June 24, 1941. R. A. FONTAINE 2,247,168

BRICK GRAB

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FIG. 1.

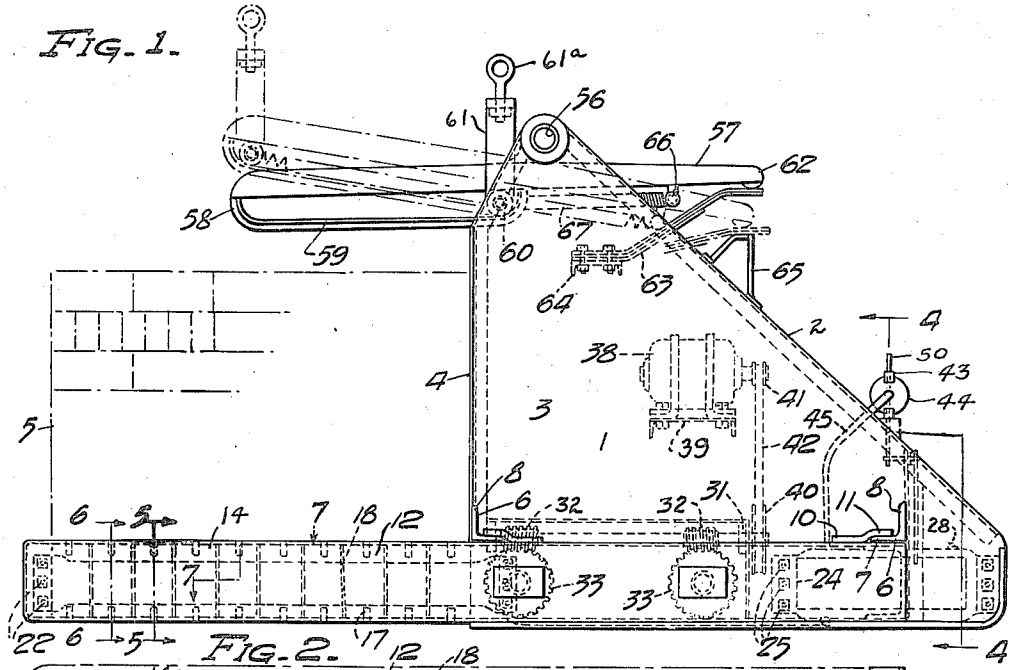


FIG. 2.

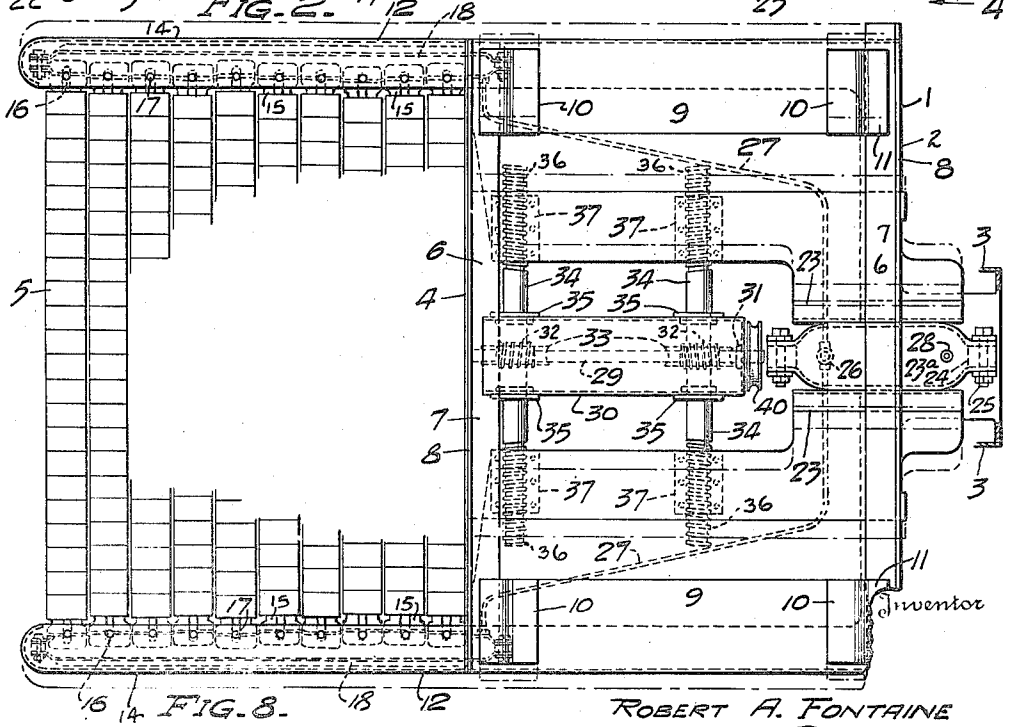
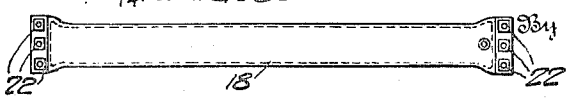


FIG. 8.



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BRICK GRAB

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FIG. 5

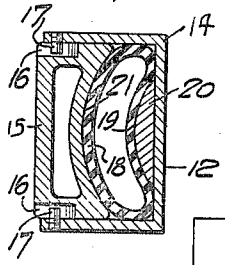


FIG. 7

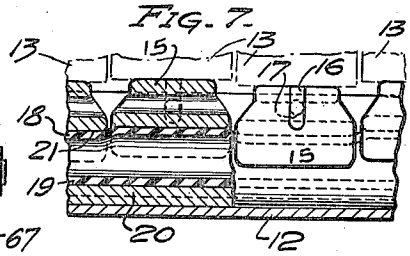


FIG. 3.

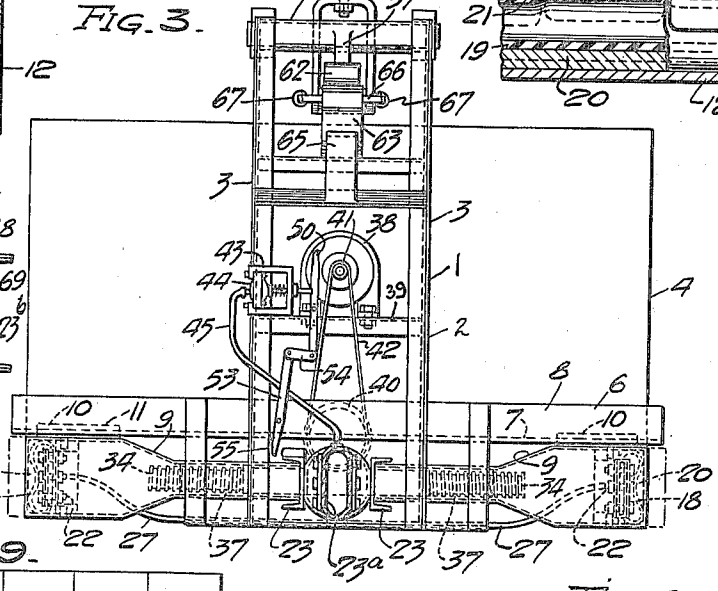


FIG. 11.

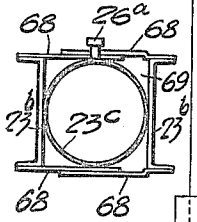


FIG. 9.

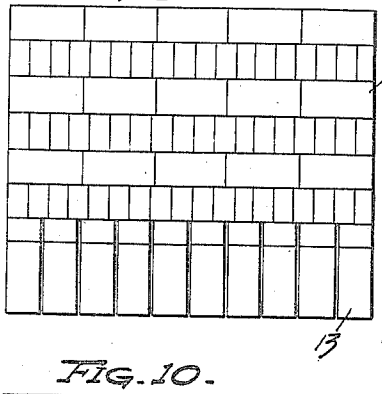


FIG. 6.

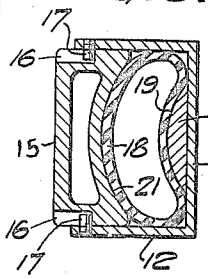


FIG. 4.

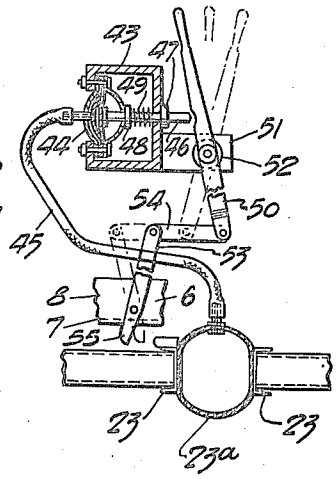
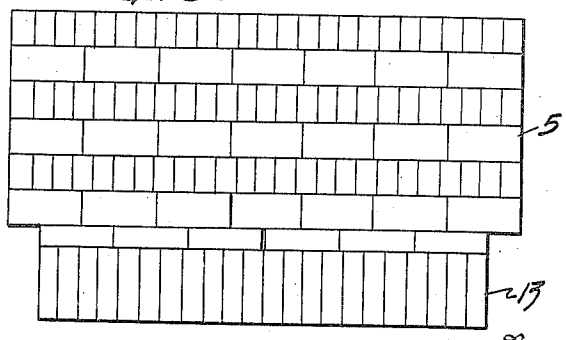


FIG. 10.



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Patented June 24, 1941 2,247,168

UNITED STATES PATENT OFFICE

2,247,168

BRICK GRAB

Robert A. Fontaine, Martinsville, Va.

Application February 21, 1940, Serial No. 320,138

10 Claims. (Cl. 294—63)

This invention relates to a brick grab and more particularly to a means for transporting a plurality of bricks arranged in a stack from one position to another.

An object of the invention is the provision, in a brick grab, of a means to be associated with a lowermost course of bricks of a stack, the means being responsive to fluid pressure controlled by movement of the means toward and away from one another so that the brick stack may be firmly held therebetween.

Another object of the invention is the provision, in a brick grab, of a means adapted to embrace a stack of bricks, the means being responsive to fluid pressure and capable of applying equal pressure throughout the lowermost course of bricks of the stack irrespective of the transverse or longitudinal alignment or misalignment of the bricks forming the lowermost course.

Another object of the invention is the provision, in a brick grab, of a means adjacent one end of the grab adapted to firmly embrace a stack of bricks and a bale means so arranged and constructed that the center line of pull tending to lift the brick grab will shift to substantially coincide with the center line of mass of a loaded or empty brick grab.

These and other objects of the invention will become apparent from the succeeding description considered together with the accompanying drawings, the latter of which disclose an exemplified form of the invention and wherein:

Figure 1 is a side elevational view of a brick grab embodying the present invention.

Figure 2 is a plan view of the brick grab of Figure 1 with a portion thereof removed to more clearly illustrate the invention.

Figure 3 is an end elevational view of the brick grab illustrated in Figures 1 and 2.

Figure 4 is a sectional view taken along the lines 4—4 of Figure 1, looking in the direction of the arrows.

Figure 5 is a sectional view taken along the lines 5—5 of Figure 1, looking in the direction of the arrows.

Figure 6 is a sectional view taken along the lines 6—6 of Figure 1, looking in the direction of the arrows.

Figure 7 is a sectional view taken along the lines 7—7 of Figure 1, looking in the direction of the arrows.

Figure 8 is a side elevational view of an element or tube employed in the brick grab.

Figure 9 is a side elevational view of a plurality of bricks arranged in a desired relation and considered best suitable for association with the brick grab of the invention.

Figure 10 is an end elevational view of the plurality of bricks illustrated in Figure 9.

Figure 11 is a slight modification of the structure illustrated.

Referring now in detail to Figures 1 through 10 of the drawings wherein like reference characters designate like parts, the numeral 1 indicates generally a brick grab illustrative of the present invention. The brick grab comprises a frame member or superstructure 2 formed, in part by coextensive vertical walls 3 each spaced a predetermined distance from the longitudinal center line of the brick grab and extending longitudinally from adjacent the transverse center line of the brick grab to an extremity thereof. Disposed transversely of the frame is a vertically directed end plate 4 secured to the walls 3 by any of the well known methods and forming a bearing or abutment face which will limit the movement of the brick grab relative to a plurality of bricks arranged in superimposed courses and designated generally by the reference character 5. Extending transversely of the brick grab are substantially horizontal angle irons 6 spaced longitudinally and facing one another. That is to say, the angle irons have substantially horizontal legs 7 directed toward one another and vertical reinforcing legs 8.

Movably associated with the frame are transversely spaced movable elements or plates 9 in subjacent relation to the angle irons and supported by the frame through suitably positioned or arranged clips 10 which are secured to the plates in any approved manner and have offset portions 11 overlying and bearing against the horizontal legs 8 of the angle irons. The clip offset portions and the portions of the plates immediately therebeneath present guideways accommodating the occupying portions of the angle irons, and by reason of this arrangement the plates may be moved toward and away from one another within a predetermined range of movement. Forming a part of the elements 9 are jaws or arms 12 extending horizontally and outwardly from the frame beyond the end plate 4. The jaws, spaced transversely of the brick grab and positioned adjacent the lower extremity thereof, are arranged to lie in the horizontal plane of a lowermost course of bricks 13 of the stack 5 so as to be capable of embracing and bearing against the said course. Each jaw or arm desirably comprises extensions 14 channel-shaped in vertical cross-section and opening or

facing inwardly of the stack of bricks. Each extension desirably has a portion underlying and secured to the associated plate 9 so that upon a transverse movement of the plates the arms or jaws will move correspondingly.

Forming brick engaging means are pressure or bearing blocks 15, a plurality of which are associated with each arm. As will be noted by referring particularly to Figures 2, 9 and 10, the bricks forming the lowermost course 13 of the stack are disposed on their ends with the broadest sides thereof facing laterally of the stack so as to present their greatest face for engagement by the arms. In this manner, therefore, an appreciable or greatest possible bearing area is arranged between the bricks and the pressure blocks. The bearing blocks are positioned in close proximity of one another along the extension portion positioned outwardly of the frame from the end plate 4 to be arranged in order that each bearing block may engage an associated brick. The bearing or pressure blocks are independently movable with respect to the extensions, and by reason of this arrangement the bearing blocks may be moved to react against the bricks and adjust themselves with full surface bearing relation with the bricks, irrespective of their longitudinal or transverse alignment or misalignment. This is most clearly illustrated in Figure 2 of the drawings to which attention is directed. To carry out the above each pressure block, being of a height to fit within the channeled arm, is provided with guideways or recesses 16 in its upper and lower face which accommodate or receive studs or prongs 19 facing one another, the studs taking the form of a particularly shaped bolt or threaded pin and being secured and removably fastened in the channel extension, presenting pivotal connections about which the blocks may rotate in an adjustable manner to accommodate the particular disposition of the brick face with which it is engaged.

Interposed between each arrangement of pressure block and extension and located substantially entirely within the confines of each channel, with its major portion outwardly of the plane of the end plate 4, is a collapsible tube 18 formed of rubber or any other analogous material and adapted to react against the bearing blocks to urge them outwardly of the extension toward the stack of bricks. The tube desirably bears against a cylindrical convex surface 19 of a filler strip 20 secured to the extension and a cylindrical concave surface 21 forming an inner face of each pressure block so that it may direct forces radially through the pressure block, and in that manner exert equal pressure throughout the entire height of each block. This will also result in the pressure blocks exerting a constant force against the engaged bricks throughout their height and thereby prevent subjecting a limited or restricted portion of the bricks to compressive force. The tubes have their ends closed in any approved manner, such as by the illustrated bolts 22 which seal the extremities of the tubes and render them leak-proof.

The movable elements 9 have, adjacent their extremities removed from the pressure blocks, vertically and longitudinally disposed abutment members 23 which are securely fastened to the plates 9 and spaced apart a desired distance on each side of the longitudinal center line of the brick grab. Positioned between the abutment members 23 is a cylinder or casing 23a formed of flexible material, such as a rubber compound or any other analogous material, so that its shape may vary dependent upon the forces to which it is subjected. The cylinder, like the previously recited tubes, is leak-proof, and to be made such it is suggested that the extremities thereof be provided with a filler 24 and transversely extending bolts 25. Positioned adjacent an inner extremity of the cylinder is a suitable cross-shaped fitting 26 which communicates with the interior of the cylinder and has conduits or hoses 27 leading therefrom in direct communication with the tubes 18. The cylinder, hoses and tubes are charged with a predetermined degree of fluid pressure through a suitable valve 28 so that the cylinder will bear against the abutment members 23 and the tubes will retain the pressure blocks in extruded position, as illustrated in Figure 6, or transmit forces through the blocks when the latter are in engagement with associated bricks, as illustrated in Figures 2, 5 or 7. Accordingly, it will be observed that when the movable elements 9 are urged toward one another to bring the arms and particularly the pressure block portions thereof into intimate contact with the bricks 13, the abutment plates 23 will also be drawn together to compress the cylinder and force the fluid pressure therefrom through the hoses 27 and into the tubes 18 to increase the fluid pressure therein. When, therefore, the fluid pressure is increased within the tubes this added pressure will react through the blocks against the lowermost course of bricks to firmly secure them between the arms and facilitate transporting the stack from one position to another.

Means has been provided to impart motion to the movable elements and to maintain them in a predetermined position. Illustrative of this last named means is a longitudinally disposed shaft 29 positioned on the longitudinal center line of the brick grab adjacent the lower portion thereof and supported by a casing 30 forming a part of the frame or superstructure. Mounted upon the shaft which may be journaled in suitable bearings 31 are spaced worm gears 32 formed with right-hand and left-hand threads. That is to say, the gears have oppositely directed threads, one gear being provided with left-hand threads and the other gear having threads turned right-hand, the purpose for this being to eliminate longitudinal thrusts being transmitted to the shaft. When the shaft is rotating in one direction the forces created in the shaft will be of a compressive character, while during the opposite rotation of the shaft the forces therein will be of a tensional character. This eliminates the necessity of providing end bearings or especially designed collars to compensate for shaft end thrusts since the latter are not created in the shaft. In meshed relation with the worm gears are associated subjacent gears 33 threaded to correspond with the threads of the related worm gears. The gears 33 are keyed to intermediate portions of parallel transversely extending shafts or screws 34 which are encircled by suitable bearings 35 secured to the casing 30 in any approved manner. The respective ends of the shafts 34 are oppositely threaded, as at 36, and as such are rotatively associated with nuts or interiorly threaded shoes 37, the latter of which are securely fastened to the underside of the plates 9 and movable therewith.

From the preceding it will be observed that upon rotation of the shaft 29 in a clockwise direction the screws will rotate in a direction in-

wardly or toward one another and the plates 9, together with their associated structure, will be urged away from one another or laterally outwardly of the brick grab. A reversal of movement of the shaft 29 will result in an approaching movement of the plates 9 and their associated structure.

A driving means has also been provided to impart motion to the shaft 29 and its connected elements. The driving means in the instant application is exemplified by a motor 38, preferably of the reversible type, which is supported in an elevated position between the vertical walls 3 by a horizontal bed plate 39 and supplied with electrical energy from any desired source. Suitably keyed to the cylinder adjacent extremity of the shaft 29 is a grooved pulley 40 which is connected to a smaller grooved wheel 41 rigidly secured to an extremity of the motor shaft by means of a belt 42. Any movement of the motor will be transmitted immediately to the pulley 40 to impart motion to the shaft 29 and simultaneously to the jaws or arms through the medium of the intervening elements hereinabove described.

So as to limit the transverse movement of the arms toward or away from one another an automatic motor control has been provided, and accordingly a brace or channeled gusset 43 is secured to either of the walls 3. Within and secured to this brace is a diaphragm 44 capable of varying internally and responsive to fluid pressure. The left side of the diaphragm, when considering the illustration of Figure 4, is in direct communication with the cross-shaped fitting 26 and the cylinder by means of a suitable conduit or hose 45 so that when the fluid pressure is forced from the cylinder the fluid pressure escaping from the cylinder will actuate the diaphragm causing it to expand internally. A plunger 46, guidingly supported by and slidably associated with the brace, extends to within the diaphragm and, upon an internal expansion thereof, is urged outwardly or projected through the brace. A suitable shoulder 47 is provided on the plunger outwardly of the brace to limit or arrest the movement of the plunger inwardly of the diaphragm. An abutment 48 is formed intermediate the extremities of the plunger to form a ledge against which a coil or compression spring 49 reacts to return a projected or extruded plunger to normal or retracted position upon an adequate reduction of the fluid pressure within the diaphragm.

In advance of the free extremity of the plunger and in direct alignment therewith is an operating lever 50 pivotally connected intermediate its ends to a suitable support 51 extending from the brace 43. A contact switch 52, in wired communication with the motor, is positioned between the lever support and the lever and movable with the latter so that when the lever is moved to the extreme left, as viewed in Figure 4 which is herein considered a forward position, the motor is actuated in one direction by reason of contact made in the switch and electrical energy is supplied thereto. This forward positioning of the lever results in the arms being drawn toward one another, expelling the fluid pressure from the cylinder and urging the plunger outwardly from the diaphragm. When the arms have been moved toward one another a predetermined distance the fluid pressure acting upon the diaphragm will result in the plunger contacting the lever and moving it to a vertical or neutral position, which breaks the circuit in the switch and cuts the electrical energy from the motor. A manual movement of the lever in an opposite or reverse direction, indicated diagrammatically in Figure 4 as disposed to the extreme right, the movement of the motor is reversed to force the arms apart out of contact with a stack of bricks. The separating movement of the arms is also automatically arrested, and this is effected by a toggle arrangement comprising a finger lever 53 pivotally connected intermediate its ends to one of the angle irons 6 and having one or an upper extremity thereof connected to an adjacent extremity of the lever 50 by means of a link 54. The finger lever 53 has its lower extremity 55 positioned in the horizontal path of one of the abutment members, and by reason of this arrangement the said abutment member, upon separation of the arms, will engage the finger lever extremity 55 to actuate the lever 50 and return it to normal or vertical position where the electrical current will be broken to stop the motor movement.

The brick grab is one of a type adapted to be transported from one position to another by any suitable crane means, and for the accommodation of the transporting means the walls 3 are, adjacent their upper extremities, connected by an axle 56. Journaled on the axle intermediate its ends is a longitudinal normally horizontal beam 57 the outer extremity 58 of which overhangs the stack of bricks outwardly of the frame away from the end wall 4. Formed in the outer extremity of the beam is a track or raceway 59 in which a roller 60 may travel from an intermediate portion of the beam to the extreme outer extremity thereof. Secured to the roller is a vertically disposed clasp 61, desirably inverted U-shape in elevation, having an eyelet 61a upstanding therefrom and to which a hook (not shown) or any other instrument of a crane may be releasably attached. The other or inner extremity 62 of the beam is held resiliently in a predetermined elevated position by means of a plurality of resilient plates forming a leaf spring 63 which is anchored or firmly secured to a spring seat 64 extending between and attached to the vertical walls 3 at a position below the axle 56. Spaced immediately beneath the free or beam-engaging extremity of the leaf spring is provided a standard or support 65 which, upon pivotal movement of the beam, may be engaged by the spring to limit or stop the movement of the beam in a clockwise direction. Extending downwardly from the beam intermediate its pivotal connection and the inner extremity 62 is an anchor 66 to which a tension spring 67 has an end thereof attached. The other extremity of the tension spring is connected to the clasp at a position adjacent the roller, and by means of this arrangement the clasp and its associated structure is normally or resiliently retained in a position adjacent the beam pivotal connection or intermediate the ends of the beam.

From the above and considering particularly Figure 1 of the drawings, it will be observed that when an empty brick grab is lifted from the ground the clasp will be positioned adjacent the center of the beam, as shown in full lines, and accordingly the center line of pull or force through the eyelet will coincide substantially with the center line of mass of the empty brick grab to retain the jaws horizontal at all times and adapted to be associated with a stack of bricks without disturbing the arranged bricks.

When the brick grab is loaded and pulling or lifting forces are exerted through the eyelet the beam is tilted or inclined because the increase in forces resulting from the bricks overcomes the spings 63, and the clasp and its associated structure move to the outer extremity 51 of the beam also because of the increase in weight of the entire structure overcoming the force of the tension spring 67. This clasp shifting from the center to the outer extremity of the beam will result in the center of pull through the eyelet substantially coinciding with the center line of mass of the loaded brick grab, and because of this the jaws will remain substantially horizontal to permit a stack of bricks to be deposited upon the ground without disturbing the arrangement of the bricks.

Some thought has been given to encasing the cylinder of the previously described structure so that upon compression thereof it may, if the material by which it is formed permits, not bulge to defeat the purpose and intention thereof. Accordingly, reference is directed to Figure 11 whereby there is disclosed a slight modification in the form of abutment members 23^b of slightly greater height than the abutment members 23 of the previously described structure. Secured to the abutment members are upper and lower overlapping pairs of retaining plates 68 which, together with the abutment members 23^b, form an enclosure 69 for an encased cylinder 23^c. The upper pair of retaining plates is suitably slotted to accommodate a fitting 26^a corresponding to the cross-shaped fitting 26 of the previously described disclosure. In this manner, therefore, if the material forming the cylinder is extremely flexible upon an approaching movement of the abutment members 23^b the cylinder will, by reason of the retaining plates, be prevented from bulging and will accordingly be compressed to force the fluid pressure therefrom.

From the above it will be noted that various alterations and changes may be made to the disclosed and described structure without departing from within the spirit and scope of the appended claims.

I claim:

1. In a brick grab, in combination, a frame, means including spaced arms movably associated with said frame, rotatable elements connecting said first named means and frame for moving said arms toward or away from one another, driving means supported by said frame and operatively connected to said rotatable elements, expansible means within said arms, and a cylinder interposed between said first named means and in communication with said expansible means, whereby upon actuation of said driving means said arms will be drawn together to embrace a stack of bricks and said first named means will compress said cylinder to increase the pressure within said expansible means.

2. In a brick grab, in combination, a frame, means including spaced arms movably associated with said frame, a plurality of relatively movable blocks connected slidably to said arms, movable elements connecting said first named means for moving said arms toward or away from one another, driving means supported by said frame and operatively connected to said movable elements, a tube within each arm reacting against said pressure blocks, a cylinder interposed between said first named means and in communication with said tubes, fluid pressure within said tubes and cylinder whereby upon actuation of said driving means said arms will be moved toward one another to embrace a stack of bricks and compress said cylinder to thereby increase the pressure against said blocks.

3. In a brick grab, in combination, a frame, means including spaced arms movably associated with said frame, rotatable elements connecting said first named means and frame for moving said arms toward or away from one another, driving means supported by said frame and operatively connected to said rotatable elements, expansible means within said arms, a cylinder interposed between said first named means and in communication with said expansible means, whereby upon actuation of said driving means said arms will be drawn together to embrace a stack of bricks and compress said cylinder to increase the pressure within said expansible means, and means responsive to the pressure within said cylinder for controlling said driving means.

4. In a brick grab, in combination, a frame, means including spaced arms movably associated with said frame, movable elements connecting said first named means for moving said arms toward or away from one another, driving means supported by said frame and operatively connected to said movable elements, expansible means within said arms, a cylinder interposed between said first named means and in communication with said expansible means, whereby upon actuation of said driving means said arms will be urged apart out of embracing engagement with a stack of bricks and thereby decreasing the pressure within said cylinder and expansible means, and link means associated with said driving means and adapted to be engaged by said first named means for arresting movement of said driving means.

5. In a brick grab, in combination, a frame, means including spaced arms slidably connected to said frame, a plurality of relatively movable blocks connected to each of said arms, movable elements connecting said first named means for moving said arms toward or away from one another, driving means supported by said frame and connected to said movable elements, a tube subjected to fluid pressure interposed between each arm and its associated blocks, a fluid pressure cylinder arranged between and embraced by said first named means, said cylinder being in communication with said tubes whereupon on actuation of said driving means said cylinder will be subjected to compressive forces to urge fluid pressure into said tubes.

6. In a brick grab, in combination, a frame, means including horizontally spaced arms adapted to overlie and contact a lowermost course of bricks of a stack, said first named means being slidably connected to said frame, a plurality of blocks connected movably to said arms, driven means connecting said first named means and adapted to move said arms horizontally toward or away from one another, a flexible tube associated with each arm and reacting against said blocks, a cylinder interposed between said first named means and in combination with each of said flexible tubes, said cylinder and tubes being subjected to fluid pressure so that upon movement of said driven means said cylinder will be constricted and thereby build up the fluid pressure in said tubes, and a horizontally disposed elevating mechanism pivotally secured to said frame, said elevating mechanism having a portion thereof capable of shifting so

that said portion may be positioned adjacent the center of mass of either a loaded or empty brick grab.

7. In a brick grab, in combination, a frame, means including horizontally spaced means adapted to overlie and contact a lowermost course of bricks of a stack, said first named being slidably connected to said frame, actuating means for moving said horizontally spaced means toward and away from one another, connected flexible means within said horizontally spaced means and interposed between said first named means, fluid pressure within said flexible means so that upon an approaching movement of said arms said lowermost course of bricks will be subjected to compressive forces, an elevating mechanism associated with said frame and comprising a normally horizontal beam pivotally connected to said frame, a shiftable attaching member connected to said beam, and resilient means connecting said beam and attaching member for retaining said attaching member in a predetermined position.

8. In a brick grab, in combination, a frame, means including spaced jaws extending from one side of said frame and adapted to embrace a lowermost course of bricks of a stack, resilient means within said jaws responsive to fluid pressure and adapted to react against said lowermost course of bricks, an elevating means associated with said frame and comprising a normally horizontal beam pivotally secured to said frame, a shiftable attaching means connected to said beam and maintained by spring means in normal position adjacent the center of the beam when said brick grab is empty, and a spring interposed between said frame and an extremity of said beam for maintaining said beam in a predetermined position when said brick grab is empty.

9. In a brick grab, in combination, a frame, means including spaced jaws extending from one side of said frame and adapted to embrace a lowermost course of bricks of a stack, resilient means within said jaws responsive to fluid pressure and adapted to react against said lowermost course of bricks, an elevating means pivotally connected to said frame and comprising a shiftable attaching means, said elevating means and attaching means being so constructed and arranged that the line of a lifting force applied to said attaching means will substantially coincide with the center line of mass when the brick grab is empty and loaded.

10. In a brick grab, in combination, a frame, means including spaced jaws extending from one side of said frame and adapted to embrace a lowermost course of bricks of a stack, resilient means within said jaws responsive to fluid pressure and adapted to react against said lowermost course of bricks, an elevating means associated with said frame and comprising a normally horizontal beam pivotally secured to said frame, shiftable attaching means connected to said beam and maintained by spring means in a normal position adjacent the center of the beam when said brick grab is empty, a spring interposed between said frame and an extremity of said beam for maintaining said beam in a predetermined position when said brick grab is empty, and a standard spaced beneath said beam extremity for limiting pivotal movement of said beam when said brick grab is loaded and being elevated through said attaching means.

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