

May 28, 1957

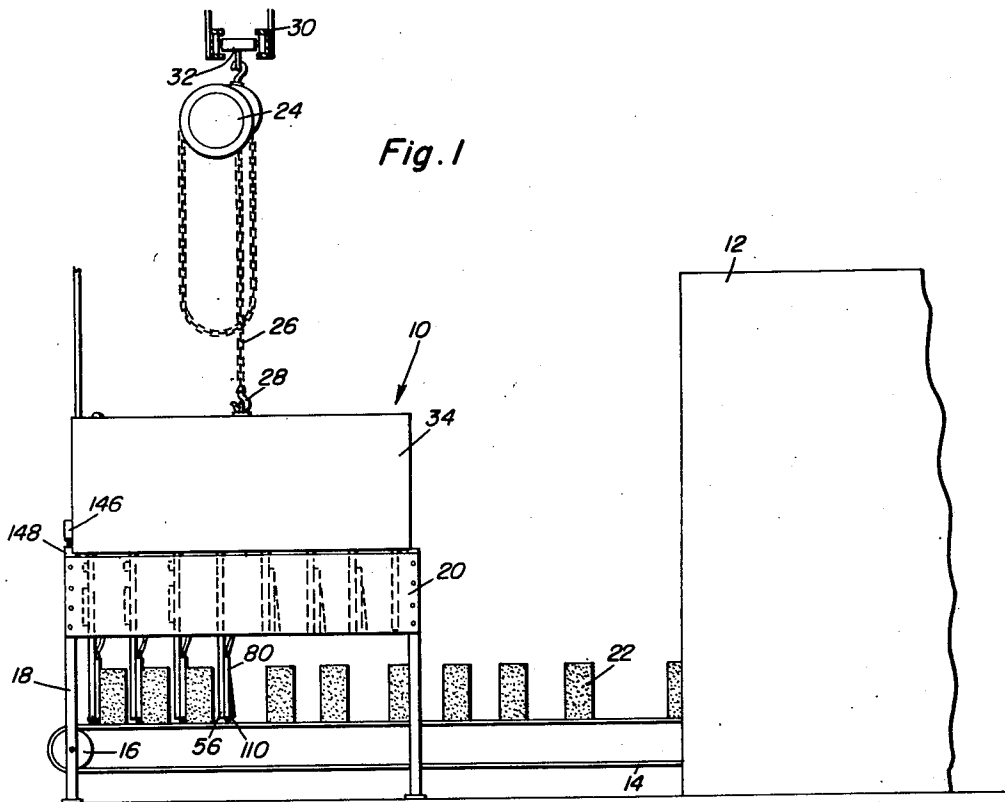
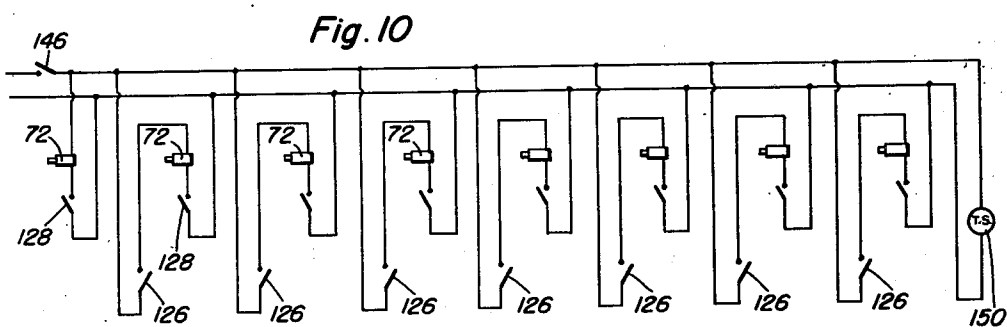
J. H. OCHS

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APPARATUS FOR HANDLING BRICKS

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5 Sheets-Sheet 1



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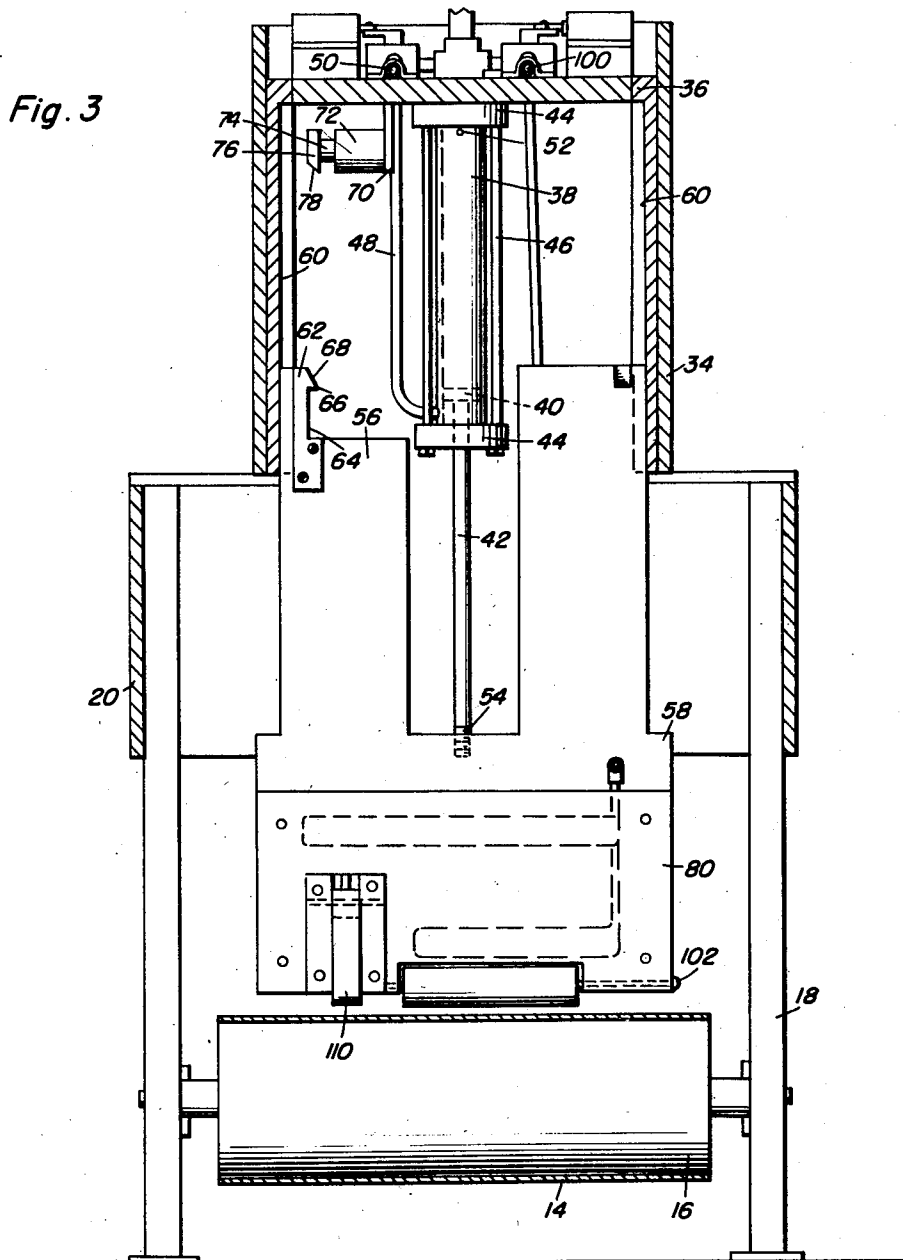
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APPARATUS FOR HANDLING BRICKS

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APPARATUS FOR HANDLING BRICKS

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5 Sheets-Sheet 4

Fig. 4

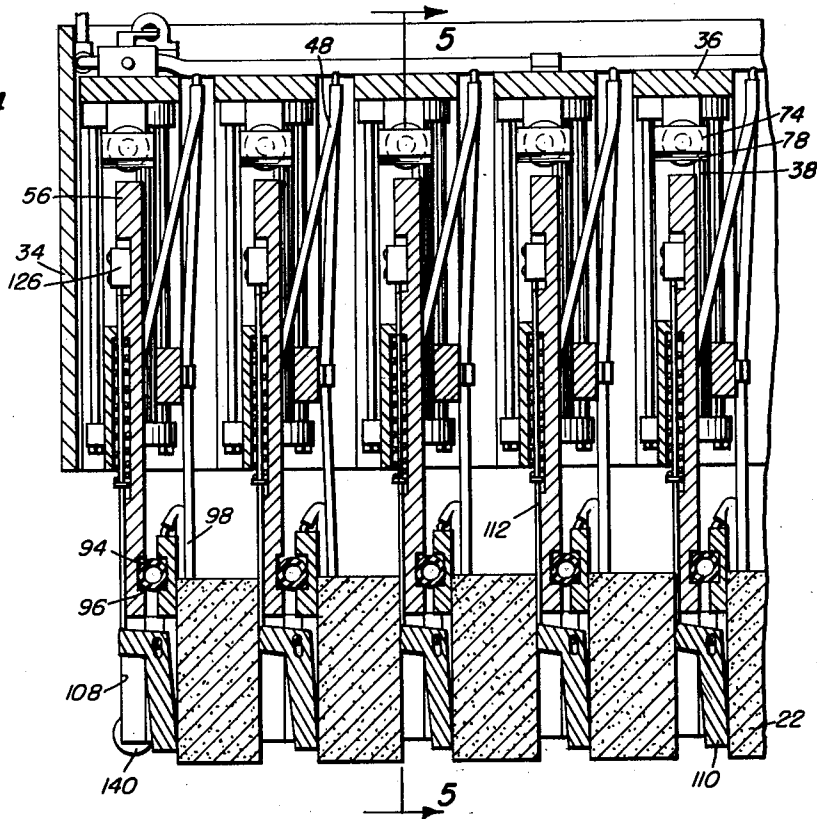


Fig. 6

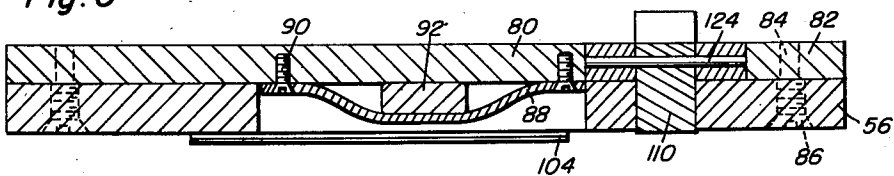
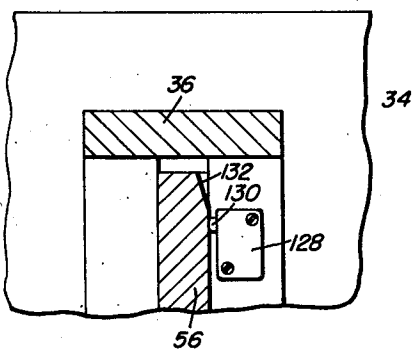


Fig. 7



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APPARATUS FOR HANDLING BRICKS

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9 Claims. (Cl. 214—89)

This invention generally relates to an article handling device, and more particularly involves novel and improved apparatus and handling brick, concrete blocks or similar articles.

An object of this invention is to provide a brick handling device that is especially adapted to pick up newly formed brick from the off bearing belt or conveyor of a stiff mud brick machine wherein the bricks will be spaced at desired intervals when they are raised off the belt for positioning on a pallet or on any other supporting surface.

Another object of the present invention is to provide a brick handling device that is completely automatic in operation for picking up brick from an off bearing belt without the use of the manual operation normally employed.

Other important objects of the present invention reside in its simplicity of construction, automatic operation, reduction in manual labor, efficiency in operation, adaptability for various installations for various type articles, usefulness in uniformly spacing and stacking bricks, its time saving qualities and its relatively inexpensive manufacturing and maintenance costs.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a side elevational view showing the brick handling device of the present invention positioned in its normal position in overlying relation to an off bearing belt from a brick machine;

Figure 2 is an enlarged vertical sectional view taken substantially along a longitudinal center line of the off bearing belt showing a portion of the brick handling device and the structural details thereof;

Figure 3 is a vertical sectional view taken substantially upon a plane passing along section line 3—3 of Figure 2, showing further structural details of the brick handling device and the vertically movable plates;

Figure 4 is a vertical sectional view similar to Figure 2 showing the bricks in gripped and raised position for transport to another area;

Figure 5 is a vertical, sectional view taken substantially upon a plane passing along section line 5—5 showing the location of the various switches;

Figure 6 is a plan sectional view taken substantially upon a plane passing along section line 6—6 of Figure 5 showing the spring means for returning the gripping plates to position;

Figure 7 is a detailed fragmental section showing a microswitch for de-energizing the solenoid after the plates have been sequentially released;

Figure 8 is a view similar to Figure 7 showing the switch after it has been released for de-energizing the solenoid;

Figure 9 is a top plan view showing the solenoid valves

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for admitting air pressure into the inflatable members for gripping the bricks and into the piston and cylinder arrangements for raising the bricks; and

Figure 10 is a diagrammatic wiring diagram for the plate release means showing the solenoids, the means for energizing the same and de-energizing the same.

Referring now specifically to the drawings, it will be seen that the numeral 10 generally designates the brick handling device of the present invention for use in conjunction with a "stiff mud" brick machine 12 having an endless off bearing belt or conveyor 14 projecting therefrom that is journaled on a roller 16 at one end that is supported by supporting legs 18 of a supporting stand 20. The off bearing belt or conveyor 14 normally takes bricks 22 away from the machine 12, and these bricks 22 are generally spaced irregularly and are positioned on their ends, as indicated and illustrated in Figure 1. Figure 1 also illustrates a hoist 24 having a suitable chain 26 thereon with a hook 28 that is supported from a horizontal trackway 30 for movement therealong since the hoist 24 is suspended from movable carriage 32. The particular hoist structure and the means for raising and lowering the brick handling device 10 forms no part of the present invention and may be of any suitable manual, automatic or semiautomatic construction. Also, the particular details of the off bearing belt or conveyor belt 14 as well as the brick machine 12 form no part of the invention and are illustrated only to show one possible use of the brick handling device 10 wherein the method of handling bricks will be used to its best advantage.

Referring now specifically to the various figures of the drawings, it will be seen that the brick handling device 10 generally includes a rectangular frame member 34 having a top plate 36 secured thereto. Attached to the top plate substantially at the center thereof is a plurality of longitudinally aligned and spaced cylinders 38 which have pistons 40 slidable therein and connected to a piston rod 42 which projects beyond the lower end of the cylinder 38. The cylinder 38 is provided with cap members 44 and interconnecting tie rods 46 for retaining the caps 44 on the cylinder 38. A fluid pressure conduit 48 is connected to the bottom of the cylinder 38 at its lower end and is connected to a fluid pressure manifold conduit 50 at its upper end for communicating the manifold 50 with the undersurface of the piston 40 wherein the piston 40 will be moved upwardly into the cylinder 38 whereby the piston rod 42 will be retracted. A vent opening 52 is provided in the upper end of the cylinder 38 to permit free and rapid movement of the piston 40 when pressurized fluid is admitted under the piston 40.

Attached to the bottom screw threaded end 54 of the piston rod 42 is a generally U-shaped plate member 56 having projecting stop lugs 58 adjacent the bottom thereof. The side edges of the plate 56 are slidably mounted in slots 60 in the sidewalls of the frame 34 which is formed by an extension of the top plate 36, whereby vertical reciprocation of the plate 56 will be rigidly guided. Adjacent one upper corner of the plate 56 is an upwardly projecting member 62 having a recess 64 on the inner edge thereof which defines a hook 66 having an upper cam surface 68. Secured to a depending bracket 70 on the top plate 36 is a solenoid 72 having a movable core 74 with a latch 76 on the outer end thereof having a lower inclined cam surface 78 wherein the cam surfaces 68 and 78 will engage during upward movement of the plate 56, thereby moving the core 74 inwardly so that the latch 76 will be received in the recess 64 below the hook member 66 whereby the latch 76 will releasably retain the plate 56 in its uppermost position whereby the fluid pressure may be released from under the piston 40 and the plate 56 will be supported by the latch 76 until

the solenoid 72 is energized. When the solenoid 72 is energized, the latch 76 is retracted, thereby releasing the plate 56 to move downwardly due to the force of gravity. The projecting stop members 58 on the plate 56 limit the vertical upward movement thereof, whereby the movement of the plate 56 will be accurately and positively controlled.

The lower end of each of the plates 56 is provided with a movable plate 80 on the front face thereof which is substantially equal in size and shape to the plate 56. The plate 80 is provided with a plurality of apertures 82 for receiving dowels 84 which guide the movement of the plate 80. The dowels 84 are an integral extension of screw threaded members 86 extending through the plate 56. For retaining the plate 80 against the front surface of the plate 56, a generally U-shaped bowed flat spring member 88 is secured at its ends to the rear surface of the plate 80 by screw threaded fasteners 90 and the spring 88 receives in its central portion an integral part 92 of the plate 56 whereby the spring 88 will resiliently urge the plate 80 against the front surface of the lower part of the plate 56.

For urging the plate 80 outwardly of the front surface of the plate 56, a pair of resilient inflatable members 94 are positioned in recesses 96 in the rear surface of the movable plate 80 and the front surface of the plate 56, whereby the resilient inflatable member 94 normally assumes the shape of the recesses 96, as illustrated in Figure 2, but when inflated, expand into substantially a cylindrical member, as illustrated in Figure 4, for a purpose described hereinafter. Attached to and in communication with the inflatable members 94 is a flexible conduit 98 in communication with fluid pressure manifold 100.

Journalled on a removable pin 102 adjacent the bottom of plate 56 is a cylindrical roller 104 mounted in a recess 106 which extends through both of the plates 56 and 80.

Both of the plates 56 and 80 are provided with a vertical slot 108 in the lower edge thereof for pivotally receiving a generally right angular member 110 which includes an elongated vertical leg projecting downwardly below the plates 56 and 80 and also below the roller 104. The short leg of the right angular member 110 projects rearwardly through the plate 56 and contacts the lower end of an actuating rod 112 that is slidably mounted through a guide 114 which includes a cylindrical bore 116 including a spring 118 tensioned between the inner end of the bore 116 and a peripheral shoulder 120 on the rod 112, thereby continuously urging the rod 112 downwardly. The right angled actuating member 110 is provided with a slot 122 slidably and pivotally mounting the right angle member 110 on a transverse pivot pin 124, thereby permitting pivotal movement of the right angle member 110 upon pressure on the forward surface thereof and vertical body movement upon pressure upon the bottom end thereof. Movement of the right angle member 110 will cause longitudinal movement of the actuating rod 112 against the spring 118, thereby actuating microswitch 126 for a purpose described hereinafter.

Adjacent the upper end of the slot 60 forming the guide for the plate 56 in opposition to the solenoid 72 is a microswitch 128 having a laterally movable button 130. The upper end of the plate 56 is provided with a notched inclined surface 132 forming a cam surface for engaging the button 130 on the microswitch 128 wherein the button will be pushed inwardly during the time that the plate 56 is in its uppermost position and when it is lowered, the button 130 will move outwardly substantially as illustrated in Figures 7 and 8. Also, it is noted that the manifolds supplying the fluid pressure are controlled by valves 134 and 136 which are controlled by solenoids 138 and 140 that are connected to the valves 134 and 136 by suitable connecting linkage 142 whereby the manifolds 50 and 100 receive the fluid pressure from a single supply conduit 144.

Also, it will be noted in Figure 1 that the frame 34 includes a microswitch 146 at the outer edge thereof for contact with an abutment member 148 wherein the brick handling device 10 will be energized by suitable electrical conduits (not shown) for automatic operation as soon as the frame 34 is rested upon stand 20.

As illustrated in Figure 10, the closing of the switch 146 will immediately energize the solenoid 72 since the microswitch 128 will be in closed position when the plates 56 are in their uppermost position. As the first plate 56 descends by the force of gravity after the solenoid 72 has been energized thereby releasing the catch 76, the microswitch 128 will be opened since the cam surface 132 is disengaged from the button 130 on the microswitch 128. This will position the first plate 56 in the path of movement of the bricks 22. When the first brick 22 on the off bearing belt 14 comes into contact with the pivotal switch actuating member 110, the rod 112 moves upwardly thereby closing solenoid switch 126 which will then energize the next solenoid 72 on the next adjacent plate 56 whereby the next adjacent plate 56 will move downwardly by the force of gravity, thereby opening the normally closed microswitch 128. Then, as soon as a second brick contacts the pivotal switch actuating member for closing the switch 126, the next adjacent solenoid 72 will be energized, and this procedure will be continued until the last plate 56 is lowered. The last plate 56 is not provided with a switch such as the switch 126, but rather, is provided with a time switch 150 for energizing the solenoids 138 and 140, thereby admitting fluid pressure into the manifolds 50 and 100.

As the time switch 150 energizes the solenoids 138 and 140, the valves 134 and 136 will be simultaneously opened whereby pressure will be simultaneously admitted into all of the cylinders 38 under the pistons 40 for a simultaneous retraction of the piston rods 42. However, air is also simultaneously admitted through the flexible conduits 98 into the inflatable members 94, thereby expanding the inflatable members 94 and moving the movable plates 80 outwardly towards the back of the adjacent plate 56 thereby clamping bricks between the adjacent plates 56 and the movable plates 80 on the front surfaces of the plates 56, whereby the bricks 22 are gripped in mutually spaced relation for vertical movement upon retraction of the piston rods 42 and upon movement of the brick handling device 10 from the supporting stand 20.

While the device has been specifically illustrated for use with electrical switches and fluid pressure or pneumatically operated mechanism, it will be understood that the entire apparatus may be either electrical or fluid pressure actuated with suitable control means wherein the movement of the bricks will actually cause automatic operation of the device and it is only necessary for an operator to remove and replace the brick handling device 10 on the supporting stand 20 after the bricks have been removed to the desired area, such as stacking the bricks upon a pallet or the like. In fact, the supporting stand 20 is not absolutely necessary, but may be replaced by some positioning means for retaining the brick handling apparatus 10 superposed over the off bearing belt 14.

It will readily be apparent that the brick handling device of the present invention provides an improved and novel apparatus utilizing a new method for handling bricks for eliminating much of the manual labor previously necessary in stacking bricks upon pallets or upon any other supporting surface in regular and uniformly spaced relation which is desirable in the handling of bricks.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and

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equivalents may be resorted to, falling within the scope of the appended claims.

What is claimed as new is as follows:

1. A device for removing brick from a brick carrying device comprising a frame, a plurality of vertically movable plates mounted on said frame, means for lowering the first plate into the path of movement of the bricks, and means on said first plate and successive lowered plates operable by the bricks for lowering the next adjacent plate, means for gripping bricks between adjacent plates, and means for simultaneously raising all of said plates and the bricks gripped therebetween, said gripping means including a fluid pressure inflatable member in the front surface of each plate, and means operable by the last plate for admitting pressure into said inflatable members for gripping the bricks between the inflatable members and the rear surface of the adjacent plates.

2. A device for removing brick from a brick carrying device comprising a frame, a plurality of vertically movable plates mounted on said frame, means for lowering the first plate into the path of movement of the bricks, and means on said first plate and successive lowered plates operable by the bricks for lowering the next adjacent plate, means for gripping bricks between adjacent plates, and means for simultaneously raising all of said plates and the bricks gripped therebetween, said raising means including a fluid pressure actuated piston and cylinder arrangement interconnecting each of said plates to said frame, and means operable by the last plate for admitting fluid pressure to said piston and cylinder arrangement.

3. A device for removing brick from a brick carrying device comprising a frame, a plurality of vertically movable plates mounted on said frame, means for lowering the first plate into the path of movement of the bricks, and means on said first plate and successive lowered plates operable by the bricks for lowering the next adjacent plate, means for gripping bricks between adjacent plates, and means for simultaneously raising all of said plates and the bricks gripped therebetween, said means operable by said bricks including a pivotal switch projecting from the front surface of each of said plates for contact by the bricks, said switch lowering the next adjacent plate into the path of movement of the bricks, said gripping means including a fluid pressure inflatable member in the front surface of each plate, and means operable by the last plate for admitting pressure into said inflatable members.

4. A device for removing brick from a brick carrying device comprising a frame, a plurality of vertically movable plates mounted on said frame, means for lowering the first plate into the path of movement of the bricks, and means on said first plate and successive lowered plates operable by the bricks for lowering the next adjacent plate, means for gripping bricks between adjacent plates, and means for simultaneously raising all of said plates and the bricks gripped therebetween, said means operable by said bricks including a pivotal switch projecting from the front surface of each of said plates for contact by the bricks, said switch lowering the next adjacent plate into the path of movement of the bricks, said raising means including a fluid pressure actuated piston and cylinder arrangement interconnecting each of said plates to said frame, and means operable by the last plate for admitting fluid pressure to said piston and cylinder arrangement.

5. A device for removing brick from a brick carrying device comprising a frame, a plurality of vertically movable plates mounted on said frame, means for lowering the first plate into the path of movement of the bricks, and means on said first plate and successive lowered plates operable by the bricks for lowering the next adjacent plate, means for gripping bricks between adjacent plates,

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and means for simultaneously raising all of said plates and the bricks gripped therebetween, said first plate having a roller on the bottom thereof for assuring that the first plate will not rest on top of a brick during its descent.

6. A device for removing brick from a brick carrying device comprising a frame, a plurality of vertically movable plates mounted on said frame, means for lowering the first plate into the path of movement of the bricks, and means on said first plate and successive lowered plates operable by the bricks for lowering the next adjacent plate, means for gripping bricks between adjacent plates, and means for simultaneously raising all of said plates and the bricks gripped therebetween, said means operable by said bricks including a pivotal switch projecting from the front surface of each of said plates for contact by the bricks, said switch lowering the next adjacent plate into the path of movement of the bricks, said pivotal switch extending below said plates for actuation by a brick if the plate descends onto the same thereby lowering the next adjacent plate.

7. A device for removing brick from a brick carrying means comprising a frame, a plurality of movable plates mounted on said frame, means for lowering the first plate into the path of movement of the first brick, means on said first plate and successive lowered plates operable by the first brick and successive lowered plates for lowering the next adjacent plates into the path of the next adjacent bricks, means for gripping the bricks between adjacent plates, and means operable by the last plate for moving the plates and bricks disposed therebetween away from the brick carrying means, said gripping means being in the form of a fluid pressure expandable member associated with the surface of the plate facing the brick whereby the brick may be clamped against the rear surface of the next adjacent plate, said gripping means being operable by the last plate.

8. A device for removing brick from a brick conveying means comprising a supporting frame, a plurality of moving plates mounted on said frame, means for moving the first plate into the lineal path of movement of a plurality of spaced bricks on the conveying means, means on the first plate and each successive plate for moving the following plate into the lineal path of movement of the following brick on the conveying means, means operable by the last plate for gripping the individual bricks between adjacent plates, and means operable by the last plate for moving the plates and bricks gripped therebetween away from the conveyed means.

9. A device for removing brick from a brick conveying means on which bricks are being conveyed in generally spaced and aligned relation, said device comprising a frame, a plurality of mutually spaced plates movably mounted on said frame for movement into the path of movement of the bricks, means on each plate for moving the succeeding plate into the path of movement of a succeeding brick, said means being responsive to contact with a brick, gripping means on each plate for individually gripping a brick between the front and rear surface of adjacent plates thereby gripping a plurality of bricks in spaced relation, and means for simultaneously actuating all of said gripping means.

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