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2,517,956

BOX HANDLING APPARATUS

Filed March 25, 1946

2 Sheets-Sheet 1

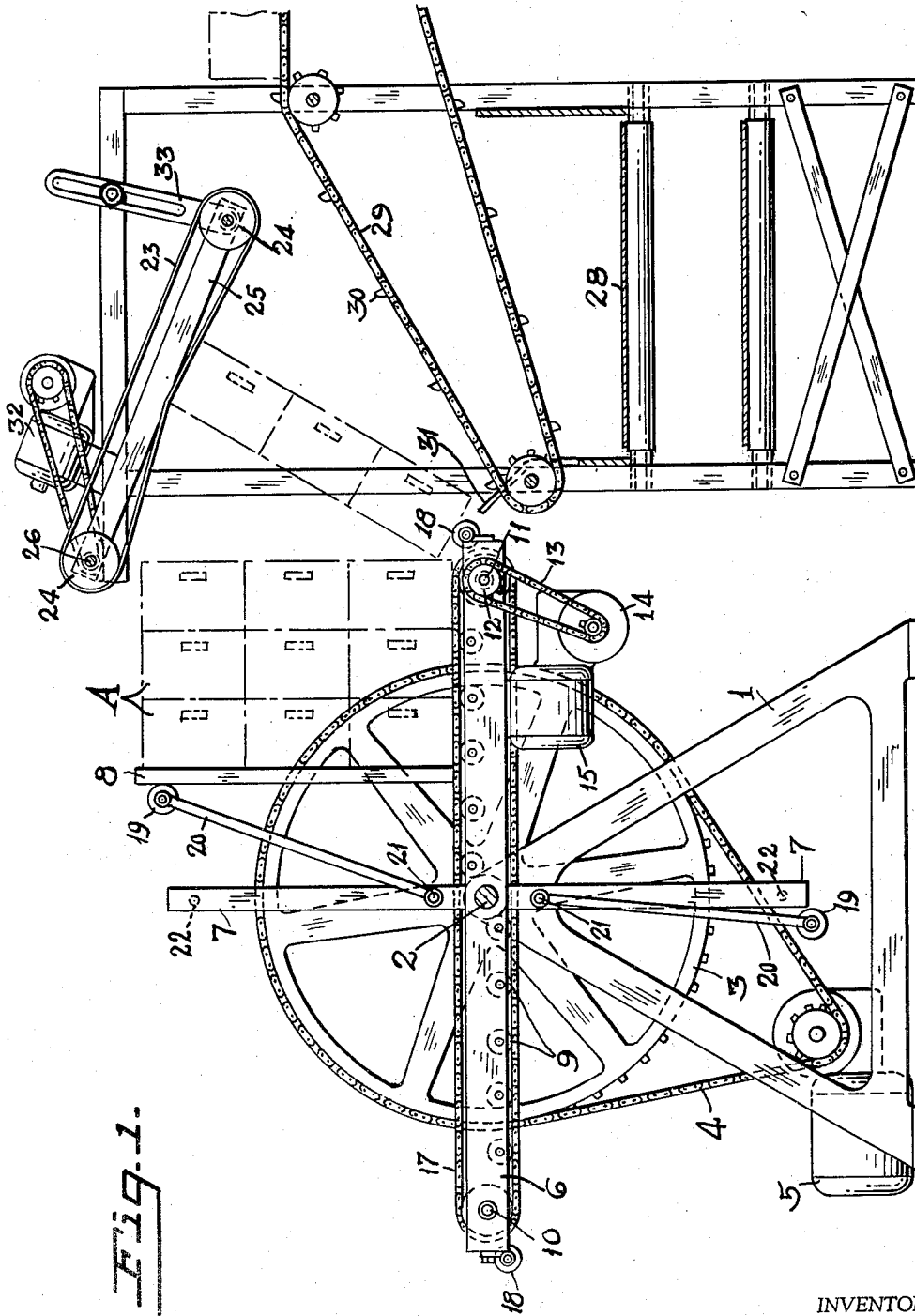


Fig. 1.

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2 Sheets-Sheet 2

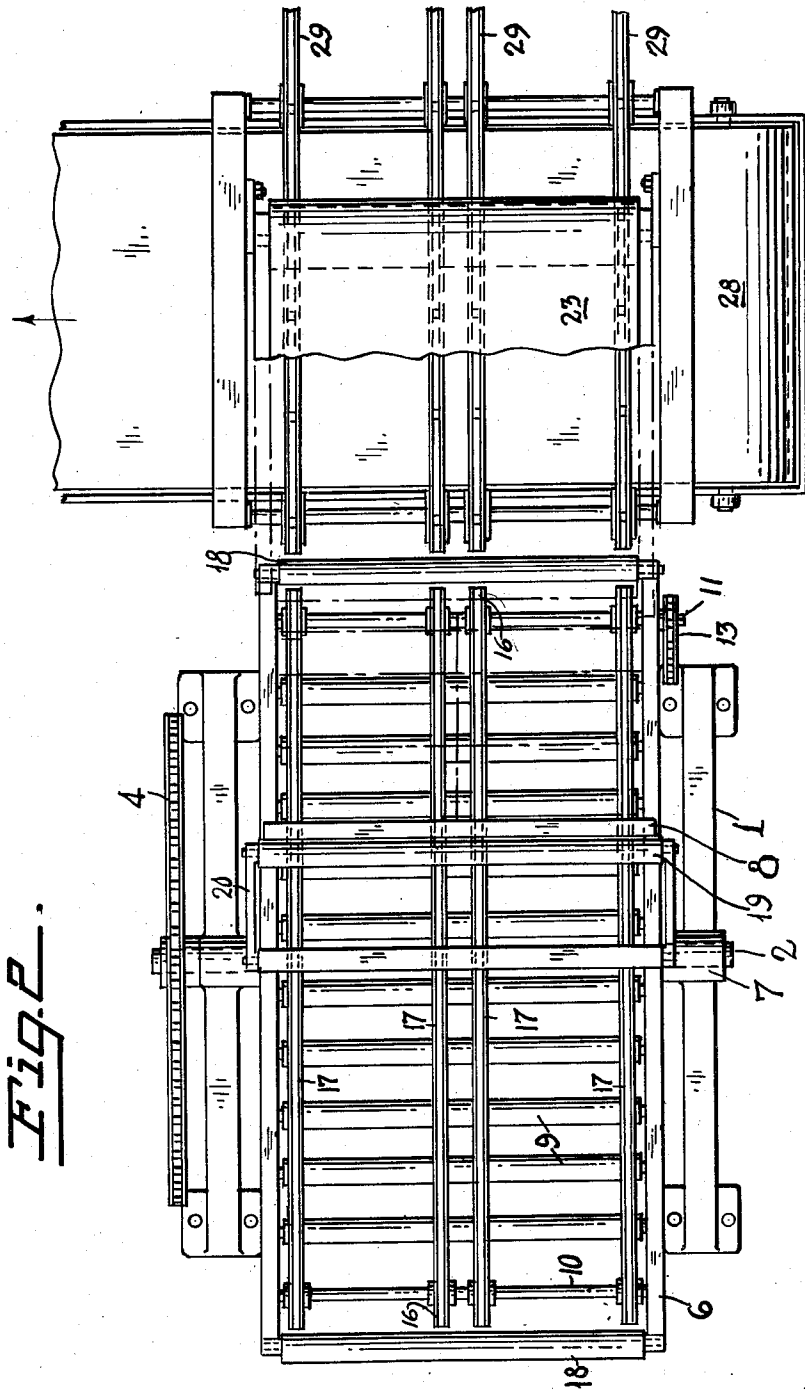


Fig. 2.

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BOX HANDLING APPARATUS

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9 Claims. (Cl. 214-1.1)

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This invention relates to improvements in apparatus for handling boxes containing produce.

An object of my invention is to provide improved box handling apparatus embodying novel means whereby a plurality of stacked boxes may be received from a loading vehicle and carried to a position where their contents are automatically dumped onto an endless conveyor or into a receptacle.

Another object of my invention is to provide improved box handling apparatus which embodies a construction capable of automatically handling a number of stacked boxes or crates containing agricultural produce, whereby the usual manual handling of the boxes in the manner ordinarily required in transferring the produce from the boxes or crates preparatory to the subsequent treatment thereof is entirely eliminated.

Other and further objects of my invention will be pointed out hereinafter, or will be indicated in the appended claims, or will be obvious to one skilled in the art upon an understanding of the present disclosure. For the purpose of this application, I have elected to show herein certain forms and details of apparatus for handling boxes representative of my invention; it is to be understood, however, that the embodiment of my invention herein shown and described is for the purpose of illustration only, and that therefore it is not to be regarded as exhaustive of the variations of the invention.

In the accompanying drawings:

Fig. 1 is a side elevation of apparatus for handling boxes, illustrating the principles of my invention; and

Fig. 2 is a top plan view of the same.

Referring to the drawings the numeral 1 designates a supporting structure on which is journaled a drive shaft 2. One end of the shaft is secured to a large sprocket wheel 3 which is connected by a chain drive 4 to the gear reduction assembly of an electric motor 5, the operation of which is controlled in the usual manner by suitable switch means either of the automatic or hand operated type.

Secured to the drive shaft 2 and rotatable therewith is a substantially rectangular open frame 6 having four rigid outwardly disposed supporting members 7 secured to its opposite sides at points substantially midway between the ends of the latter. The supporting members 7 are arranged at right angles with respect to the sides of the frame 6, and one pair thereof extends in one direction from points adjacent the drive shaft and

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the other pair extends in the opposite direction. Each pair of supporting members 7 when in a certain horizontal position is adapted to support a movable platform 8 which is placed thereon preparatory to the transfer thereto of a number of stacked boxes A containing produce or the like.

Interposed between and rotatably supported by the opposite sides of the frame 6 are a number of spaced elongated rollers 9 which are arranged in a manner whereby a set of several of them are positioned in alignment and are disposed at one side of the shaft 2, while a set of several others are similarly positioned at the opposite side of the said shaft. The rollers extend transversely across the interior of the frame 6, and one set thereof projects beyond or above the upper edges of the sides of the frame while the other set of said rollers projects beyond or below the lower edges of the frame's sides, as clearly shown in Fig. 1. Thus when the frame is horizontally positioned the rollers 9 of one set will extend above the upper edges of the frame and will be capable of movably supporting a number of produce containing boxes A.

Journalled in the opposite sides of the frame 6 and arranged at opposite ends of the latter are transversely disposed shafts 10 and 11, the latter being operatively connected by a sprocket 12 and a chain drive 13 to a reduction gear assembly 14 of an electric motor 15. Secured to the shafts 10 and 11 are a plurality of sprocket wheels 16 which serve to operatively support a number of spaced endless chains 17, the latter extending over and in engagement with the rollers 9. The chains 17 are slowly actuated at a uniform speed in a clockwise direction by the motor 15, and when the frame 6 is positioned horizontally or in an inclined position the uppermost set of rollers 9 will be arranged beneath the chains and in positions where the latter are prevented from sagging or becoming disengaged from certain of the boxes then supported on the frame.

Rotatably supported at the opposite ends of the frame 6 are transverse rollers 18 which are respectively arranged in alignment with the set of rollers 9 located nearest thereto. The end rollers 18 are adapted to facilitate the discharge of the produce boxes A from the frame when the latter have been conveyed by the chains 17 to positions where they are no longer supported thereon.

Preparatory to the loading operation the motor 5 is operated until the frame 6 and the supporting members 7 are in vertical and horizontal positions respectively. A plurality of rows of stacked produce containing boxes A which are open at

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their upper sides, are deposited by an elevator truck or other means onto a platform 8 previously placed by an operator on the two supporting members 7 then located to the left of the shaft 2. The innermost vertical row of boxes is shoved backwardly until the boxes thereof engage with the chains 17 which then extend alongside a vertically disposed set of rollers 9. After additional rows of boxes are deposited on the platform 8 one behind the other, the dumping or transfer operation may be commenced. The operation of the electric motor 5 through the closing of the control switch (not shown) connected in its electrical circuit, causes the shaft 2, the frame 6, the supporting members 7, and the produce containing boxes A to be turned in a clockwise direction. As the pair of supporting members 7 on which the platform 8 and the stacked boxes are supported approach a vertical position, the weight of the boxes is transferred to the frame 6, and particularly to the forward ends of the upper flights of the chains 17 then engaging with the underlying set of rollers 9. By the time the supporting member 7 has reached a vertical upstanding position, the boxes will have been turned through an angle of ninety degrees to positions where their open tops face forwardly and they rest on their then lower sides. At this point the operation of the motor 5 is discontinued and the operation of the motor 15 commenced. Control switches (not shown) may be provided for automatically or manually controlling the timely operation of the motor 15 and discontinuing the operation of the motor 5. As the chains 17 are actuated in a clockwise direction by the motor 15 the boxes are conveyed forwardly toward the right hand or rear end of the frame 6. One of two transverse rollers 19 carried at the outer ends of two arms 20 which are pivotally supported on a supporting member 7, as at 21, exerts a forward pressure, through the force of gravity, on the upper end of the platform 8, thereby causing the latter to follow the boxes in a forward direction without becoming disengaged from the rear row of said boxes. The lower end of the platform 8 being supported on the chains 17 will be conveyed forwardly along with the boxes. Stop members 22 projecting from the supporting members 7 prevent the arms 20 and rollers 19 from falling rearwardly as the frame and the said members are rotated. While some of the produce contained in the upper exposed row of boxes A will fall therefrom as the said boxes are turned on their sides, there will not be any particular loss since the lower row of boxes will intercept and carry forwardly such of the produce that does not fall below the frame, and as to the latter the operator can readily recover the same.

As the boxes are conveyed forwardly, the upper forward row engages with a slowly moving endless belt 23 which extends over end rollers 24 that are journaled in spring pressed bearings carried at the ends of a frame 25. The frame 25 is pivotally suspended as at 26 from a supporting structure 27, and its weight resting on the upper horizontal row of boxes through the belt 23 serves to maintain the forwardly disposed rows of boxes in positions where they continue to engage one with another. The forward rows of boxes are held in their normal relative formation while they are tipped downwardly and forwardly to discharge their contents onto an endless belt conveyor 28. As the boxes are conveyed forwardly the lower forward row thereof engages with the rides over an end roller 18, which supports the forward rows

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of said boxes as they approach the end of their forward movement and are tipped to dumping positions. The counterclockwise movement of the belt 23 carries the forward upper rows of boxes forwardly and downwardly for a short distance and until the upper forward row becomes disengaged from said belt, and at this point an endless chain conveyor 29, consisting of four widely spaced endless chains, positioned beneath the belt 23 and forwardly of the frame 6, intercepts the falling empty boxes and conveys them to a discharge station. The endless conveyor chains 29 carry spaced lugs 30 which engage with the lower rear edges of the boxes and hold them on the conveyor. A plate 31 arranged forwardly of the rear end of the frame 6 is adapted to intercept the lower forward row of boxes as it falls from the roller 18, thereby making it possible for the chain conveyor 29 to efficiently operate in the manner intended.

The endless belt 23 is connected through suitable reduction gears and a sprocket and chain arrangement, to an electric motor 32, and the operation of the said belt is continuous and at a slow speed. A slotted stop link 33 is arranged to prevent the pivotal movement of the frame 25 beyond certain limits.

Each succeeding row of boxes A is carried forwardly and emptied in the manner described. The platform 8, when the last vertical row of boxes has been discharged from the frame 6, is removed by an operator for subsequent use in the manner heretofore described.

It is to be understood that my invention may embody a construction in which a greater or less number of units may be employed to handle the produce containing boxes, but in principle each is substantially the same as the embodiment herein shown and described.

What I claim is:

1. In apparatus for handling boxes or the like, an elongated frame mounted for rotation about a horizontal axis, duplex supporting structures secured to and extending in opposite directions from the central portion of the frame, each of said supporting structures when in a horizontal position being positioned for initially receiving a number of stacked containers, a combined support and conveyor carried by the frame and positioned at substantially right angles to the supporting structures, the said combined support and conveyor being arranged to receive the stacked containers transferred from either of the supporting structures when the frame is rotated through a partial revolution, and means for actuating the conveyor to convey the containers to a position for dumping.

2. In apparatus for handling boxes or the like, an elongated frame mounted for rotation about a horizontal axis, duplex supporting structures arranged at substantially right angles to the frame and secured to and extending in opposite directions from the central portion of the frame, each of said supporting structures when in a horizontal position being positioned for initially receiving and supporting a number of stacked boxes, a conveyor carried by and positioned in substantially parallel relation to the frame and arranged to receive the stacked boxes when the frame has rotated through a predetermined angle, means for rotating the frame, and means for actuating the conveyor, whereby the stacked boxes may be conveyed to positions for discharging the contents thereof.

3. In apparatus for handling boxes or the like, a frame mounted for rotation about a horizontal

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axis, having an endless conveyor carried thereon, a supporting structure carried by the frame and when horizontally positioned being arranged for initially receiving and supporting a number of stacked boxes or the like, the conveyor and the supporting structure being positioned at substantially right angles to each other, and the conveyor being arranged to receive the stacked boxes from the supporting structure when the frame is rotated substantially through ninety degrees, means for rotating the frame, means carried on the supporting structure for applying a forward pressure on the boxes as they are being conveyed by the conveyor, whereby the boxes are maintained in stacked positions and means for actuating the conveyor, whereby the stacked boxes may be carried to dumping positions.

4. In apparatus for handling boxes or the like, an elongated frame pivotally mounted at its central part for rotation about a substantially horizontal axis, an endless conveyor carried by the frame and arranged for longitudinal movement with respect thereto, a rigid supporting structure carried by and arranged at substantially right angles to the frame for initially receiving and supporting a number of stacked boxes having their tops open and facing upwardly, the said supporting structure and conveyor being relatively arranged so that when the frame is rotated substantially through ninety degrees the boxes will be tipped on their sides and transferred from the supporting structure to the endless conveyor, means for actuating the conveyor whereby the boxes are conveyed in a direction in which their top open ends face the direction of their movement, means for exerting a continued pressure on the boxes in a direction of their movement and means arranged to engage with certain boxes of the stack as they approach an end of the frame, whereby the relative formation of certain of the boxes may be substantially maintained while the contents thereof is discharged therefrom.

5. In apparatus for handling boxes or the like, an elongated frame pivotally mounted at its central part for rotation about a substantially horizontal axis, means for rotating the frame, an endless conveyor carried by the frame and arranged for longitudinal movement with respect thereto, duplex supporting structures carried by the frame and arranged at right angles to the frame and at angles of substantially one hundred and eighty degrees from each other, either of the supporting structures when in a horizontal position being positioned for initially receiving and supporting a number of stacked boxes or the like with their tops open and facing upwardly, the said supporting structures and conveyor being relatively arranged so that when the frame is rotated substantially through ninety degrees the boxes loaded on a supporting structure will be tipped on their sides and transferred from the supporting structure to the endless conveyor, and means for actuating the conveyor whereby the boxes are conveyed in a direction in which their top open ends face the direction of their movement, whereby the boxes may be conveyed to positions where their contents are discharged therefrom.

6. In apparatus for handling boxes or the like, a frame mounted for rotation about a substantially horizontal axis and having a duplex supporting structure arranged at substantially right angles to the frame for initially receiving and

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supporting a number of stacked boxes having their top ends open, means on the frame for receiving the stacked boxes as they are tipped on their sides and transferred from the duplex supporting structure when the frame is partially rotated, means on the frame for conveying the boxes in stacked formation to an end of the frame, and means for intercepting the boxes and holding them in stacked formation while they are tipped to dumping positions.

7. In apparatus for handling boxes or the like, a rotatably mounted frame, duplex supports carried by the frame and arranged to be successively brought to a position for initially receiving and supporting a plurality of stacked boxes as the frame is rotated through a complete revolution, and combined receiving and conveying means mounted on the frame and arranged to receive the boxes in stacked formation from the support when the frame is partially rotated the said conveyor means being positioned at substantially right angles to the duplex supports.

8. In apparatus for handling boxes or the like, a rotatably mounted frame, a rigid duplex supporting structure carried by and positioned at right angles to the frame for initially receiving and supporting a plurality of stacked boxes having their top ends open, conveyor means positioned in substantially parallel relation to and carried by the frame and arranged to receive the stacked boxes as they are discharged from the supporting structure when the frame is partially rotated, means for rotating the frame, means for actuating the conveyor means, whereby the boxes may be conveyed to a discharge position, means arranged to intercept the boxes as they reach the discharge position, the said intercepting means being capable of holding the boxes in stacked relationship while the contents thereof is discharged therefrom, means for receiving the discharged contents from the boxes, and conveyor means for intercepting and conveying the boxes away after the contents are discharged therefrom.

9. In apparatus for handling boxes or the like, a rotatably mounted frame arranged for rotation about a horizontal axis, means for rotating the frame, a rigid duplex support carried by and positioned at substantially right angles to the frame for initially receiving and supporting a plurality of stacked boxes having their top ends open, conveyor means carried by the frame and arranged to receive the stacked boxes as they are discharged from the duplex support when the frame is partially rotated, the said conveyor being arranged to maintain the boxes in stacked formation while they are conveyed to a discharge position, and means positioned to intercept the boxes and assist in tilting the boxes while in stacked formation to positions where their contents are discharged therefrom.

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