May 1, 1923. 1,453,767

C. C. REESE ET AL

SUGAR PACKING MACHINE

Filed Sept. 7, 1920 3 Sheets-Sheet 1

Fig. 1.

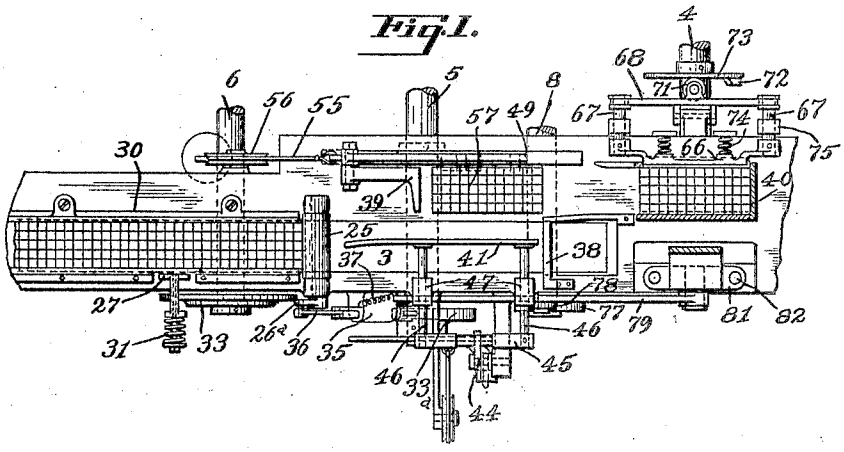


Fig. 4.

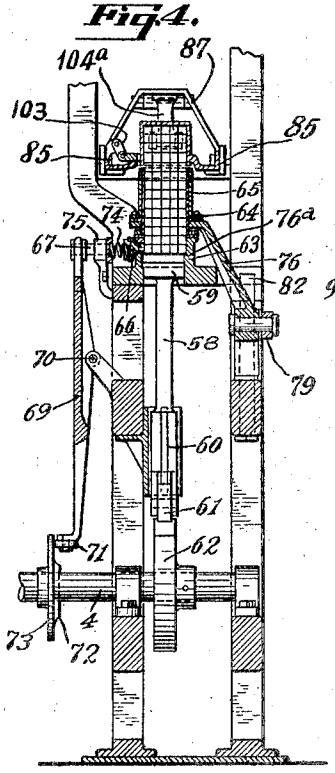
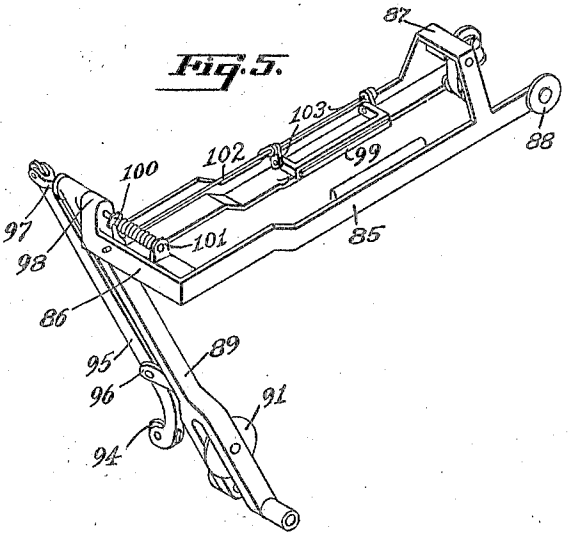


Fig. 5.



INVENTORS
CHARLES C. REESE.
JOSEPH T. BUZZO.
ROBERT S. WOODFORD.
BY Chas. E. Townsend
ATTORNEY.

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C. C. REESE ET AL

SUGAR PACKING MACHINE

Filed Sept. 7, 1920 3 Sheets-Sheet 2

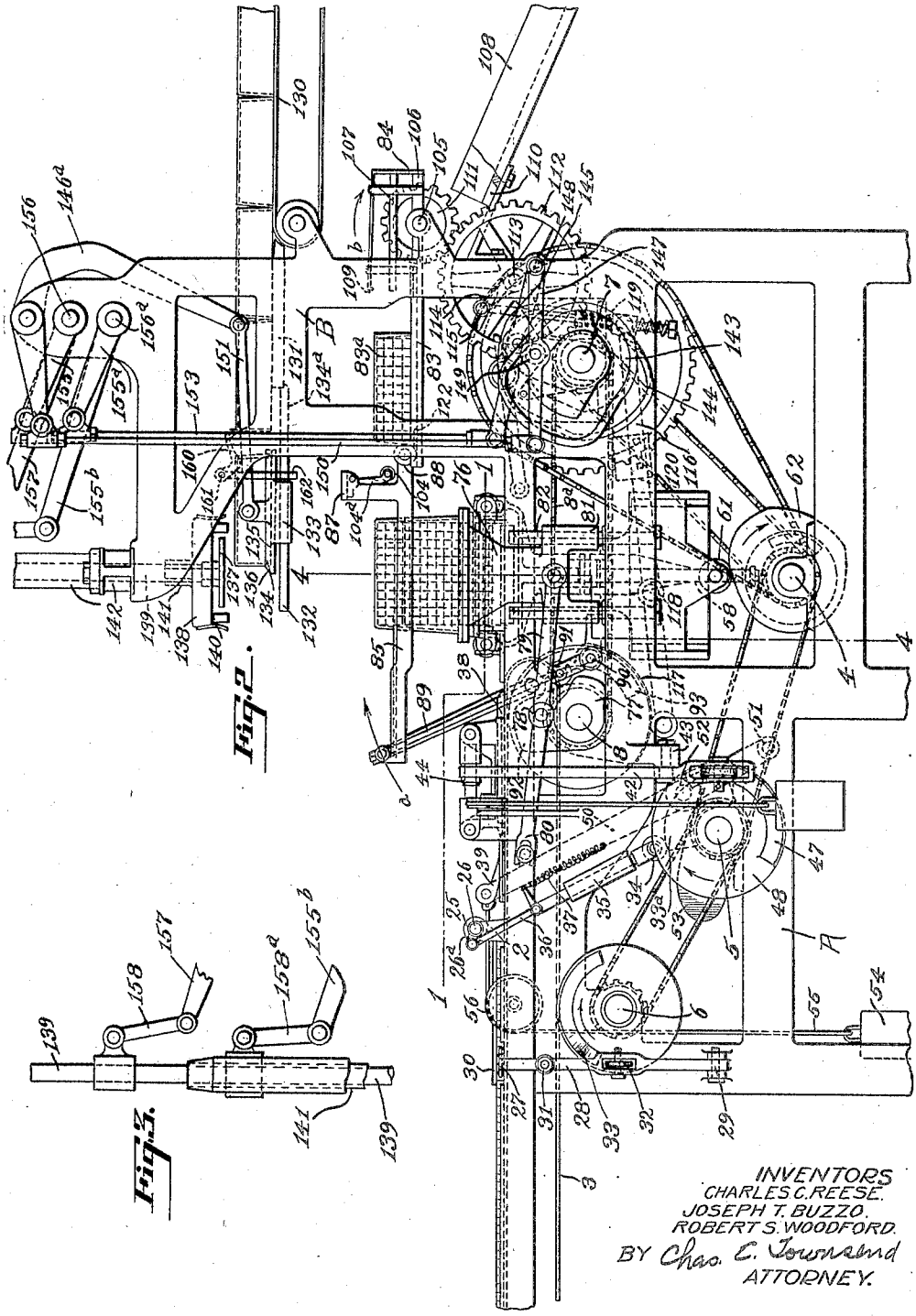


Fig. 2.

Fig. 3.

INVENTORS
CHARLES C. REESE.
JOSEPH T. BUZZO.
ROBERT S. WOODFORD.
BY Chas. E. Townsend
ATTORNEY.

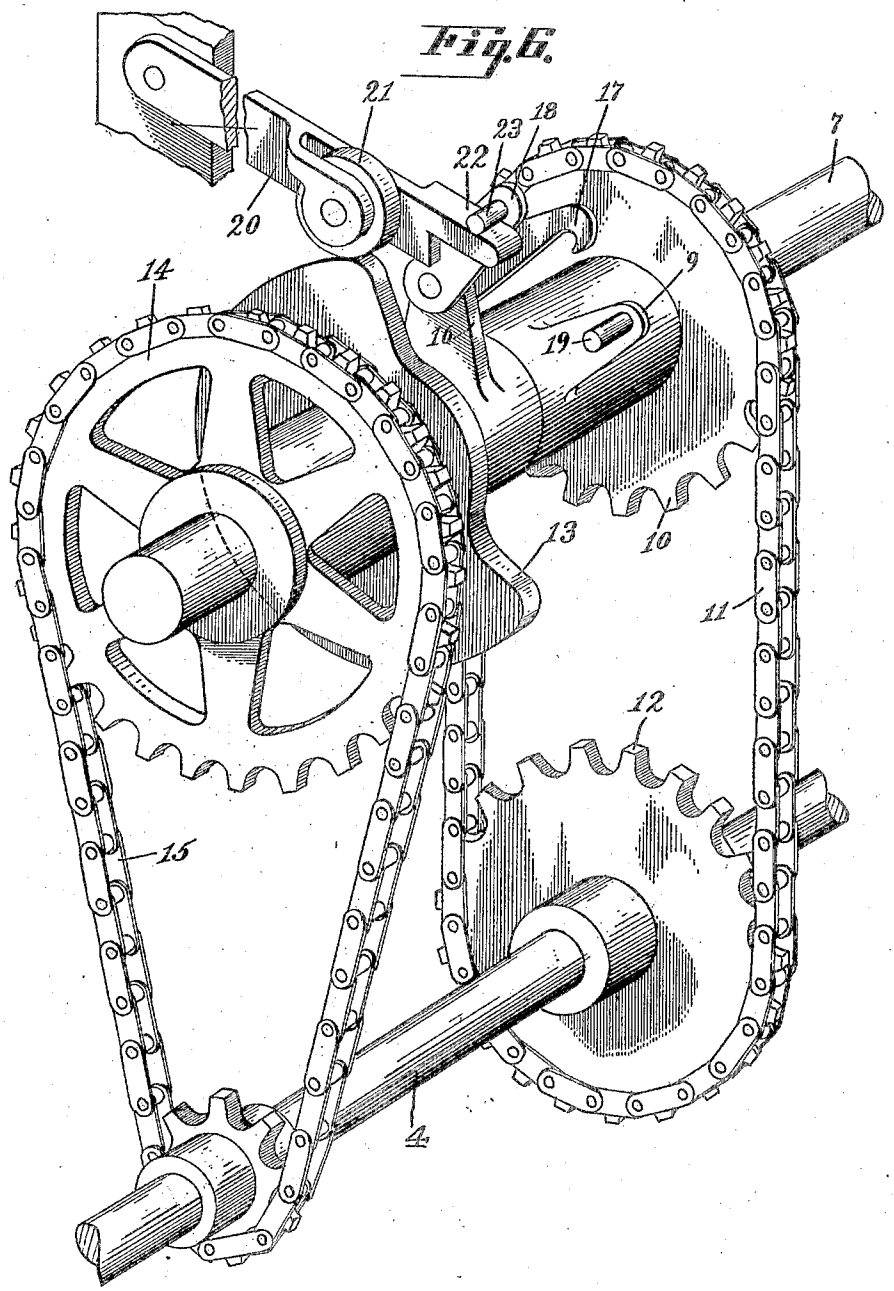
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C. C. REESE ET AL.

SUGAR PACKING MACHINE

Filed Sept. 7 1920 3 Sheets-Sheet 3

Fig. 6.



INVENTORS
CHARLES C. REESE.
JOSEPH T. BUZZO.
ROBERT S. WOODFORD.
BY Chas. E. Townsend,
ATTORNEY.

Patented May 1, 1923. 1,453,767

UNITED STATES PATENT OFFICE.

CHARLES C. REESE, OF SAN FRANCISCO, JOSEPH T. BUZZO, OF OAKLAND, AND ROBERT S. WOODFORD, OF CROCKETT, CALIFORNIA.

SUGAR-PACKING MACHINE.

Application filed September 7, 1920. Serial No. 408,489.

To all whom it may concern:

Be it known that we, CHARLES C. REESE, of the city and county of San Francisco, State of California, JOSEPH T. BUZZO, of Oakland, Alameda county, State of California, and ROBERT S. WOODFORD, of Crockett, Contra Costa County, State of California, and citizens of the United States, have invented a new and useful Improvement in Sugar-Packing Machines, of which the following is a specification.

This invention relates to a sugar packing machine, and especially to that type employed for assembling and packing cube sugar in cartons or the like.

One of the objects of the present invention is to provide a machine, whereby cube sugar and similar products may be assembled, stacked and packed in cartons or the like; and especially a machine which is automatic in operation throughout the several movements and by which handling of the sugar by operators may be entirely avoided and absolute sanitation maintained at all times.

Another object of the present invention is to provide a feeding mechanism whereby sugar may be continuously delivered to the machine and in conjunction therewith automatically actuated means for segregating the sugar and forming single layer blocks containing a predetermined number of rows of cubes both in length and in width.

Another object of the invention is to provide means for intermittently advancing the segregated blocks of sugar when formed and for delivering the same in successive order to an automatically actuated mechanism whereby the blocks are assembled and stacked in superposed layers.

Another object of the invention is to provide means for transferring the sugar from the stacker to individual cartons and finally for transferring, inverting and removing the cartons in successive order.

Further objects will hereinafter appear.

The invention consists of the parts and the construction, combination and arrangement of parts as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Fig. 1 is a plan section of the sugar packing machine taken on line 1—1, of Fig. 2.

Fig. 2 is a side elevation of the machine.

Fig. 3 is a detail view of the upper ends of the plungers whereby the carton delivering mechanism is actuated.

Fig. 4 is a vertical cross section taken on line 4—4, Fig. 2.

Fig. 5 is a perspective view of the carton clamping and removing mechanism.

Fig. 6 is a perspective view of the intermittent driving mechanism.

First, the present machine is designed for the purpose of assembling cube sugar in single layers, each layer containing a predetermined number of cubes; secondly it is intended for the purpose of stacking the assembled layers; third, placing said layers in successive cartons while these are inverted; fourth, removing the cartons when filled; fifth, turning or inverting the cartons and discharging the same from the machine when filled, and sixth, delivering empty cartons one by one to the machine.

The machine consists of a main frame A on which is formed a receiving table 2. Sugar is delivered to the receiving table by means of an endless continuously travelling belt 3 and sugar is in turn delivered to the belt in any suitable manner not here shown, being deposited thereon in a single layer, in this instance five rows wide. The sugar thus delivered to the main receiving table is intermittently transferred from one position to another, being first separated into blocks or layers containing a predetermined number of cubes; secondly, removed from the belt; third, placed in stacked formation; and fourth, delivered to a carton. The mechanism required for the several operations is actuated from a main continuously driven drive shaft 4, a pair of continuously driven auxiliary shafts 5 and 6, and a pair of intermittently driven auxiliary shafts 7 and 8. Shafts 5 and 6 are driven in unison with the main drive shaft 4, while the intermittently driven shafts 7 and 8 remain stationary during three revolutions of the drive shaft and then rotated one revolution in unison therewith. The mechanism interposed between the main drive shaft and the shaft 7 for transmitting an intermittent movement thereto will now be briefly described.

Referring to Fig. 6, 7 indicates a shaft and 9 a crank arm which is freely turnable on the shaft. Suitably secured to the crank arm or otherwise connected therewith is a sprocket gear 10 and adapted to transmit a

continuous rotary movement to said sprocket and crank arm is a chain 11 which is driven by a sprocket 12 secured on the main drive shaft; the ratio of the drive being one to one. Turnably mounted on the shaft is a cam member 13. Secured thereto or otherwise connected with the cam is a sprocket gear 14. This sprocket is driven from the main drive shaft by means of a chain 15 and the ratio employed is four to one, that is, the cam and sprocket 14 will make one revolution about the shaft 7 while the main drive shaft completes four revolutions. Keyed to the shaft 7 is a crank arm 16 and turnably mounted on the outer end of the crank arm is a hook-shaped latch 17 and a trip lever 18. The latch 17 is adapted to be engaged by a pin 19 secured on the first named crank arm 9, such engagement being only permitted however at predetermined time intervals. The latch 17 is normally held in a raised position when the pin 19 will pass without forming a driving connection, and the latch is held in this position by means of the trip lever 18, the cam 13, and a rocker arm 20 actuated thereby. One end of the rocker arm is pivotally attached to the main frame while the outer end is provided with a roller 21 engaged by the cam. Formed on the forward end of the rocker arm is a projecting arm or lug 22 which is disposed directly below a pin 23 formed on the trip lever. The cam 13 is so shaped that it will retain the latch in a raised position during three revolutions of the main drive shaft and will then lower the trip arm and the latch 17 actuated thereby to a position where it will be engaged by the pin. This pin, as previously stated is carried by the crank arm 9 or the sprocket 10, and as these are driven in unison with the drive shaft, it should be obvious that one revolution will be transmitted to shaft 7 and that it will rotate at the same speed as the drive shaft during this revolution. Similarly that the moment one revolution has been completed, release will automatically take place due to the form or shape of cam 13 as this will raise the trip lever and latch 17 out of engagement with the pin 19 the moment the revolution has been completed, and will hold said members in raised position during the following three revolutions due to the fact that the cam rotates only one revolution to four of the main drive shaft. The intermittent drive here described is necessary as certain parts of the mechanism function only once to four operations of other parts of the mechanism as will hereinafter be described.

The sugar in a single layer and assembled formation five rows wide delivered to the machine by the continuously moving conveyor belt 3 engages a temporary stop member 25. This stop member is disposed directly above the conveyor belt and crosswise of the same. The stop member is carried by a shaft 26 which is adapted to be intermittently rotated a part of a revolution. Cooperating with the temporary stop member is a clamping bar 27. This bar is secured on the upper end of an arm 28 pivotally supported by the main frame as at 29. Sugar delivered by the belt passes between a stationary guide plate 30 and the clamping bar 27. The forward movement of the sugar with the belt is regulated first by the temporary stop 25, and secondly by the clamping bar 27. The temporary stop will first retard the forward movement of the sugar. The clamping bar will next come into operation as said bar is normally forced into clamping position by means of a spring 31. The arm 28 is provided with a roller 32 adapted to be engaged by a surface cam 33 formed on a disc secured on shaft 6. The cam 33 engages the roller and swings the arm 28 outwardly during a portion of the revolution of the shaft 6, and similarly releases the roller and permits the spring 31 to force the arm inwardly and the clamping bar 27 into engagement with the sugar during predetermined time intervals. This clamping engagement takes place a moment after the travel of the sugar has been temporarily stopped by the positioning of the member 25. This member is raised to release a certain section of sugar the moment the clamp 27 has been brought into action. The temporary stop 25 is actuated by the cam 33^a secured on shaft 5. This cam engages a roller 34 secured on the lower end of a plunger which is guided in a bearing member 35 secured or otherwise formed on the main frame of the machine. The plunger is connected with a crank arm 26^a secured on the shaft 26 by means of a link 36. The cam serves the function of raising the plunger by forcing it upwardly thereby swinging the stop member 25 into engagement with the sugar and temporarily retarding the forward movement of the same. A spring 37 is also connected with the plunger and this spring serves the function of returning the plunger to recede to a lowered position and thereby raises the stop member to permit forward movement of the sugar. The cartons employed in the present instance are designed to receive four superposed layers of sugar, each layer consisting of a block which is five rows in width and twelve rows long. The spacing between the stop member 25 and the clamping bar 27 is therefore such that twelve rows of cubes will be liberated when the temporary stop member is raised. The block of sugar thus separated from the continuous layer advanced by the belt will now move forward with the belt to a second position and is here stopped by a permanent stop member 38.

said stop member being in the form of a bar secured to the frame extending crosswise of the belt.

To transfer the block of sugar just described from the belt to a point where it may be stacked in superposed layers and then transferred to a carton, it is first necessary to remove the block transversely from the belt to an intermediate transfer bar 39, which in turn moves the sugar or the block to an elevating platform generally indicated at 40. The sugar resting upon the belt and temporarily retarded by the permanent stop bar 38 is removed from the belt in a transverse direction by means of a pusher plate 41. This pusher plate is actuated at given time intervals and the mechanism employed is actuated by the shaft 5. The mechanism briefly consists of an arm 42 pivotally supported on one side of the main frame by a bearing bracket 43. The upper end of this arm is connected by means of a link 44 with a crosshead 45 which in turn is supported by crosshead rods 46. The crosshead rods are supported by bearing members 47 and are reciprocally mounted therein. The pusher plate 41 is secured to the forward ends of the crosshead rods and a rocking movement transmitted to the main actuating arm 42 will therefore transmit a transverse movement to the pusher plate with relation to the belt. A rocking movement must however be transmitted to the main actuating arm and this is produced in the present instance by a surface cam 47 formed on the face of a disc 48 secured on and driven by the shaft 5.

The block of sugar transferred from the belt by the mechanism just described will when transferred engage a guide plate 49. It will furthermore be disposed directly in front of the transfer bar 39. This bar is intermittently operated and is also actuated by the shaft 5; the mechanism interposed comprises an arm 50 pivotally attached to the main frame as at 51. A roller 52 carried by the arm is engaged by a cam 53 secured on shaft 5 and an oscillating movement is in this manner transmitted to the arm 50 in a forward direction; return of the arm to the normal retarded position shown being accomplished by employing a weight 54 which is connected with the arm by means of a cord 55, said cord being guided in any suitable manner or as shown by a sheave 56. Pivotally attached to the upper end of the actuating arm 50 is the intermediate transfer bar 39. This bar engages the block of sugar disposed in front thereof and transfers it from the position indicated at 57, in Fig. 1 to the elevating platform 40.

From the foregoing description it will be seen that four different groups of mechanism have been employed for the purpose of transferring one block of sugar from the belt to the elevating platform; the two first groups of mechanism serving the function of actuating the temporary stop member 25 and the clamping bar 27. The third group serves the function of removing the block of sugar transversely from the belt, and the fourth group of mechanism described serving the function of transferring the block removed from the belt to what may be termed the last position or that assumed when the elevating platform is reached. The sugar is now in readiness for stacking and this is accomplished in the following manner:

Referring to Figs. 1, 2 and 4, in particular, 58 indicates a plunger on the upper end of which is secured an elevating platform 59. The plunger 58 is carried by a cross head 60 and this in turn carries a roller 61 which is actuated by a cam 62 secured on the main drive shaft 4. The cam transmits an intermittent upward reciprocal movement to the plunger and platform carried thereby, said intermittent movement consisting of two rises and two rests, and it furthermore transmits a continuous downward reciprocal movement when the platform recedes and then a resting period while sugar is being delivered thereto. The stacking mechanism otherwise consists of a rectangularly shaped frame 63, in which is formed a rectangular shaped sugar receiving chamber, the chamber being rectangular in shape due to the formation of the blocks of sugar delivered thereto. The stacker otherwise consists of an upper stationary guide frame 64 constructed of four pieces of sheet iron, to-wit, two side sections and two end sections and the stacker is otherwise provided with a movable guide frame 65 and a clamping bar 66. The clamping bar is particularly shown in Figs. 1 and 4. It passes through a slot formed in one side of the frame 63 and it is supported by a pair of cross head rods 67 secured to a cross head 68 which is actuated by an arm 69 pivotally attached to the main frame as at 70. The lower end of this arm carries a roller 71 actuated by a surface cam 72 formed on the inner face of a disk 73 keyed or otherwise secured to the main driving shaft 4. The clamping bar is normally held in clamping position by means of a spring 74 interposed between a clamping plate and stationary lugs 75 formed on the main frame: the clamping bar being released by the actuating arm 69 when this is rocked about its pivotal mounting by means of the surface cam 72.

The movable guide frame 65 forms two functions: first that of a carton receiver, and secondly that of a guide when the sugar in stacked formation is being transferred from the stack proper to the carton. The guide frame assumes a raised position where it projects into the bottom of the carton when the sugar is being transferred thereto and it recedes to assume a lowered position

when the carton has been filled and while it is being removed. This reciprocal movement transmitted to the movable guide frame is actuated by means of the auxiliary shaft 8. This shaft carries a cam 77 which engages a roller 78 carried by an actuating arm 79. This arm is pivotally secured to the main frame at one end as at 80 and is connected at its opposite free end to a crosshead 81 reciprocally mounted in cross head guides 82 supported by the main frame; reciprocal movement of the crosshead being in turn transferred to the movable guide frame by means of the arm 76 secured or otherwise connected with the crosshead. The time element involved with relation to the elevating table, the clamping bar 68 and the movable guide frame 65 is now to be considered and will be as follows:

Sugar stacked in superposed layers within the stacker normally assumes the position shown in Fig. 4; the stack of superposed layers being held in this position by means of the clamping bar 66 actuated by the springs 74. The layer or block of sugar delivered to the elevating platform when this assumes its lowermost position is first elevated into contact with the lowermost layer in the stack when the plunger is actuated by the first rise on the cam. A rest period is then reached on the cam and during this period cam 72 engages the actuating levers 69 and thereby releases the clamping bar. The weight of the whole stack of sugar will therefore be imposed upon the new layer delivered or upon the elevating platform and the entire stack, together with the last layer delivered will now be elevated during the second operation of the cam. The movement transmitted by the second rise or operation of the cam will elevate the last received layer of sugar to the position shown in Fig. 4. In other words the entire stack will be raised slightly more than the thickness of one layer of sugar. The top or peak of the cam is reached when the last rise has been transmitted, a rest period is again encountered at the peak of the cam and during this rest cam 72 releases the actuating arm 69, thereby permitting the springs 74 to exert their pressure on the clamping bar and again force this into engagement. The entire stack just elevated is now clamped and supported by said member and a slight transverse movement is simultaneously transmitted, causing the stack to engage a shoulder 76^a formed in the opposite side of the stacking frame; this shoulder serving the function of partially supporting the stack in conjunction with the clamping bar. The continued revolution of the main shaft 4 and the cam 62 whereby the elevating platform is actuated will now permit the platform to recede and assume its lowered normal position. This is due to the fact that the cam recedes from the peak to the last rest position which is assumed when a new block of sugar is transferred to the platform. It may therefore be stated that the cam contains two rises and two rest positions which actuate the platform during its upward movement and a drop in the rest position which actuates the platform during its receding movement and during the rest period when a new block of sugar is delivered thereto.

The temporary stop member 25, the pusher plate 41 and the intermediate transfer bar 39 all operate in successive order and at time intervals equivalent one to the other. The timing of the movement of the elevating platform is similar, but the movement of the guide frame 65 is dissimilar due to the fact that it is intermittently actuated by the shaft 8, and also due to the fact that it must assume a raised position while the platform is elevated four times or during the period which it takes the stack to rise a distance of four tiers or layers of sugar. It may here be stated that the time period during which the guide frame remains elevated is equal to the time consumed in transferring the sugar from the stacker to the carton and as four layers of sugar are placed in the carton here shown, it is obvious that the movable guide frame remains elevated during four reciprocations or movements of the elevating platform and the other mechanism cooperating therewith. The carton remains in position over the movable guide frame while this assumes its raised position and during this time period is filled with sugar due to the successive intermittent upward movement of the superposed stack of sugar contained in the stack. A downward or receding movement is transmitted to the movable guide frame the moment four layers of sugar have been delivered to the carton and the filled carton is removed with relation to the stacking mechanism during this time period, the carton removed being delivered to a receiving table 83 from where it is transferred to a combination turning and discharging device 84 hereinafter to be described.

The carton removing mechanism is actuated from the intermittently operated shaft 8 and the mechanism employed consists of a rectangular shaped frame 85 comprising two side bars, an end bar 86 and a bridging bar 87. The forward end of the frame is provided with rollers 88 supported by track members secured one on each side of the receiving table 83. The opposite end of the frame 85 is pivotally attached to an actuating arm 89, the lower end of which is pivotally secured to the main frame as at 90. Secured on the actuating arm 89 is a roller 91 and engageable therewith is a cam 92. This cam is secured on the shaft 8 and ro-

tates in unison with the same. The shaft 8 is, as previously stated, rotated in unison with the shaft 7, being driven from shaft 7 by means of a sprocket chain drive indicated at 8ª, and as shaft 7 is only rotated once during four revolutions of the main driving shaft, it is obvious that a similar movement will be transmitted to the shaft 8 and that the cam 92 secured thereon will only engage the roller 92 once during four revolutions of the main drive shaft. This engagement takes place during the time period when the movable guide frame is lowered and it therefore swings the actuating arm 89 forward in the direction of arrow *a*, see Fig. 2. Just previous to this movement however a surface cam 93 comes into operation. This cam is formed on a disc secured on shaft 8 and it engages a roller 94 carried by the lower end of a rocker arm 95. This arm is pivotally mounted as at 96 on one side of the main actuating arm 89. The upper end of the rocker arm 95 is connected with the forked end of a rocker 97. This rod extends through the upper end of the main actuating arm 89 and through a bearing lug 98 formed on one end of the frame 85. The rocker arm 95 and the cam whereby it is actuated serves the function of retracting a clamping bar 99 carried by the frame 85 and a spring surrounding the rod 97 and interposed between a shifting collar 100, and a bearing lug 101 serves the function of throwing the clamping bar into operable position. The shifting collar 100 is engaged by a forked lever secured on one end of a shaft 102. The shaft is journalled on one side of the frame 85 and carries a pair of crank arms 103 to which the clamping bar 99 is attached.

In actual operation surface cam 93 normally serves the function of engaging the roller 94 and thereby swinging the rocker arm 95 to a position where it maintains the clamping bar in released position. The moment rotary movement is transmitted to the shaft 8, surface cam 93 swings out of engagement with the roller 94 and thereby permits the spring on rod 97 to exert its pressure and thereby transmit a movement which swings the clamping bar into gripping position. This operation or release of the rocker arm 95 takes place a moment before the actuating arm 89 is swung forwardly in the direction of arrow *a* and as the clamping bar 99 assumes a position in alignment with one side of the carton, it can be seen that it will exert a pressure on the carton and the lowermost layer of sugar disposed thereon, said pressure being sufficient to support the sugar against accidental removal during the transfer of the carton from the stacker to the receiving table 83.

For the purpose of further describing the operation of the machine, it should be understood that the carton being inverted while sugar is being transferred from the stacker to the carton, and that the carton remains in an inverted position during its transfer from the stacker to the receiving table, hence the reason for the provision of the clamping bar 99. The carton delivered to the receiving table must be inverted or placed right side up before it is possible to discharge the carton from the machine. This is accomplished during the first operation of the transferring frame 85 and is caused by the action of a roller 104 placed on the forward end of the frame 85. This roller engages the end of the carton previously deposited on the receiving table and transfers it from the position indicated at 83ª, see Fig. 2, to the inverting or turning device indicated at 84. This device is carried by a shaft 105 and consists of a table 106 and strap iron enclosing frame 107. The forward end of the frame is of course open to receive the carton indicated at 83ª and the opposite end closed to prevent the carton from dropping out during the turning or inverting operation. The inverting device turns in the direction of arrow *b* and delivers the carton right side up to a discharge chute indicated at 108. One of the straps forming the enclosing frame of the inverting device is provided with an upturned end or latch 109. The forward end of the bar carrying the latch enters a slot 110 formed in the discharge chute and by receding into said slot leaves the carton right side up in the chute and in a position where the angle is so great that it will slide downwardly by gravity, the carton being released with relation to the inverting device and the latch 109 during the receiving movement of the latch into the slot. The inverting device as previously stated is supported or carried by the shaft 105. An oscillating movement is intermittently transmitted thereto through means of a pair of gears indicated at 111 and 112, the gear 112 is secured on a shaft 113 journalled in the main frame. This shaft also carries a crank arm 114 to which is attached a connecting link 115. This link is actuated by a rocker arm 116 which in turn is actuated by a cam 117 secured on the shaft 8. The rocker arm 116 is pivotally secured to the frame as at 118 and a resilient connection is formed between the rocker arm and the crank 115, said resilient connection being formed by a sliding crosshead. The rocker arm is pivotally attached to a pair of interposed springs as indicated at 119. During the resting period of the shaft 8, the gears 111 and 112 will remain stationary and the inverting device in the position shown in Fig. 2. A moment after the shaft 8 has started rotation, the cam 117 will move out of engagement with the roller on the end of the rocker arm 116 and a

counterweight 120 secured on the opposite end of the rocker arm will then exert its weight through the link 115 to rotate the gears 111 and 112 in the direction indicated by arrow *b*, thus inverting the carton previously delivered thereto and permitting the same to discharge by gravity into the discharge chute 108. Shaft 8 however makes one complete revolution when turned. The cam 117 will therefore again move into engagement with the roller on the rocker arm 116, thus transmitting a reverse movement to the rocker arm and similarly to the gears 111 and 112 thereby returning these to normal position and the inverting device to receiving position. The shaft having completed its revolution will again come to rest and as the cam 117 engages the rocker arm during the rest period, it is obvious that no movement can be transmitted to the inverting device until the proper time period arrives.

As a further description of the operation of the transferring frame 85, it may be stated that besides the functions already described, to-wit, that of transferring the cartons from the stacker to the receiving table 83, and that of clamping the sugar in the carton during said transferring operation, other functions are obtained. By referring to Fig. 2, it will be seen that a cam member 122 is disposed at the forward end of each bracket. The front end of the frame when starting on the forward movement is slightly elevated by these cam members and a similar rise, but to a greater degree is transmitted to the rear end of the frame due to the arcuate movement of the free end of the actuating arm 89. The frame 85 is in this manner lifted in an upward direction, first due to the action of the cams 122, and secondly due to the arcuate movement of the actuating arm. This upward movement is important as it separates the carton and the sugar contained therein with relation to the main stack of sugar contained in the stacker, thereby making a clean separation or break between the two sections of sugar before longitudinal movement is transmitted to the frame 85. The roller 104 which engages the carton previously delivered to the receiving platform 83 is journalled in an arm 104^a which is pivotally attached to the bridging bar 87. This is important as it permits the arm 104^a, together with the roller, to ride freely over each carton delivered to the receiving table 83 during the return movement of the transferring frame 85.

As previously stated the movable guide frame 65 performs two main functions; first, that of receiving and supporting cartons; and second, that of guiding the stacked sugar into the cartons during the filling operation. The mechanism for removing the cartons when filled and for inverting the same has just been described and the means employed for delivering the empty cartons in successive order to the movable guide frame will now be described.

The carton delivering mechanism is disposed above the receiving table 83, being supported by an extension B of the main frame A. The mechanism briefly, consists of a continuously moving conveyor belt 130 upon which the cartons are placed by an operator. This belt delivers the cartons to a receiving table 131 disposed directly above the receiving table 83. Positioned in front of the receiving table 131 is a pair of interspaced crosshead guides 132, and slidably mounted thereon is a crosshead 133, upon which is supported a transfer platform 134. This platform is provided with a pair of side guides, such as shown at 135, and a front stop guide 136. The cartons are delivered to the transferring platform 134 by the tendency of the cartons to advance forwardly over the receiving table 131; this tendency or movement being caused by the frictional engagement of the conveyor belt 130 with relation to the empty cartons supported thereby, that is the cartons supported by the belt have a tendency to advance with the belt and will, of course, exert an endwise pressure on the cartons delivered to the receiving table 131; the friction thus produced and the endwise pressure thus exerted being sufficient to advance the cartons in successive order across the receiving table and then forwardly into position on the transferring platform 134. The carton is here stopped when in position by means of the stop guide 136. The carton supported by the transferring platform is next moved into alignment with a plunger 137 and a friction actuated gripping member 138. The plunger consists of a plate 137 supported by a rod 139, while the friction gripping member consists of a head 138 and a plurality of resilient spring fingers 140. The head member 138 is secured on the lower end of a tube 141 within which the plunger rod 139 is guided; the rod and tube being in turn supported and guided by a bearing member 142.

Means are provided for transmitting a reciprocal movement to the friction actuated gripping member 138 and the plunger 137, and means are also provided for moving the transferring platform 134 into and out of alignment with said members. The means employed is a series of internal cams, generally indicated at 143, 144 and 145. These cams are secured on the shaft 7 and rotate in unison with the same when this makes its one revolution to four of the main driving shaft 4. The cams 144 and 145 actuate the plunger rod 139 and the tube 141, respectively, while the cam 143 actuates a rocker arm 146^a which in turn actuates the trans-

ferring platform 134; movement being transmitted from the cam 143 to the rocker arm by means of an arm 147 pivotally attached to the main frame, as at 148 and by a roller 149 engaged by the cam and this imparts an oscillating movement to the arm 147, which movement is in turn transmitted through a rod or link 150 which is direct connected with the rocker arm 146a. The opposite end of this rocker arm is connected through a link 151 with the crosshead 133 and this link will, of course, transmit a reciprocal movement to the platform, thereby moving it into alignment with the receiving table 131 or into alignment with the plunger 137.

The cam 144 actuates a rod or link 153 in a manner similar to that just described. This link is connected with a crank arm 155 secured on a shaft 156. This shaft is journaled to the main frame extension B and has secured on its opposite end a crank arm 157 which is connected with the rod 139 by means of a collar and a connecting link 158, indicated in Fig. 3. Cam 145 actuates a crank arm 155a secured on a shaft 156a and this in turn actuates a crank arm 155b connected to the tube 141 by a link 158a. The cams 144 and 145 actuating the plunger and tube, respectively, are so shaped that they, practically speaking, will transmit a uniform reciprocating movement to the same, both in an upward and in a downward direction. The cams, however, vary slightly in shape. This variation will be explained during the description of the operation of the device.

With the receiving platform assuming the dotted line position indicated at 134a in direct engagement with the receiving table 131, it will be seen that a carton will advance forwardly upon the receiving platform until the stop member 134 is engaged. A moment after the carton has been placed in position, forward movement of the receiving platform will take place, due to the movement of the cam whereby it is actuated. The platform will, during its forward movement, assume a position in direct alignment with the members 137 and 138. These will at this time move downwardly in unison until the friction fingers 140 engage the carton and grip the same. A slight upward movement will then be imparted to the members 137 and 138 sufficient to lift the carton upwardly away from the side guides 135 and the end stop guide 136. The transferring platform will then move back to the dotted line position indicated at 134a and will remain in this position during the next three revolutions of the shaft 4. The plunger 137 and the head member 138 will, the moment the transferring platform has receded, move downwardly in unison and will deposit the carton upon the upper end of the movable guide frame 65 which in the meantime has been moved to raised position.

Continued movement of the cams 144 and 145 will next cause the head member 138 and the spring fingers carried thereby to move upwardly while the plunger 137 remains stationary. The plunger holds the carton in position on top of the guide frame during the first upward movement of the head member 138 and thereby permits the fingers 140 to release the carton. However, the moment release has been made, upward movement of the plunger will also take place and both will travel in unison until the position shown in Fig. 2 is reached. These several movements take place during the single revolution of the shaft 7; the plunger 137 and the head member 138 remain stationary while the transferring platform moves into alignment to deliver a carton thereto. The first downward movement then takes place to permit engagement with the carton. A slight upward movement next takes place and simultaneously during this movement the transferring platform is returned to receiving position. A downward movement is then imparted which causes the carton to be deposited upon the guide frame and the carton is then finally released and the members 137 and 138 raised to normal position in readiness for the reception and delivery of the next carton.

By referring to Fig. 2 and the carton delivering mechanism just described, it should be obvious that means must be provided for stopping the cartons against advance movement across the receiving table 131, while the transfer platform 134 is delivering a carton to the head member 138. Such advance of the empty cartons across the table is automatically taken care of by a latch arm 160 pivotally attached to the frame as at 161. The latch in reality is secured on a shaft journalled in the frame and this shaft carries an actuating arm 162 which is engaged by the crosshead 133 during the movement thereof. Movement of the transferring table by means of the crosshead to receiving position causes the crosshead to engage the lower end of the actuating arm 162, thereby transmitting a turning movement to the shaft 161 and an upward movement to the latch 160.

The cartons released by the stop member can therefore advance when the transferring platform is in readiness and in position to receive the same, but they are stopped against advance while the transferring platform is delivering the carton to the head member 138 as the latch is automatically dropped into the path of the advancing cartons during the period when the transferring platform is out of position.

From the foregoing description it can be

seen that the several operations performed throughout the machine are automatically actuated and that the several operations are so timed that each follows the other. The sugar delivered by the main conveyor belt 2 is first separated into blocks or layers containing a predetermined number of cubes, this being accomplished by means of the clamping plate 27 and the temporary stop member 25. The movement of the sugar up to the temporary stop member is continuous, but the movement of the sugar thereafter is intermittent; that is, it is temporarily stopped while the member 25 engages the same. It is then advanced to the permanent stop 38 where it is again stopped until transferred transversely from the belt by means of the pusher plate 41. The sugar again comes to a rest when delivered to the main receiving table in front of the transfer bar 39; resting in this position until it is transferred by this bar to the elevating platform 59. The movement of the sugar upwardly through the stacking mechanism is also intermittent as the entire stack is intermittently raised by means of the elevating platform whenever this is elevated. It takes four reciprocal movements of the elevating platform to fill or load the carton.

It is obvious that the movement of the transferring frame 85 will only take place once during four reciprocal movements of the elevating platform. Also that movement of the inverting device 84 and the plungers 137 and 138, together with the transferring platform 134, will only take place once during four operations of the elevating platform, the transfer bar 39, the pusher plate 41, the temporary stop member 25 and the clamping plate 30. The clamping plate just specified, the temporary stop member 25, the pusher plate 41, the transfer bar 39 and the elevating platform, together with the clamping plate 66, are all actuated from the continuously driven shafts 4, 5 and 6, while the remainder of the mechanism, to-wit, the transferring platform 134, the plungers 137 and 138, the inverting device, the transferring frame 85, and the movable guide frame are actuated from the intermittently driven shafts 7 and 8.

The sugar delivered to the machine is mechanically handled throughout and sanitation should therefore be maintained at a maximum as handling of the sugar by operators is entirely avoided. In fact, the only duty required by an operator is that of delivering empty cartons to the conveyor 130 and in sealing the filled cartons delivered to the discharge chute 108.

The machine here shown, while described as employed for the purpose of packing cube sugar, may of course be used for numerous similar purposes and we wish it understood that such use may be resorted to whenever desired. Also that the materials and finish of the several parts and the general design employed may be such as the experience and judgment of the manufacturer may dictate or varying conditions may demand.

Having thus described our invention, what we claim and desire to secure by Letters Patent is:

1. In a machine of the character described, a feeding belt adapted to continuously deliver a single layer of sugar cubes, means cooperating with the belt adapted to form separated blocks of sugar each containing a predetermined number of cubes, means for removing the blocks from the belt in successive order, and means for stacking the blocks in superposed layers.

2. In a machine of the character described, a feeding belt adapted to continuously deliver a single layer of sugar cubes, means cooperating with the belt adapted to form separated blocks of sugar each containing a predetermined number of cubes, means for removing the blocks from the belt in successive order, means for stacking the blocks in superposed layers, means for transferring a predetermined number of layers from the stack to cartons in successive order to fill each carton, and means for automatically removing each carton when filled.

3. In a machine of the character described, a feeding belt adapted to continuously deliver a single layer of sugar cubes, means cooperating with the belt adapted to form separated blocks of sugar each containing a predetermined number of cubes, means for removing the blocks from the belt in successive order, a stacking mechanism, an elevating platform forming a bottom therefor, means for delivering each block of sugar to said platform, means for intermittently raising and lowering the platform to elevate each block of sugar delivered thereto and to form a stack of superposed blocks, and means permitting free upward movement of the sugar in the stacker, said means also preventing retrograde movement when the platform is lowered.

4. In a machine of the character described, a feeding belt adapted to continuously deliver a single layer of sugar cubes, said cubes being arranged in row formation and assembled, a fixed guide plate on one side of the belt, a movable clamping plate on the opposite side of the belt, and a movable stop member extending crosswise of the belt and in advance of the clamping plate.

5. In a machine of the character described, a feeding belt adapted to continuously deliver a single layer of sugar cubes, said cubes being arranged in row formation and assembled, a fixed guide plate on one

side of the belt, a movable clamping plate on the opposite side of the belt, a movable stop member extending crosswise of the belt and in advance of the clamping plate, means for moving the stop member into engagement with the belt to prevent forward movement of the sugar with the belt, and means for moving the clamping plate into engagement with the sugar, said clamping plate actuating means and said stop member actuating means being operated alternately to separate the sugar into blocks each containing a predetermined number of cubes.

6. In a machine of the character described, a feeding belt adapted to continuously deliver a single layer of sugar cubes, said cubes being arranged in row formation and assembled, a fixed guide plate on one side of the belt, a movable clamping plate on the opposite side of the belt, a movable stop member extending crosswise of the belt and in advance of the clamping plate, means for moving the stop member into engagement with the belt to prevent forward movement of the sugar with the belt, means for moving the clamping plate into engagement with the sugar, said clamping plate actuating means and said stop member actuating means being operated alternately to separate the sugar into blocks each containing a predetermined number of cubes, and means for removing each block of sugar from the belt in a transverse direction.

7. In a machine of the character described, a main frame, a receiving table supported by the frame, a feeding belt adapted to continuously deliver a single layer of sugar cubes, said cubes being arranged in row formation and assembled, a fixed guide plate on one side of the belt, a clamping plate on the opposite side of the belt, a pivotally mounted rocker arm supported on the frame, on the free end of which the clamping plate is secured, a shaft journaled on the frame, a cam on said shaft engageable with the arm to impart a rocking movement thereto and to alternately move the clamping plate into and out of engagement with the sugar, and a movable stop member extending crosswise of the belt and in advance of the clamping plate.

8. In a machine of the character described, a main frame, a receiving table supported by the frame, a feeding belt adapted to continuously deliver a single layer of sugar cubes, said cubes being arranged in row formation and assembled, a fixed guide plate on one side of the belt, a clamping plate on the opposite side of the belt, a pivotally mounted rocker arm supported on the frame, on the free end of which the clamping plate is secured, a shaft journaled on the frame, a cam on said shaft engageable with the arm to impart a rocking movement thereto and to alternately move the clamping plate into and out of engagement with the sugar, a shaft journaled on the frame above the belt and positioned crosswise of the same, a stop member secured on the shaft, a third shaft journaled in the frame, a cam secured thereon, means for transmitting movement from said cam to rock the second named shaft and thereby move the stop member on the shaft into or out of engagement with the belt, and means for driving the first and last named shafts in unison, the cams on the respective shafts being so positioned as to alternately actuate the clamping plate and the stop member.

9. In a machine of the character described, a main frame, a receiving table supported by the frame, a feeding belt adapted to continuously deliver a single layer of sugar cubes, said cubes being arranged in row formation and assembled, a fixed guide plate on one side of the belt, a clamping plate on the opposite side of the belt, a pivotally mounted rocker arm supported on the frame, on the free end of which the clamping plate is secured, a shaft journaled on the frame, a cam on said shaft engageable with the arm to impart a rocking movement thereto and to alternately move the clamping plate into and out of engagement with the sugar, a shaft journaled on the frame above the belt and positioned crosswise of the same, a stop member secured on the shaft, a third shaft journaled in the frame, a cam secured thereon, means for transmitting movement from said cam to rock the second named shaft and thereby move the stop member on the shaft into or out of engagement with the belt, means for driving the first and last named shafts in unison, the cams on the respective shafts being so positioned as to alternately actuate the clamping plate and the stop member, a pusher plate arranged on one side of the belt, a permanent stop member extending crosswise of the belt in advance thereof, and means for imparting a transverse movement to the pusher plate to transfer the sugar from the belt to the receiving table.

10. In a machine of the character described, a main frame, a receiving table supported by the frame, a feeding belt adapted to continuously deliver a single layer of sugar cubes, said cubes being arranged in row formation and assembled, a fixed guide plate on one side of the belt, a clamping plate on the opposite side of the belt, a pivotally mounted rocker arm supported on the frame, on the free end of which the clamping plate is secured, a shaft journaled on the frame, a cam on said shaft engageable with the arm to impart a rocking movement thereto and to alternately move the clamping plate into and out of engagement with the sugar, a shaft journaled on the frame above the belt and positioned crosswise of the same, a stop

member secured on the shaft, a third shaft journaled in the frame, a cam secured thereon, means for transmitting movement from said cam to rock the second named shaft and thereby move the stop member on the shaft into or out of engagement with the belt, means for driving the first and last named shafts in unison, the cams on the respective shafts being so positioned as to alternately actuate the clamping plate and the stop member, a pusher plate arranged on one side of the belt, a permanent stop member extending crosswise of the belt in advance thereof, means for imparting a transverse movement to the pusher plate to transfer the sugar from the belt to the receiving table, said means comprising a cross-head to which the pusher plate is attached, a rocker arm, and a cam secured on the third named shaft engaging with the rocker arm to intermittently impart a rocking movement thereto.

11. In a machine of the character described, means for forming a vertical stack of superposed layers of sugar, which stack is formed by upward movement of the sugar, said means comprising a guide frame, an elevating platform forming a bottom for the frame, means for delivering an assembled layer of cube sugar thereto, means for raising and lowering the platform after the sugar has been delivered thereto, means for clamping the sugar against downward movement of the guide frame when the platform is lowered, and means for releasing said clamping means when a new layer of cube sugar is delivered to the platform and brought into contact with the first named layer during the next upward movement of the platform, said means being automatically released when the platform again recedes.

12. In a machine of the character described, a sugar stacking device comprising a guide frame, an elevating platform forming a bottom for said frame, means for delivering an assembled layer of cube sugar thereto, means for intermittently transmitting an upward reciprocal movement to the platform, said upward movement being in each instance a slight distance greater than the thickness of the layer of sugar delivered thereto, means permitting free upward movement of each layer of sugar in the guide frame, means preventing retrograde movement of the sugar in the guide frame, means on the guide frame for receiving and supporting an empty carton, said carton adapted to receive the stack gradually formed and raised by the elevating platform, and means for removing the carton when filled.

13. In a machine of the character described, a sugar stacking device comprising a guide frame, an elevating platform forming a bottom for said frame, means for delivering an assembled layer of cube sugar thereto, means for intermittently transmitting an upward reciprocal movement to the platform, said upward movement being in each instance a slight distance greater than the thickness of the layer of sugar delivered thereto, means permitting free upward movement of each layer of sugar in the guide frame, means preventing retrograde movement of the sugar in the guide frame, means on the guide frame for receiving and supporting an empty carton, said carton adapted to receive the stack gradually formed and raised by the elevating platform, means for removing the carton when filled, and means for delivering an empty carton when the filled carton has been removed.

14. In a machine of the character described, the combination with the stationary guide frame of the stacker and a vertically movable guide frame supported thereby, of means for delivering an empty carton thereto, said movable guide frame supporting the carton and guiding sugar thereinto, means for engaging and clamping the carton and the sugar contained therein when filled, means for lowering the movable guide frame to extract it with relation to the carton when filled, and means for transmitting a minor upward movement and a major longitudinal movement and the carton clamping means to transfer the filled carton to a receiving table.

15. In a machine of the character described, the combination with the stationary guide frame of the stacker and a vertically movable guide frame supported thereby, of means for delivering an empty carton thereto, said movable guide frame supporting the carton and guiding sugar thereinto, means for engaging and clamping the carton and the sugar contained therein when filled, means for lowering the movable guide frame to extract it with relation to the carton when filled, means for transmitting a minor upward movement and a major longitudinal movement and the carton clamping means to transfer the filled carton to a receiving table, means for advancing the filled carton from the receiving table to an inverting device, and means for turning the inverting device and for delivering the filled carton to a discharge chute.

16. In a machine of the character described, the combination with the stationary guide frame of the stacker, of an elevating platform forming a bottom for said guide frame, a slidably mounted guide frame supported by the stationary guide frame, means for imparting four reciprocal movements to the elevating platform and one reciprocal movement during said four reciprocal movements to the movable guide frame, a transferring frame adapted to straddle the movable guide frame, means for delivering an

empty carton which is adapted to be supported by the movable guide frame, means on the transferring frame for engaging and securing the carton, a receiving table supporting one end of the transferring frame, a cam member thereon adapted to impart a slight upward movement to the transferring frame, an actuating arm having an arcual movement supporting the opposite end of the transferring frame, and means for transmitting an oscillating movement to the actuating arm.

17. In a machine of the character described, the combination with the stationary guide frame of the stacker, of an elevating platform forming a bottom for said guide frame, a slidably mounted guide frame supported by the stationary guide frame, means for imparting four reciprocal movements to the elevating platform and one reciprocal movement during said four reciprocal movements to the movable guide frame, a transferring frame adapted to straddle the movable guide frame, means for delivering an empty carton which is adapted to be supported by the movable guide frame, means on the transferring frame for engaging and securing the carton, a receiving table supporting one end of the transferring frame, a cam member thereon adapted to impart a slight upward movement to the transferring frame, an actuating arm having an arcual movement supporting the opposite end of the transferring frame, means for transmitting an oscillating movement to the actuating arm, means carried by said arm for releasing the clamping device carried by the transferring frame, and other means carried by the transferring frame for moving the clamping member into engagement.

18. In a machine of the character described, the combination with the stationary guide frame of the sugar stacking mechanism and the movable guide frame supported thereby, of means for depositing an empty carton in inverted position on top of the movable guide frame, means for elevating sugar in stack formation upwardly into the carton, means for retracting the guide frame when the carton is filled, a receiving table, means for transferring the carton in inverted position from the stacker to the receiving table, and means for inverting the carton and delivering it to a discharge chute.

19. In a machine of the character described, the combination with the stacker and a movable guide frame carried thereby, of means for depositing empty cartons in inverted position on top of the guide frame, said means comprising a conveyor belt, a transferring platform adapted to receive the cartons one by one delivered by the conveyor belt, a friction actuated carton-gripping device, means for moving the transferring platform into alignment with said device, means for moving the gripping device into engagement with the carton to grip and remove it from the transferring platform, and means for moving said gripping device downwardly with relation to the movable guide frame to place the carton in inverted position thereon.

20. In a machine of the character described, the combination with the stacker and a movable guide frame carried thereby, of means for depositing empty cartons in inverted position on top of the guide frame, said means comprising a conveyor belt, a transferring platform adapted to receive the cartons one by one delivered by the conveyor belt, a friction actuated carton-gripping device, means for moving the transferring platform into alignment with said device, means for moving the gripping device into engagement with the carton to grip and remove it from the transferring platform, means for moving said gripping device downwardly with relation to the movable guide frame to place the carton in inverted position thereon, and means for releasing the carton when placed in position.

21. In a machine of the character described, the combination with the stacker and a movable guide frame carried thereby, of means for depositing empty cartons in inverted position on top of the guide frame, said means comprising a conveyor belt, a transferring platform adapted to receive the cartons one by one delivered by the conveyor belt, a friction-actuated, carton-gripping device, means for moving the transferring platform into alignment with said device, means for moving the gripping device into engagement with the carton to grip and remove it from the transferring platform, means for moving said gripping device downwardly with relation to the movable guide frame to place the carton in inverted position thereon, means for releasing the carton when placed in position, and other means for transferring the carton to a receiving table in inverted position when filled.

22. In a machine of the character described, the combination with the stacker and a movable guide frame carried thereby, of means for depositing empty cartons in inverted position on top of the guide frame, said means comprising a conveyor belt, a transferring platform adapted to receive the cartons one by one delivered by the conveyor belt, a friction-actuated, carton-gripping device, means for moving the transferring platform into alignment with said device, means for moving the gripping device into engagement with the carton to

grip and remove it from the transferring platform, means for moving said gripping device downwardly with relation to the movable guide frame to place the carton in inverted position thereon, means for releasing the carton when placed in position, other means for transferring the carton to a receiving table in inverted position when filled, and means for inverting the carton and discharging it from the machine.

23. In a machine of the character described, a main frame, a continuously driven driving shaft journaled in the frame, a pair of continuously driven auxiliary shafts driven in unison with the main driving shaft, a second pair of auxiliary shafts, means actuated by the driving shaft for transmitting an intermittent movement thereto, said intermittent movement being such that the second named auxiliary shafts will revolve one revolution in unison with the main driving shaft and then remain idle during three revolutions of the main driving shaft, a clamp member intermittently actuated by one of the first named continuously driven auxiliary shafts, a temporary stop member actuated by the other of said continuously driven auxiliary shafts, a laterally movable pusher plate actuated by the last named shaft, a transfer bar also actuated by said shaft, an elevating platform intermittently actuated by the main drive shaft, a movable guide frame actuated by one of the intermittently driven auxiliary shafts, a transfer frame also actuated by said shaft, and an empty carton delivering device actuated by another of the intermittently driven auxiliary shafts.

24. In a machine of the character described, a carton inverting device comprising a shaft, a platform supported by the shaft, an open ended frame supported by the platform, means for delivering filled cartons in an inverted position to the platform through the open end of the frame, and means for transmitting an oscillating movement to the shaft to invert and discharge the carton by gravity.

25. In a machine of the character described, a carton inverting device comprising a shaft, a platform supported by the shaft, an open ended frame supported by the platform, means for delivering filled cartons in an inverted position to the platform through the open end of the frame, means for transmitting an oscillating movement to the shaft to invert and discharge the carton by gravity, a discharge chute adapted to receive the carton, means on the inverting device for securing the carton against endwise removal until delivery to the discharge chute, and means actuated by the chute for automatically releasing the carton.

26. In a machine of the character described, the combination with the stationary guide frame of the stacker, of a movable guide frame slidably mounted thereon, a cross-head, an arm on the cross-head to which the movable guide frame is secured, means for transmitting a reciprocal movement to the cross-head, the arm and movable guide frame, an elevating platform forming a bottom for the stationary guide frame, and means for transmitting a plurality of reciprocal movements to said platform during one reciprocal movement of the movable guide frame.

27. In combination, a material conveyor, material stacking means associated therewith, a carton conveyor and interposed means for positioning a carton in relation to the stacking means whereby the material may be packed therein.

28. In combination, a material conveyor, a material stacking means associated therewith, means interposed between the conveyor and the stacking means for dividing the material on the conveyor into blocks of a predetermined size, means for transferring the blocks of material thus formed from the conveyor to the stacking means, a carton conveyor and means for receiving a carton from the same and positioning the carton adjacent the stacking means.

29. In a machine of the character described in combination with a continuously operating conveyor, a vertically reciprocal member mounted above the conveyor, a clamping member mounted adjacent the conveyor, and means for operating the reciprocal member and clamping member in timed relation.

30. In a machine of the character described in combination with a continuously operating conveyor, a vertically reciprocal member, a clamping member, a horizontal reciprocal member, and means for operating the three last named members in timed relation.

31. The combination with a continuously operating conveyor adapted to deliver a continuous layer of material, of a vertically reciprocal member mounted above the conveyor and a clamping bar cooperating therewith and adapted to engage the material and separate blocks thereof from the continuous layer.

32. The combination with a continuously operating conveyor adapted to deliver a continuous layer of material to be packed, of a clamping member adapted to engage and restrain the movement of the material, and a vertically reciprocal member adapted to separate blocks of material from the continuous layer.

33. The combination with a continuously operating conveyor adapted to deliver a con-

tinuous layer of material to be packed, of a carton holder, a receiving table, means for dividing the continuous layer of material into blocks, means for transversely transferring the blocks of material from the belt to the receiving table, and means for elevating the blocks from the receiving table to the carton holder.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

CHAS. C. REESE.
JOSEPH T. BUZZO.
ROBERT S. WOODFORD.

Witnesses:
W. W. HEALEY,
M. E. EWING.