

March 5, 1946.

5. **D. C. CURTIS**
MEANS AND METHOD FOR HANDLING AND STACKING
RAILROAD TIES AND THE LIKE
Filed July 26, 1944 4 S

2,396,090

4 Sheets-Sheet 1.

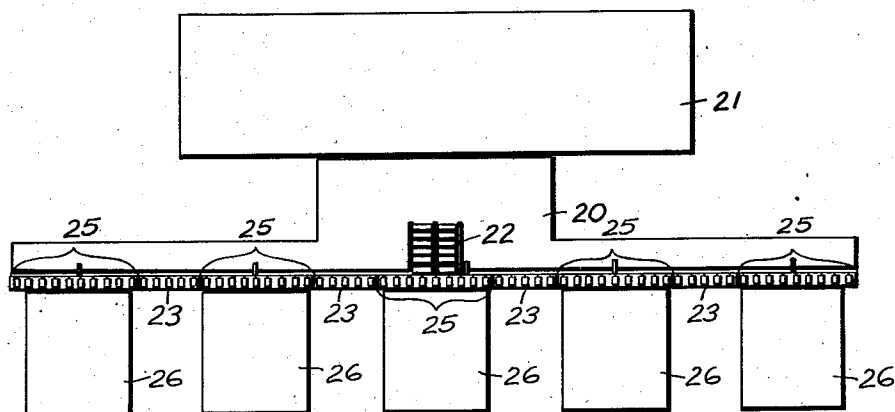


Fig. 1

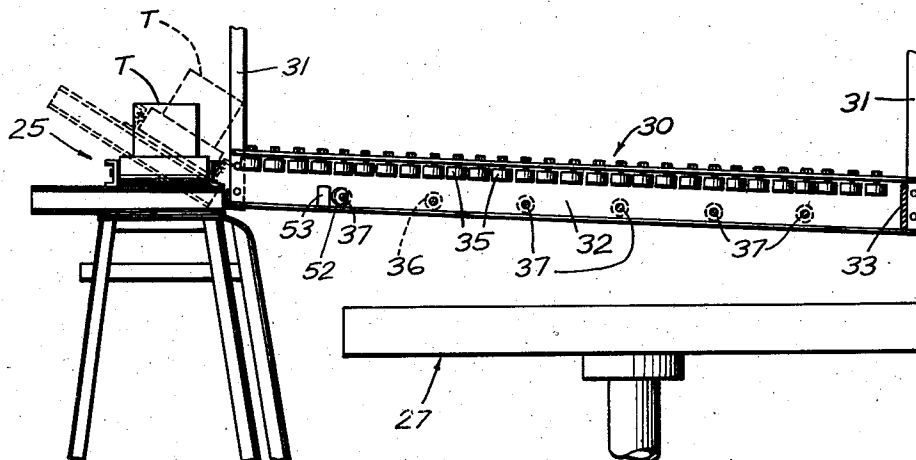


Fig. 2

INVENTOR.
Dwight C. Curtis
BY
Manly Brown & Co.
ATTYS.

March 5, 1946.

D. C. CURTIS
MEANS AND METHOD FOR HANDLING AND STACKING
RAILROAD TIES AND THE LIKE
Filed July 26, 1944

2,396,090

4 Sheets-Sheet 2

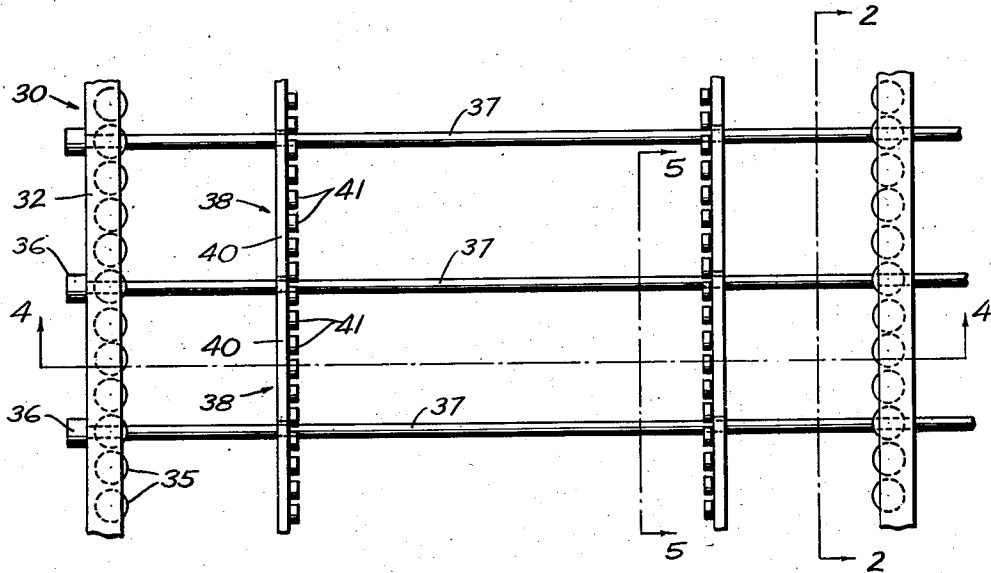


Fig. 3

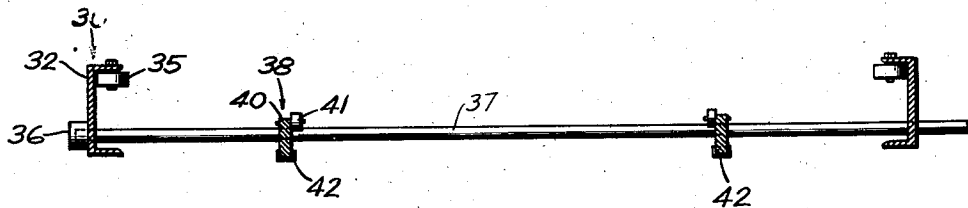


Fig. 4

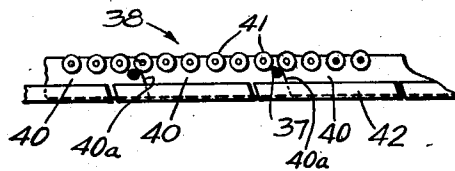


Fig. 5

INVENTOR.
Dwight C. Curtis
BY
Mann, Brown & Co.
ATTYS.

March 5, 1946.

D. C. CURTIS
MEANS AND METHOD FOR HANDLING AND STACKING
RAILROAD TIES AND THE LIKE
Filed July 26, 1944

2,396,090

4 Sheets-Sheet 3

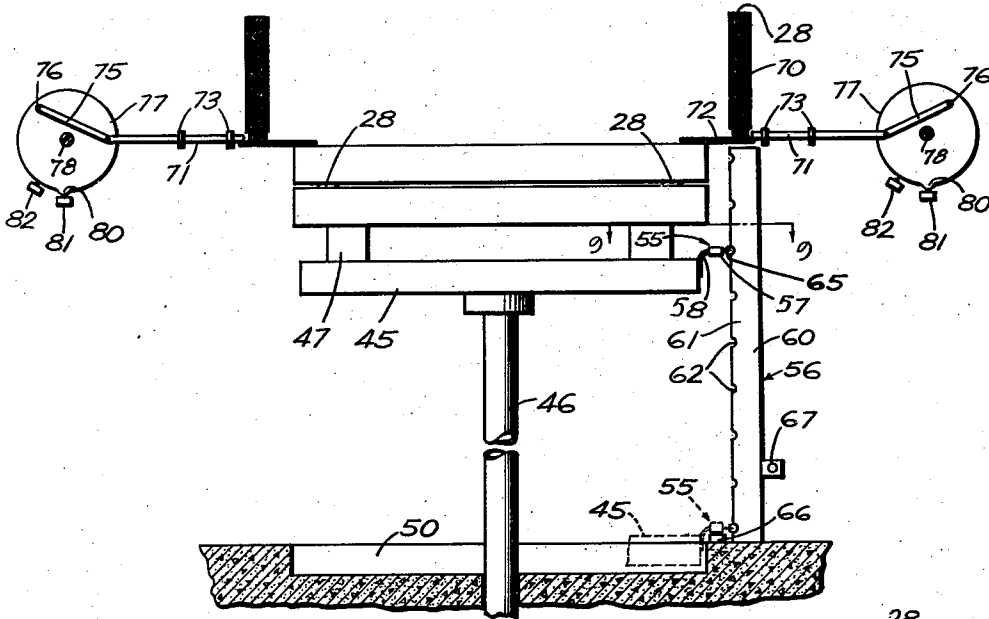


Fig. 6

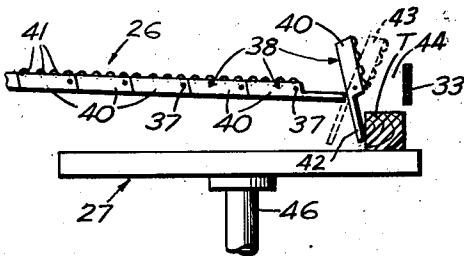


Fig. 7

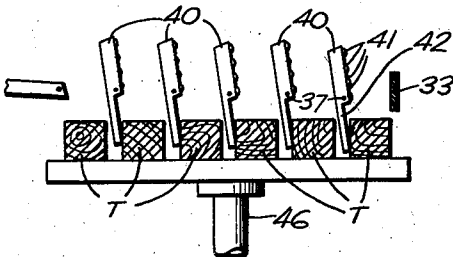


Fig. 8

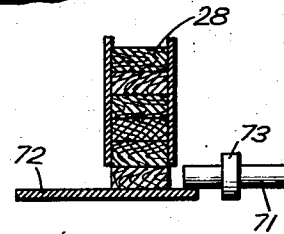


Fig. 6A

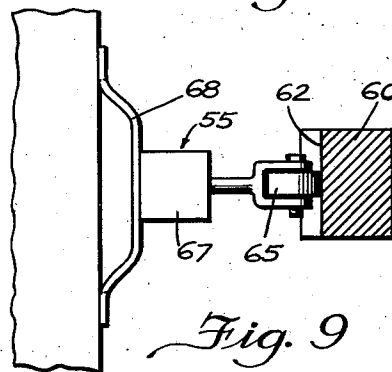


Fig. 9

INVENTOR.
Dwight C. Curtis
BY
Mann, Brown & Co.
ATTYS.

March 5, 1946.

D. C. CURTIS
MEANS AND METHOD FOR HANDLING AND STACKING
RAILROAD TIES AND THE LIKE.
Filed July 26, 1944

2,396,090

4 Sheets-Sheet 4

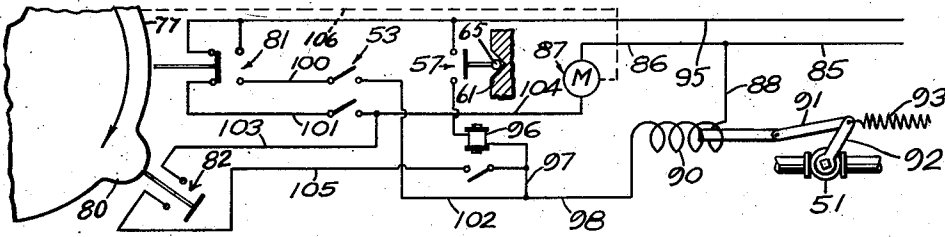


Fig. 10

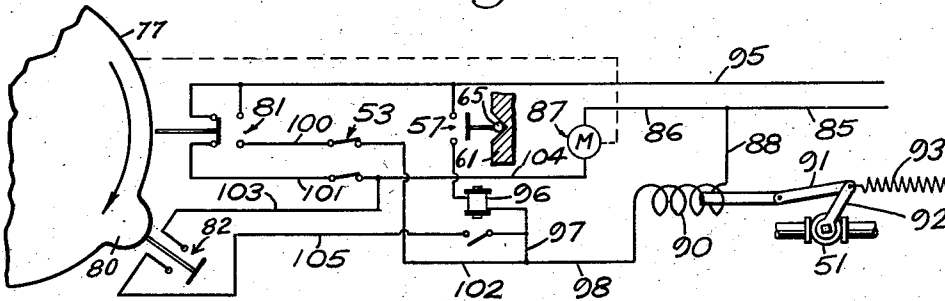


Fig. 11

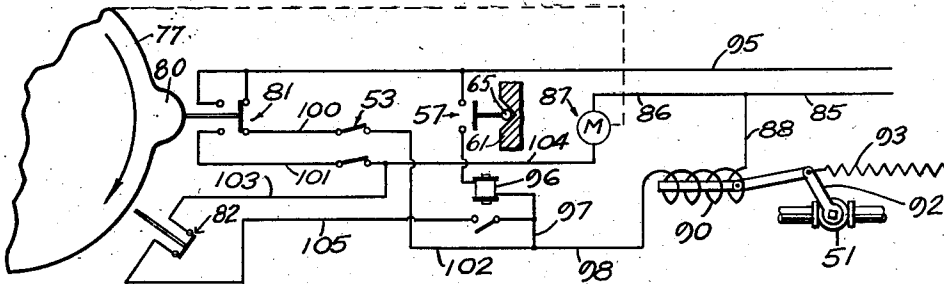


Fig. 12

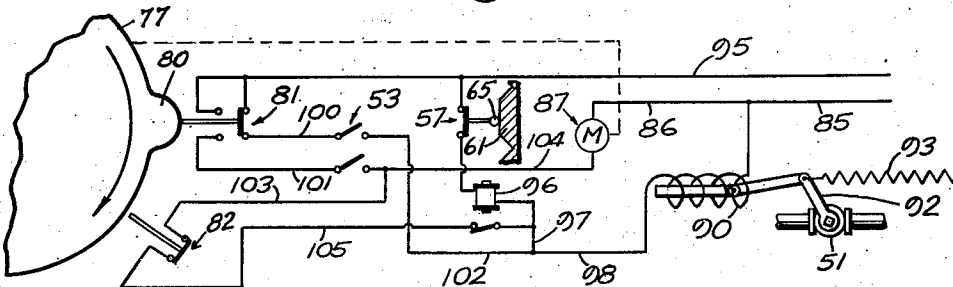


Fig. 13

INVENTOR.
Dwight C. Curtis
BY
Mann, Brown & Co.
ATT'YS.

UNITED STATES PATENT OFFICE

2,396,090

MEANS AND METHOD FOR HANDLING AND
STACKING RAILROAD TIES AND THE
LIKE

Dwight C. Curtis, Deerfield, Ill.

Application July 26, 1944, Serial No. 546,618

9 Claims. (Cl. 214—6)

My invention relates to material handling devices, with special reference to the handling, sorting and stacking of elongated objects. For the purpose of the present disclosure, I shall describe, by way of example, how the invention is applied to the handling of railroad ties.

Railroad ties must be handled several times in the course of the operations of cutting, boring, treating, seasoning and sorting the ties prior to final use. Since each tie is so heavy as to require exceptional strength for manual handling, and, since several million ties are required each year, there has been a long standing need for devices and methods to minimize manual handling of ties and to speed up the sorting and stacking operations. The general object of my invention is to meet this need at the various stages in the production of ties.

Cross ties, switch ties and bridge ties are cut to different lengths and carloads of the ties of mixed lengths are commonly received at points for chemical treatment, seasoning and storing. The ties must be unloaded, sorted by sizes, stacked with spacers for exposure to air, moved into treating plants and later moved into stock or storage. One of the objects of my invention is to provide a means and a method whereby ties may be conveyed from the railroad cars to selected points in accord with size, formed into stacks incorporating appropriate spacers and then moved into treating plants, all without any manual handling whatsoever.

In general, this object is attained by unloading the ties consecutively onto a conveyor system, switching the ties selectively in accord with length onto elevated branch conveyors or aprons, dropping the ties from each elevated apron at spaced points in sequence to form rows on a stack support under the apron and periodically increasing the vertical distance between the stack support and apron to provide space for new rows, each stack support being designed for the convenient removal of a finished stack by a lift truck.

In the preferred practice of my invention, a further object is to minimize the necessity for operators to manipulate controls, position spacers, or otherwise give attention to the progressive formation of the various stacks. This object is attained by a system of control providing for cyclic repetition in the sequence of positions at which the ties are dropped for distribution on a stack, providing for automatic increase in the vertical spacing at the top of the stack when required for new rows, providing for the automatic positioning of spacers after the completion of

each row and preferably also providing for an automatic signal for the completion of a stack.

The above and further objects of my invention will be understood from my description of a preferred practice of the invention and the accompanying drawings, especially further objects relating to the specific construction of the distribution apron and objects relating to a circuit arrangement for automatic control.

In the accompanying drawings, which are to be taken as illustrative only;

Figure 1 is a diagrammatic layout of a system for unloading, sorting and stacking railroad ties for processing and seasoning,

Fig. 2 is a fragmentary view at one end of the system showing a distribution apron and an associated stack support, certain parts being omitted for simplicity, the apron being shown in section as indicated by the line 2—2 of Figure 3,

Fig. 3 is a plan view of a distribution apron, Fig. 4 is a sectional view taken as indicated by the line 4—4 of Fig. 3,

Fig. 5 is a view of a conveyor member employed in the apron, taken as indicated by the line 5—5 in Figure 3,

Fig. 6 is an elevation at one of the stacking stations showing a stack support and associated means employed for automatic operation,

Fig. 6a is a detail of Fig. 6,

Fig. 7 is a diagrammatic view indicating the manner in which a distribution apron operates,

Fig. 8 is a similar view taken at the completion of a row of ties on the stack support,

Fig. 9 is a fragmentary section taken as indicated by the line 9—9 of Fig. 6, and

Figs. 10-13 show a wiring diagram of the control system at various stages in the automatic operation.

General arrangement

Fig. 1 shows, by way of example, how the invention may be applied to the problem of unloading ties from freight cars, sorting the ties by length and stacking the ties for transportation by lift trucks.

An unloading platform 20 is provided to receive ties from a freight car 21, the ties being transported by any suitable means from the interior of the freight car to a receiving apron 22 for a main conveyor 23. This receiving apron has a support surface comprising a plurality of rollers whereby the ties thereon may be normally moved with ease onto the main conveyor. The main conveyor 23 is preferably a well-known type of roller conveyor in use prior to this invention that

slopes in both longitudinal directions from the receiving apron 22 for gravity movement of objects thereon and has various tiltable sections 25. Opposite each of the tiltable sections 25 is a suitable branch conveyor means 26 constructed in accord with the present invention to serve as a distribution conveyor or distribution apron in a tie-stacking operation, the ties being dropped from the distribution apron at spaced points in sequence onto a stack support, generally designated 27 (Fig. 2).

Each of the tiltable sections 25 is remotely controlled by an operator at the receiving apron 22. When a tie gravitates to a selected section 25, the selected section is tilted as indicated in dotted lines in Figure 2 thereby causing the tie to roll over onto the corresponding distribution apron 26.

Provision is made for intermittently increasing the vertical spacing between each distribution apron 26 and the corresponding underlying stack support 27 to provide clearance for the periodic addition of new rows of ties on the stack support. To this end either the distribution apron 26 or the stack support 27 may be adapted for vertical movement relative to the other. In the present preferred practice of the invention, the stack support 27 is vertically movable while the distribution apron 26 remains fixed in height, the stack support being dropped by approximately the thickness of a tie whenever a row of ties is completed. Prior to the addition of a new row of ties, suitable spacer means, such as two spacer strips 28 (Fig. 6), are added to the stack for the vertical spacing of the stack rows.

The construction of a distribution apron

The purpose of each of the distribution aprons 26 is to provide a conveyor path across the corresponding stack support 27 and to provide for dropping the ties at spaced points along the path in sequence. The general concept underlying my preferred construction for such a distribution apron is the provision of a series of spaced openings in the apron through which the ties may be dropped onto the corresponding stack support, all but one of the openings being normally closed or barred and automatic means being provided to uncover or unbar the openings in sequence. In putting this concept into practice, I find it convenient to arrange for all but said one of the openings to be unbarred in response to the dropping of a tie through the preceding opening in the sequence of openings. A specific structure for such a delivery apron is shown, by way of example, in Figs. 2-6.

Each of the distribution aprons 26 includes an inclined frame 30 suitably supported from overhead by bars 31, the frame being preferably adjustable in width to handle ties of various lengths. As best shown in Figs. 3 and 4, the frame 30 may comprise two inwardly turned side channels 32 with a forward stop plate 33 fixedly attached to one of the side channels and extended through a suitable slot in the other side channel. Each of the two side channels 32 is provided with a series of inwardly presented rollers 35 to facilitate movement of the ties by gravity. Journalled in suitable bearings 36 on the side channels 32 is a series of spaced cross shafts 37 serving as pivots for a plurality of individual conveyor members 38.

It is contemplated that each of the conveyor members 38 will have a normal position to support and to convey ties but will be movable from a

normal supporting position to a tie-releasing position, such movement being made in response to the weight of a tie. It is further contemplated that normally all but one of the conveyor members will be normally non-responsive to the weight of a tie on the apron but that each of these will be rendered responsive automatically by the release of a tie by the preceding conveyor member in the sequence. In other words, normally only one conveyor member 38 will be responsive at any one time and the response of any one conveyor member to the dropping of a tie from the distribution conveyor will automatically make the next succeeding conveyor member responsive. As taught herein, a convenient expedient for making the conveyor members 38 responsive in sequence is to arrange the conveyor members in overlapping relationship whereby a conveyor member in its normal position masks a weight-responsive means for actuating the next adjacent conveyor member, the weight-responsive means being exposed when the masking conveyor member responds to the weight of a tie.

In the specific construction shown, each conveyor member comprises one of the cross shafts 37 and two spaced bars 40 fixedly mounted thereon for rotation therewith. Each of the bars 40 is provided with a plurality of upwardly pressed rollers 41 to facilitate the gravity movement of successive ties across the distribution apron.

It is contemplated that the conveyor members 38 will be suitably biased to seek their normal tie-supporting positions. In the present construction, the gravitational tendency of the bars 40 to rotate about the axes of corresponding cross shafts 37 is relied upon to provide the desired bias. It is also contemplated that suitable stop means will be provided to hold the conveyor members 38 in their normal tie-supporting positions in opposition to such bias and any suitable stop means may be employed for this purpose. Thus, one cross shaft 37 may serve as a stop means to limit the biased rotation of the two bars 40 on the adjacent cross shaft 37. In my preferred construction, however, the end of a bar 40 that is mounted on one cross shaft 37 serves as the stop means for the corresponding bar 40 on the next adjacent cross shaft 37, the ends of the cross bars being beveled or inclined for this purpose, as best shown by the inclined lines 40a in Fig. 5. It is apparent that one bar 40 is in the path of counterclockwise rotation of the next adjacent bar 40 to the right thereof.

In my preferred practice, each of the cross bars 40 is provided with a forwardly extending channel bar 42 to serve as the weight-responsive means for rotating the corresponding conveyor member 38 out of its normal tie-supporting position to a release position. Initially, with all of the conveyor members 38 in their normal tie-supporting positions, all of the channel bars 42 except the two channel bars at the end of the distribution apron are masked by the adjacent conveyor members 38, each masking bar 40 nesting into an underlying channel bar 42.

When a tie T is dropped onto the distribution apron 25 by one of the tiltable sections 25 of the main conveyor 23 while all of the conveyor members 38 of the distribution conveyor are in their normal positions, the tie will gravitate along the rollers 41 to the front end of the distribution apron against the stop plate 33 and then drop through the opening between the stop plate and the cross shaft 37 carrying nearest pair of bars 40, which opening is designated 44 in Figure 7.

In thus dropping into position on the stack support 27 to start a new row, the falling tie moves against the two outermost channel bars 42 to swing the outermost conveyor member 38 to its tie-releasing position shown in Figure 7.

It is requisite that once a conveyor member 38 is tilted, it remains tilted until the row of ties is completed. No latching means or other expedient is required for this purpose, however, because the vertical spacing between the distribution apron 26 and the stack support 27 is such that the deposited tie lies in the path of return movement of the tilted conveyor member 38 to maintain the conveyor member in its tilted or release position. See Fig. 7. In other words, the tie in falling into place on the stack support rotates the conveyor member and then holds the conveyor member in its released position in opposition to the bias of the conveyor member.

Suitable stop means may be provided to prevent rotation of a conveyor member 38 beyond its range of bias. In the present construction, however, such a stop means is unnecessary because whenever a conveyor member 38 is rotated excessively clockwise, as viewed in Fig. 7, the conveyor member is brought into abutment against the end of the channel bar 42 of the next adjacent conveyor member 38, this limit position of the tilted conveyor member being indicated in dotted lines at 43 in Fig. 7. It may be desirable, however, to provide some other simple expedient to limit the rotation of the last conveyor member 38 to be tilted.

When the second tie is delivered to the distribution apron 26, it gravitates to the opening uncovered by the tilting of the endmost conveyor member 38 and drops through that opening to the next position in sequence on the stack of ties. This second tie may strike the tilted endmost conveyor member 38, in which event the tilted conveyor member serves as stop means to arrest the forward progress of the tie.

When a row of ties is completed on the stack support 27, as indicated in Fig. 8, the stack support is lowered to make room for a new row of ties and the consequent increase in vertical spacing between the stack support and the distribution apron 26 automatically releases the tilted conveyor members 38 from contact with the ties on the stack support, whereupon all of the conveyor members 38 return to their normal tie-supporting positions by virtue of their inherent bias.

Stack support

Each of the stack supports 27 may comprise a table 45 supported by a vertically movable hydraulic plunger 46. In preparation for the stacking of ties onto the stack support, a suitable platform 47 of the well-known type designed for cooperation with a lift truck is placed on the hydraulic table 45 to receive the ties. When a stack of ties is completed, the table 45 retreats into a recess 50 in the floor to place the surface of the table flush with the floor surface, whereupon a lift truck is moved into position for engagement with the platform 47 to remove the platform and the superimposed stack of ties.

The plunger 46 is elevated by the operation of a suitable hydraulic pump and is lowered by the opening of a suitable hydraulic valve, such as the valve indicated at 51 in Figs. 10-13. Since hydraulic systems incorporating such pumps and valves are well known, no detailed description is necessary here.

Means for automatic operation

The invention, as described to this point, may be practiced to advantage by manual operation of the various valves 51 to lower the various hydraulic tables 45 and by manual positioning of the various spacer strips 28 when required. I prefer, however, to achieve even greater advantages by the addition of means to make the sequence of stacking operations largely, if not entirely, automatic. Various expedients that may be employed to make the above described apparatus automatic will now be explained.

One requisite is that whenever a row of ties is completed on a stack the corresponding hydraulic table 45 automatically descends by a distance approximately equal to the thickness of a tie, or, more specifically, the combined thickness of a tie and a spacer 28. A suitable expedient for attaining this particular control is to provide an electric switch responsive to tilting of the last conveyor member 38 in the sequential operation of the conveyor members on the distribution apron 26. Thus, as shown in Fig. 2, the particular cross shaft 37 that rotates when the last of the conveyor members 38 tilts may be provided with an eccentric 52 to close a normally open push-button switch 53 when a tie to complete a row of ties drops through the last space in the sequence of spaces on the distribution apron 26.

A further requisite for automatic operation is means to control the downward movement of the hydraulic table that is required periodically for the addition of new rows to the stack of ties. To this end, I may provide one control means movable with the hydraulic table and a second fixed control means for cooperation therewith, one of these control means being indexed for predetermined levels of the hydraulic table.

Fig. 6 shows an elevation-control means, generally designated 55, carried by the hydraulic table 45 and shows a second fixed elevation-control means, generally designated 56, for cooperation therewith, the control means 56 being indexed for spaced predetermined positions of the hydraulic table. The elevation-control means 55 may comprise a suitable switch 57 mounted on a bracket 58 for actuation by the elevation-control means 56. The elevation-control means 56 is shown in the form of a rigid post 60 with a cam face 61 turned toward the vertically movable switch 57, the cam face having index recesses 62 for actuating the switch at various levels of the hydraulic table. In the particular construction indicated, the switch 57 has an operating plunger carrying a roller 65, the plunger being continuously urged outward by spring pressure to press the roller against the post 60. When the roller 65 presses against the cam face 61, the switch 56 is closed, and, when the roller enters a recess 62, the switch is thereby opened.

Preferably, suitable means is provided to indicate the completion of a stack of ties on a hydraulic table 45. Thus, Fig. 6 shows a normally open switch 63 that is operated by pressure from the previously mentioned bracket 58 when the hydraulic table 45 reaches its lowermost position. Such a switch 66 may control any suitable audible or visible signal device, such as a lamp 67.

A further requisite for automatic operation is the provision of suitable means for placing the spacer strips 28 on a stack of ties when required. For this purpose, I show in Fig. 6 a magazine 70 on each side of the stacking station to hold a supply of the strips 28 and I provide a pair of

horizontally spaced plungers 71 for each magazine to dispense the strips therefrom, as desired. The magazine 70 comprises simply a box-like receptacle or frame dimensioned to slidably retain a single tier of the spacer strips, the box-like receptacle being open at the bottom and being spaced above a pair of feed guides 72 by a distance greater than the thickness of one spacer strip but less than the thickness of two spacer strips. The two feed guides 72 are spaced horizontally to support each of the strips 28 at spaced points and extend into the region above the maximum top level of the stack of ties.

Each of the plungers 71 is in the form of a bar mounted in a pair of slide bearings 73 and operatively connected by a link 75 to a crank pin 76 on a wheel 77. The two wheels 77 for the plungers associated with each magazine 70 are keyed to a common shaft 78 for rotation in unison. It is apparent that one complete rotation of the shaft 78 will cause a cycle of operation in which the two plungers 71 will advance and retract. On the advance movement, the two plungers will dislodge a spacer strip 28 from the supply in the magazine 70 and force the strip along the two feed guides 72 to cause the strip to drop into place on the top row of ties of the stack.

The two shafts 78 on the opposite side of the stack station are operatively connected for actuation by a common motor shown diagrammatically at 87 in Figure 10, and, for the purpose of control, one of the four crank wheels 77 is provided with a peripheral lug 80 for cooperation with a pair of spaced switches 81 and 82.

A suitable circuit arrangement incorporating the various switches for automatic operation is shown in Figs. 10-13. One main lead 85 from a suitable source of E. M. F. is connected by a wire 86 with one side of a motor 87 for actuating the two shafts 78 and is also connected by a wire 88 to one side of a solenoid 90 for actuating the hydraulic valve 51. The core of the solenoid 90 is shown connected by a link 91 with an operating arm 92 for the valve 51, the solenoid acting against the opposition of a suitable spring 93. Energization of the solenoid 90 opens the valve 51 to cause the corresponding hydraulic table 45 to descend and de-energization of the solenoid permits the spring 93 to close the valve thereby to hold the hydraulic table stationary.

The other of the two main leads 95 is connected to one side of the switch 57 and is also connected to two contacts of the switch 81. The switch 81 has four contacts and a single contactor arm, as indicated. The second side of the switch 57 is in series with the coil of a relay 96 and with the solenoid 90, the relay 96 being connected to the solenoid by wires 97 and 98.

The switch 53 on the distribution apron 26 has four contacts and two contactor arms, as shown, two of the contacts being connected by wires 100 and 101 to two contacts, respectively, of the switch 81. A third contact of the switch 53 is connected by a wire 102 with the wire 98 leading to the solenoid 90 and the fourth contact is connected by a wire 103 to one side of the switch 82 and is also connected by a wire 104 to the motor 87. The second side of the switch 82 is connected by a wire 105 with one of the contacts of the relay 96, the other contact of the relay being connected to the wire 97.

In the normal stationary position of the hydraulic table 45, the various switches are positioned, as indicated in Fig. 10. It will be noted

that the two contactor arms of the apron switch 53 are open, the index switch 57 is open, the contactor arm of the switch 81 is in one of its two positions, the switch 82 is open and the relay 96 is open. Both the motor 87 and the valve solenoid 90 are deenergized, the valve 51 being held closed by the spring 93 to hold the hydraulic table stationary. The dotted line 106 in Figure 10 indicates that the crank wheel 77 which serves as a switch-operating cam is driven by the motor 87.

Operation with automatic control

The automatic operation of the apparatus may be readily understood from the foregoing description. An operator standing on the unloading platform 20 directs the successively unloaded ties onto the main conveyor 23 and operates suitable remote control levers or pedals (not shown) to actuate the selected tilttable sections 25 of the conveyor to cause the ties to be dispatched to the appropriate distribution aprons 26, there being at least one such distribution apron for each different length of tie. The ties are fed by each distribution apron 26 in automatic sequence to the underlying stack supports.

When the last conveyor member 38 in the sequential series on one of the distribution aprons 26 is operated to complete a row of ties on the stack, as shown in Fig. 8, the distribution apron switch 53 is automatically operated by rotation of the eccentric 52, both contactor arms of the switch closing, as shown in Fig. 11. As a result, the following circuit is established through the motor 87: Lead 85, wire 86, motor 87, wire 104, one contactor arm of switch 53, wire 101 and switch 81 to the second lead 95.

The motor 87 drives the two shafts 78 to rotate the four wheels 77 in synchronism thereby causing the two plungers 71 on each side of the stack to extend and retract. The extension of the two plungers on each side of the stack dislodges a spacer strip 28 from the corresponding magazine 70 forcing the strip outward along the guides 72 and causing the spacer strips to drop into place on the stack of ties.

At the beginning of this cycle of operation for positioning spacers on the stack, the initial movement of the lug 80 away from the switch 82 causes the switch 82 to close but the relay 96 remains de-energized. When the plungers 71 are retracted at the end of the described spacer-positioning cycle, the lug 80 reaches the switch 81 and forces the switch 81 to its second position, as shown in Fig. 12, thereby establishing the following circuit through the valve solenoid 90: Lead 85, wire 88, solenoid 90, wire 98, wire 102, one contactor arm of switch 53, wire 100 and switch 81 to lead 95.

The energization of the solenoid 90 causes the valve 51 to open in opposition to the spring 93, whereupon the hydraulic table 45 moves downward. The initial downward movement of the hydraulic table carries the roller 65 of the switch 57 out of an index recess 62 and onto the cam face 61 thereby causing the switch 57 to close. The closing of the switch 57 establishes the following circuit through the motor 87: Lead 85, wire 86, motor 87, wire 104, wire 103, switch 82, wire 105, the contactor arm of relay 96, wire 97, the coil of relay 96 and switch 57 to the second lead 95. The energized motor turns the wheel 77 and therefore carries the lug 80 away from the switch 81 towards the switch 82 to cause return of the switch 81 to its normal position (shown

in Figure 10) and a short time later to cause return of the switch 82 to its normal open position. During an early portion of this interval of time initiated by operation of the switch 81 and terminated by the subsequent opening of the switch 82, a second motor circuit is closed in parallel with the motor circuit just described, the second parallel circuit being traced as follows: lead 85, motor 87, wire 104, wire 103, switch 82, wire 105, contactor of relay 96, wire 97, the coil of relay 96 and switch 57 to the second lead 95. Before the lug 80 on the wheel 77 reaches the switch 82 to cause the switch to open, the hydraulic table 45 lowers to such extent that the top row of ties releases the various tilted conveyor members 38 of the distribution apron 26 thereby operating the apron switch 53 and causing both of the contactor arms of the switch 53 to take their normal open position. The opening of the switch 53 breaks the second parallel motor circuit just described and the motor is soon deenergized when the lug 80 opens the switch 82 to break the first described motor circuit.

The above described movement of the lug 80 from the switch 81 to the switch 82 breaks the heretofore described circuit for energizing the solenoid 90 but not before a second circuit is established to keep the solenoid energized. The second solenoid circuit is traced as follows:

As the hydraulic table 45 moves downward towards the next predetermined level, the top row of ties releases the various conveyor members 38 of the distribution apron 26, whereupon the apron switch 53 is operated, both the contactor arms of the switch moving to open position as indicated in Fig. 13. This operation of the switch 53 does not, however, de-energize the valve solenoid 90 because the following circuit is effective through the solenoid: Lead 85, wire 88, solenoid 90, wire 98, wire 97, relay coil 96 and switch 57 to the second lead 95. Eventually the lowering of the hydraulic table 45 carries the roller 65 into the next index recess 62 to open the switch 57 and thereby deenergize the solenoid 90 to permit the spring 93 to shut the valve 51. The valve parts of the circuit are then in the original positions of Fig. 10, the hydraulic table 45 remaining stationary for the progressive formation of another row of ties thereon.

Eventually a hydraulic table 45 reaches the lowermost index recess 62, whereupon the bracket 58 comes into contact with the switch 66 to operate the signal means 67. The signal means attracts the attention of an operator who thereupon brings up a lift truck to remove the finished stack of ties. After the finished stack is removed, an empty platform 47 is placed on the cleared hydraulic table 45 and the operator manipulates the control of the hydraulic system to pump the hydraulic table to its highest predetermined level for starting a new stack of ties.

In the described automatic operation, control is governed by the completion of a row of objects on a stack support. The completion of a row causes three actions; namely, the placing of spacer means on the stack, the lowering of the stack and the restoring of the conveyor members of the distribution apron to their normal positions. Obviously the order in which these three actions occur in response to the completion of a row may differ in various practices of the invention.

The preferred practices of my invention described herein in detail for the purpose of disclosure and to illustrate the principles involved

will suggest to those skilled in the art various changes and substitutions under my basic concept, and I reserve the right to all such departures that properly lie within the scope of my appended claims.

I claim:

1. In an apparatus of the class described for handling objects such as ties, means to receive and support a stack of the objects, and a plurality of conveyor members providing a conveyor path above and across said stack support for distributing the objects onto the stack support, said means and said plurality of conveyor members being variable with respect to the vertical distance therebetween, each of said conveyor members being rotatable about a transverse axis in response to the weight of an object from a normal position to a release position for dropping the object onto said stack support, said conveyor members being biased towards their normal positions, the normal vertical distance between said stack support and said plurality of conveyor members being such that objects released to the stack support block the return movement of the corresponding conveyor members to their normal positions whereby the conveyor members may be released by sufficient increase in the distance.

2. In an apparatus of the class described for handling objects such as ties, means to receive and support a stack of the objects, a plurality of conveyor members providing a conveyor path above and across said stack support for distributing the objects onto the stack support, each of said conveyor members being rotatable about a transverse axis in response to the weight of an object from a normal position to a release position for dropping the object onto said stack support, said conveyor members being biased towards their normal positions, the vertical distance between said stack support and said plurality of conveyor members being such that objects released to the stack support block the return movement of the corresponding conveyor members to their normal positions, and means to cause relative vertical movement between said stack support and said plurality of conveyor members thereby to make room for a new row of objects on the stack support and thereby to release said conveyor members for automatic return to their normal positions.

3. In an apparatus of the class described for handling objects such as ties, means to receive and support a stack of the objects, a plurality of conveyor members providing a conveyor path across and above said stack support for distributing the objects onto the stack support, each of said conveyor members being movable from a conveying position to a release position to drop an object onto said stack support, said conveyor members being so constructed and arranged as to operate automatically in sequence to drop the objects to sequential positions on said stack support, means to increase the vertical distance between said stack support and said conveyor members periodically by substantially the thickness of one of said objects, and means to operate said distance-increasing means automatically when all of said conveyor members are moved to their release positions.

4. In an apparatus of the class described for handling objects such as ties, means to receive and support a stack of the objects, a plurality of conveyor members providing a conveyor path across and above said stack support for distributing the objects onto the stack support, each of

said conveyor members being movable from a conveying position to a release position to drop an object onto said stack support, said conveyor members being so constructed and arranged as to operate automatically in sequence to drop the objects to sequential positions on said stack support, means to increase the vertical distance between said stack support and said conveyor members periodically by substantially the thickness of one of said objects, and means to operate said distance-increasing means in response to the operation of the last of said conveyor members in the sequence.

5. In an apparatus of the class described for handling objects such as ties, means to support a stack of the objects, a conveyor means extending across and above said stack-support means, said conveyor means having a series of openings through which the objects may drop into corresponding positions on said stack-support means, one of said means being fixed in elevation, the other of said means being vertically movable, means normally barring said openings, said barring means being so constructed and arranged as to operate in sequence to drop the objects in sequence for the formation of a stack on said stack-support means, a first fixed control means extending vertically adjacent said movable means, a second control means for cooperation with said first control means to control the vertical position of said movable means, said second control means being carried by said movable means for movement therewith, one of said control means having a series of spaced control points, actuating means to actuate said movable means periodically away from said fixed means in a step-by-step manner determined by the spacing of said series of control points thereby to provide space for the addition of a new row of objects on said stack-support means, and means to operate said actuating means automatically in response to the completion of a row of objects on said stack-support means.

6. In an apparatus of the class described for handling objects such as ties, means to support a stack of the objects, a conveyor means extending across and above said stack-support means, said conveyor means having a series of openings through which the objects may drop to corresponding positions on said stack-support means, one of said means being fixed in elevation, the other of said means being vertically movable, means normally barring said openings, said barring means being so constructed and arranged as to operate in sequence to drop the objects in sequence for the formation of a stack on said stack-support means, a first fixed control means extending vertically adjacent said movable means, a second control means for cooperation with said first control means to control the vertical position of said movable means, said second control means being carried by said movable means for movement therewith, actuating means to move said movable means periodically away from said fixed means in a step-by-step manner controlled by said two control means thereby to provide space for the addition of a new row of

objects on said stack-support means, and means to operate said actuating means in response to unbarring of the last of said openings in the sequence.

7. Means for distributing ties onto a stack support comprising a series of transverse members above the stack support positioned sequentially at progressively lower positions to define a path of gravity movement for the ties, said transverse members being of greater spacing than the width of a tie, two longitudinal conveyor members mounted in spaced relation on each of said transverse members for forward rotation about a transverse axis from a normal tie-supporting position to a tie-releasing position, each of said conveyor members having a tie-supporting portion extending uphill from its axis of rotation and a weight-responsive portion extending downhill from its axis, the tie-supporting portion of one conveyor member normally overlying the weight-responsive portion of the adjacent conveyor member uphill therefrom, and a plurality of conveyor rollers on each of said tie-supporting portions.

8. Means for distributing ties onto a stack support comprising a series of transverse members above the stack support positioned sequentially at progressively lower positions to define a path of gravity movement for the ties, said transverse members being of greater spacing than the width of a tie, spaced longitudinally positioned bars mounted on each of said transverse members, each of said bars being normally in a tie-supporting position extending toward the next transverse member uphill therefrom, each of said bars being rotatable forward from its normal tie-supporting position to a tie-releasing position, a plurality of conveyor rollers on each of said bars, and longitudinal weight-responsive means operatively connected to and extending downhill from each of said bars, each of said bars in its normal position extending above one of said weight-responsive means to prevent operation thereof.

9. Means for distributing ties onto a stack support comprising a series of transverse members above the stack support positioned sequentially at progressively lower positions to define a path of gravity movement for the ties, said transverse members being of greater spacing than the width of a tie, spaced longitudinally positioned bars mounted on each of said transverse members, each of said bars being normally in a tie-supporting position extending toward the next transverse member uphill therefrom, each of said bars being rotatable forward from its normal tie-supporting position to a tie-releasing position, a plurality of conveyor rollers on each of said bars, longitudinal weight-responsive means operatively connected to and extending downhill from each of said bars, each of said bars in its normal position extending above one of said weight-responsive means to prevent operation thereof, and means mounting a plurality of guide rollers on each side of said series of transverse members for contact by the ends of the ties to confine the gravitating ties to the desired path.

DWIGHT C. CURTIS.