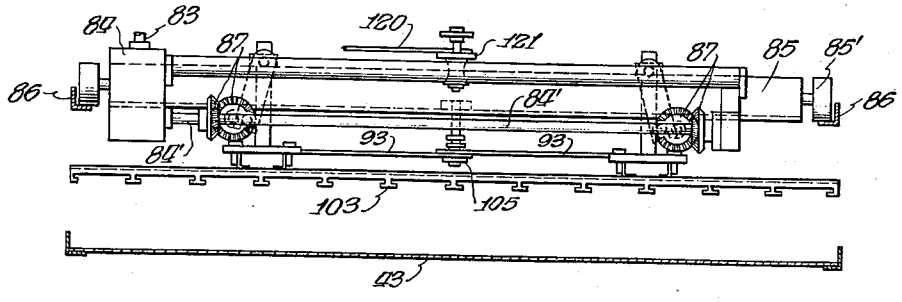

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Fig. 7

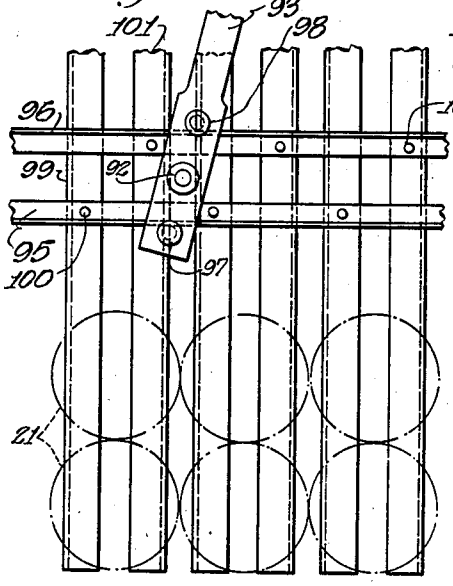


Fig. 9

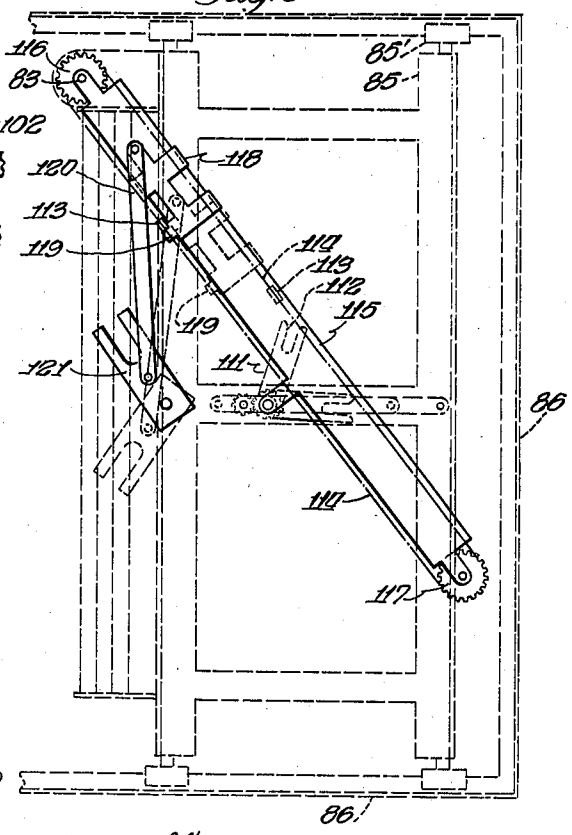
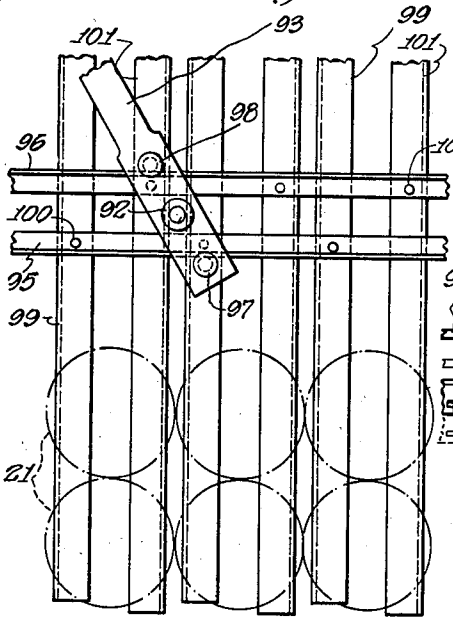


Fig. 8



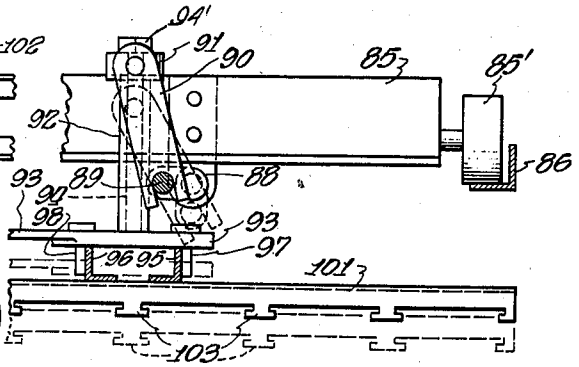


Fig. 10

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2,318,444

UNITED STATES PATENT OFFICE

2,318,444

CAN STACKER

Howard W. Wilson, Salem, Oreg., assignor to Paulus Brothers Packing Company, Salem, Oreg., a corporation of Oregon

Application May 31, 1940, Serial No. 338,252

12 Claims. (Cl. 214—6)

The invention relates to improvements in can stackers and has for its primary object the provision of an improved can stacker so constructed and arranged as to place cans in a stack for storage or other purposes automatically, which is of simple construction and highly efficient in use.

Other objects will appear hereinafter.

The invention consists of the combinations and arrangements of parts hereinafter described and claimed.

The invention will be best understood by reference to the accompanying drawings forming a part of this specification, and in which

Fig. 1 is a top plan view of a can stacker embodying the invention;

Fig. 2 a longitudinal vertical section thereof;

Fig. 2*a* an enlarged detail view taken substantially on line 2*a*—2*a* of Fig. 1;

Fig. 3 a front end view of the machine;

Fig. 4 an enlarged detail partial elevation of the upper portion of a can conveyor employed in the stacker;

Fig. 5 a horizontal section of the stacking end of the machine;

Fig. 6 a section taken substantially on line 6—6 of Fig. 5;

Fig. 7 an enlarged plan view of a portion of a can clamping arrangement employed in the stacker and showing the same in position to clamp the cans;

Fig. 8 a view similar to Fig. 7 but showing the clamping arrangement in position to release the cans;

Fig. 9 a top plan view illustrating the mechanism for actuating the can clamps for clamping and releasing the cans and associated parts; and

Fig. 10 a partial section illustrating mechanism employed for elevating and lowering the can clamps.

The embodiment of the invention illustrated in the drawings comprises an inclined can chute 20, best shown in Fig. 3, adapted and arranged to contain a plurality of cans 21 on their sides so that they will automatically roll into the machine. A can guide in the form of vertical rods 23 is arranged in the frame of the machine at the bottom of the chute 20 and in a position to constitute a stop for the cans rolling down said chute, said guide rods 23 being positioned centrally with reference to the vertical frame bars 24 of this portion of the machine. A can conveyor is arranged within the frame bars 24 in the form of two sprocket chains 25 operating over sprockets 26 and 27 positioned, respectively, at the top and bottom of the frame bars 24, as shown. The chains 25 carry inwardly projecting pins 25', best shown in Figs. 1 and 4, arranged at intervals on said chains in transverse registration with each other and so that a registering pair of said pins will contact with opposite sides of the lowermost can 21 in the chute 20 and elevate said can in contact with the corresponding guide rods 23, as will be readily understood. The upper sprocket 26 is fixed to a transverse shaft 28 carrying a gear 29 meshing with a gear 30, which in turn meshes with a gear 31 on a shaft 32 extending into a housing 33 containing suitable speed reducing gearing operable by gearing 34—35 from an electric motor M mounted as indicated on the top of the frame of the machine and arranged to constantly drive the can elevator at slow speed, as will be readily understood. A curved can guide 36 is arranged as indicated over and between the tops of the sprockets 26 and whereby the cans 21 will be carried around the top of the can guide 23, as best indicated in Fig. 4, and whereby the cans will be correspondingly lowered on the other side of the can conveyor.

As best shown in Figs. 1 and 3, another can chute 37 is arranged to project into the space between the pins 25' so that as the cans are lowered they will contact with the upper end of said chute 37 and thus will be disengaged from the pins 25' and guide rods 23 rolling down the chute 37 which is inclined as shown for this purpose. Suitable guide rods 38 are arranged above and at the sides of the chute 37 to maintain the cans thereon as they roll to the lower end thereof. Another can guide 39 is arranged as shown around the lower end of the chute 37 to deflect the cans when they roll off of said chute downwardly and inwardly onto a horizontal table leaf 40, which is carried by a rocker shaft 41, as best shown in Fig. 2, to swing vertically and has its outer edge resting upon an angle bar 42 extending along that side of the machine, as shown. As best shown in Fig. 2, the table leaf 40 constitutes an extension of an arranging table 43 arranged in horizontal registration with said table leaf 40, as shown. The shaft 41 carries a gear 44 meshing with a pair of gears 45, which in turn mesh with a gear 46 carrying a rocker arm 47 connected by a link 48 with an operating gear 50, which in turn meshes with a gear 51 on a shaft 52.

As best shown in Figs. 1, 2 and 3, the shaft 52 carries a clutch mechanism 53 splined thereto and cooperating with a bevel gear 54 loose on the shaft 52 and meshing with a bevel gear 55

on an inclined shaft 56 carrying a bevel gear 57 meshing with a bevel gear 58 on the main drive shaft 59 of the machine. The drive shaft 59 is constantly driven at slow speed by means of a motor M' operatively connected therewith through gearing enclosed in a gear housing 59'. The clutch 53 is engaged by a clutch fork 60 on a control rod 61 arranged along the side of the chute 37 and extending to the lower end thereof. At its lower end the control rod 61 is provided with an upwardly extending arm having a projection 62 at its end set in the path of an arm 63 on a shaft 64 carrying a ratchet 65, the arm 63 being arranged to engage the projection 62 at one point in its revolution on the shaft 64 and force the control rod 61 to the left, as shown in Fig. 3, as will be readily understood.

As best shown in Figs. 1, 2a and 3, a squirrel cage gear 66 is arranged on a shaft 67 extending transversely at the lower end of the chute 37 and whereby the bars of said squirrel cage gear 66 will engage the teeth of the ratchet 65 to rotate the shaft 64. The shaft 67 is provided with three operating arms 68 projecting upwardly into the path of the cans rolling off of the lower end of the chute 37 so that as each can passes the ratchet 65 will be stepped up the space of one tooth. There are twelve teeth in the ratchet 65 so that when twelve cans have thus passed off of the chute 37, the ratchet 65 and shaft 64 will have been caused to make one complete revolution. The arrangement is such that at the completion of such a revolution the arm 63 engages the projection 62 to push the control rod 61 to engage the shaft 52 with the gear 54 and thus rock the shaft 41 to swing the table leaf 40 upwardly through an angle of 160°, as indicated by the dotted lines in Fig. 2. This upward swinging of the table leaf 40 will, of course, carry the twelve cans thereon upwardly and to the right to place the same in a row in an upright position on the edge of the table 43, as will be readily understood, and also pushing said cans, and any cans already positioned on said table, back from said edge the widths of the newly positioned cans. Continued rotation of gear 59 returns the table leaf 40 to its original position.

The control rod 61 also carries a lower extension 69 having an upward projection 70 at its end which will be carried into engagement with the bars of the squirrel cage gear 66 when the control rod 61 is thus shifted by the arm 63 and whereby the shaft 67 and its arm 68 will be temporarily locked to prevent the further passage of cans during this upward swinging of the table leaf 40. The gear 50 carries a cam projection 71, best shown in Figs. 2 and 3, which is arranged to contact with the end of the control rod 61 as soon as the table leaf 40 has returned to its original position and thus return said rod 61 to initial position, thereby releasing the arms 68 for the further passage of cans.

As best shown in Figs. 1 and 2, a reciprocating pawl arm 72 is pivotally connected with the joint between the arm 47 and the link 48 and carries a pawl 73 cooperating with a ratchet wheel 74 on a shaft 75 which carries an arm 76 cooperating with a stop 77 on the side of a clutch fork 78 engaging a clutch 79 on the shaft 59. The clutch 79 cooperates with clutch members 80 on a bevel gear 81 which is loose on the shaft 59 and whereby when the clutch 79 is operated to the right, in the position indicated in Fig. 2, the gear 81 will be operatively connected to be driven by the shaft 59, as will be readily understood. The ratchet wheel 74 contains eight teeth, so that it requires eight operations of the arm 72 to cause one complete revolution of the shaft 75 and the arm 76. Obviously, as each row of twelve cans is thus placed on the edge of the table 43, the ratchet wheel 74 will be stepped up the space of one of its teeth, and thereby a complete revolution of the arm 76 will be caused every time eight rows of cans are thus placed on the edge of table 43. The arrangement is such that when the last row of cans is thus placed on the edge of said table the arm 76 contacts with the stop 77 operating the clutch fork 78 to shift the clutch 79 to cause operation of the bevel gear 81 as explained above.

As indicated by the dotted lines at the central left portion of Fig. 2, a bevel gear 82 is arranged as indicated to mesh temporarily with the gear 81 during its rotation, as explained above. The gear 82, illustrated in full lines at the right of Fig. 2, is carried by a vertical shaft 83, best shown in Figs. 1, 2, 5 and 9. The shaft 83 leads vertically into gear box 84 mounted upon a carriage 85 which in turn is arranged to reciprocate on wheels 85' operating in a frame 86, as indicated. A shaft 84' projects laterally from the gear box 84 and is connected by bevel gearing 87 with two shafts 88 mounted as indicated on the frame 85. The shafts 88 carry four cranks 89 connected by links 90 with arms 91 rigidly secured at their upper ends to hangers 92 having operating levers 93 pivotally mounted thereon by means of stud shafts 94 projecting upwardly through said hangers and rotatably mounted therein by means of nuts 94' at their tops, as best shown in Fig. 10, and whereby the levers 93 are given a floating bearing on the cranks of the crank shafts 88, as will be readily understood. The levers 93 carry the clamping bars 95 and 96 pivotally suspended therefrom by means of the swivel pins 97 and 98 which are welded to the outer sides of the bars 95 and 96 and serve to hang said bars from said levers. One set of clamping members 99 is secured to the under sides of the clamping bars 95 by means of bolts 100 and clamping members 101 are secured to the under sides of the clamping bars 96 by means of the bolts 102. The clamping members 99 and 101 are provided on their under sides with notched clamping heads 103 adapted and arranged to engage under the rims or chimes of the cans 21 as they stand arranged on the table 43. The arrangement is such that as the shafts 88 are thus rotated by the action of the gear 81 the clamping heads 103 will be lowered into cooperation with the tops of the cans, as will be readily understood.

As best shown in Figs. 2, 5 and 6, the levers 93 are connected in pairs by slot and pin connections 104 with a central operating link 105 which in turn is connected as indicated with a crank arm 106 on the bottom of a rocker shaft 107 carrying a gear 108 meshing with a gear 109 on a rocker shaft 110, which in turn carries a notched rocker arm 111 having a notch 112 in its free end. The notch 12 cooperates with a stop 113 on an endless chain 114 having one side traveling through a housing 115, as best shown in Figs. 5 and 9. The chain 114 travels over sprockets 116 and 117 mounted, as shown, at the ends of the housing 115, the sprocket 116 being secured to the shaft 83 and rotating thereby. The arrangement is such that with the parts in the positions indicated by the dotted lines in Fig. 9, the stop 113 engages the notch 112 and swings the arm 111 through an angle

as shown before it passes out of said notch. This operation of arm 111 operates the clamping bars 95 and 96 through the action of the levers 93 to cause the clamping heads 103 to engage the tops of the cans resting upon the table 43. Immediately thereafter the continued rotation of the shafts 88 raises the levers 93 and, consequently, the clamping members so that the entire layer of cans is thus elevated from its position on the table 43.

A slide 118 is mounted as shown on the housing 115 and carries a projection 119 set in the path of the stop 113 as it travels along the other side of the housing 15 and pushes the slide 118 into the full line position indicated in Fig. 9. The slide 118 is connected by link 120 with a rocker arm 121 operatively connected with a lever arm 122 through a slot and pin connection 123, as best shown in Fig. 5. The lever arm 122 has a rigid connection with a mutilated gear 124 having blank spaces 125 at diametrically opposite sides thereof. As best shown in Figs. 1, 2 and 3, the gear 124 cooperates with a pinion 126, normally resting over one of the blank spaces 125. The pinion 126 is carried by a transverse shaft 127' driven by gearing 128' and 129' from the shaft 59. The arrangement is such that the movement thus given to the lever 122 rocks the gear 124 in a clock hand wise direction to bring the gear 124 into mesh with the pinion 126 and whereby said gear will be rotated through approximately 180° by the continued action of the shaft 127' and pinion 126 until the blank space 125 on the other side of the gear 124 passes under the pinion 126, whereupon this revolution will stop, by which time the parts will be in the positions indicated in full lines in the drawings. The lever 122 carries a roller 127 operating between two guide bars 128 carried by brackets 129 secured to the carriage 85, as indicated, and whereby the swinging of the lever 122 will cause the movement of said carriage from its initial position to that shown in Figs. 1 and 2, of course carrying the layer of cans with it, at which time the layer of cans will be directly over the stack of cans being formed. This movement of the carriage 85 carries the gear 82 into mesh with a gear 130 on shaft 59, thereby rotating the shaft 83 in a direction opposite to that caused by the gear 81, as will be readily understood. The reversal of the direction of rotation of shaft 83 of course reverses the direction of travel of the chain 114 and the shafts 88.

The arrangement is such that this action of the shafts 88 will cause lowering of the clamping members, thereby lowering the layer of cans onto the top of the stack, on which the usual sheet of heavy paper or the like has already been deposited by hand. The stop 113 and the lever 111 are so shaped and rounded that said stop will freely pass over the exposed portion of said lever in either direction of movement so that said stop is now free to pass around the sprocket 117 and engage the arm 111 in its lower position, as indicated in Fig. 9, such engagement rocking the arm 111 back to initial position to release the cans and thus properly place them on the top of the stack being formed. Continued movement of the stop 113 causes the same to pass around the sprocket 116 and reengage the projection 119 on its other side to shift the slide 118 back to its initial or dotted line position, as indicated in Fig. 9. This shifting of the slide 118 of course shifts the arm 121 and the lever 122 to cause re-engagement of the gear 124 with the pinion 126 which thereby reverses the movement of the carriage 85 returning it to initial position and re-engaging the gear 82 with the gear 81.

The carriage 85 carries an arm 131, best shown in Figs. 1 and 2, set to engage a corresponding arm 132 on the clutch fork 78, thereby disengaging the clutch 79 from the gear 81 so as to discontinue all operation of the parts on the carriage 85 until a new layer of cans has been established on the table 43, whereupon the operation will be repeated, as explained above, to transfer the new layer of cans over the stack being formed and deposit it thereon, as will be readily understood. As best shown in Figs. 2 and 5, the frame 86 carries guide rollers or wheels 134 operating in vertical guide posts 135 on the main frame of the machine so that the frame 86 is thus rendered free to travel vertically carrying all of the operating parts of the transfer mechanism with it. The frame 86 is suspended upon cables 133 which pass vertically over guide sheaves 136 and are wrapped upon drums 137 carried by a shaft 138 operated by suitable gearing in the gear box 139 from a shaft 140 connected through clutch mechanism 141 with a drive shaft 142, which in turn is connected through gearing in a gear box 143 with shaft 144 constantly driven through gearing in the gear box 33 by the motor M and whereby the frame 86 and all the parts thereon will be slowly elevated through the action of the motor M the height of a can during the period occupied by the parts in transferring and depositing a can layer on the stack and returning to initial positions so that there will be a continuous operation of the machine as long as cans are supplied to the chute 20 and until the extreme height of stack permitted to be made by the machine is reached. A lever 145 is operatively connected as indicated with the clutch 141 so that said frame 86 may be disconnected from the motor M as and when desired and to permit of suitable manual adjustments of the parts when necessary. In this way an automatic can stacker is provided which is practically entirely automatic in operation and which will therefore stack cans for storage with great efficiency and economy.

In operation cans are delivered to the outer side of the elevator, rolling on their sides to positions against the inner guide rods whence they are picked up by the elevator fingers, carried to the top of the elevator and then down the inner side thereof, until they are removed by the slightly sloping can chute 37. The cans then roll along this chute to the opposite end thereof where they pass the control mechanism 62—70 which causes the receiving plate to operate when the twelfth can passes the control as explained above. The receiving plate is then swung upwardly through an angle of about 160° and thus raises the cans to an upright position and slides them forward. The next twelve cans similarly cause a repetition of this operation until eight rows of cans have thus been placed in position on the table 43. At the end of these eight operations arm 76 has made a complete revolution and contacts stop 77 and then brings into action the carriage 85 which lifts the ninety-six cans from the table 43, carries them to a position over the stack, lowers them onto the stack, releases them, and then returns it to its original position over said table, thus completing one cycle of operation of the machine.

While I have illustrated and described the preferred form of construction for carrying the in-