May 12, 1936. E. R. SUTCLIFFE 2,040,574

APPARATUS FOR LOADING OR PILING BRICKS OR THE LIKE

Filed July 21, 1933 3 Sheets-Sheet 1

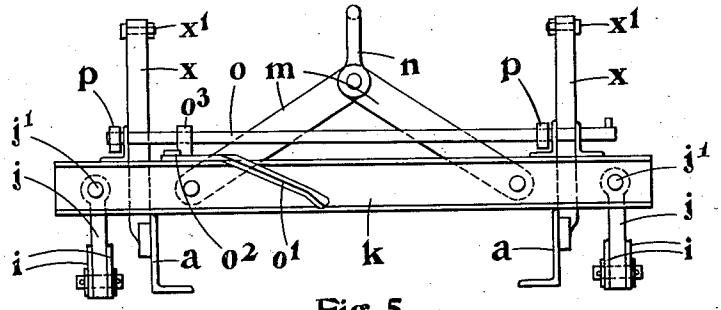


Fig. 5.

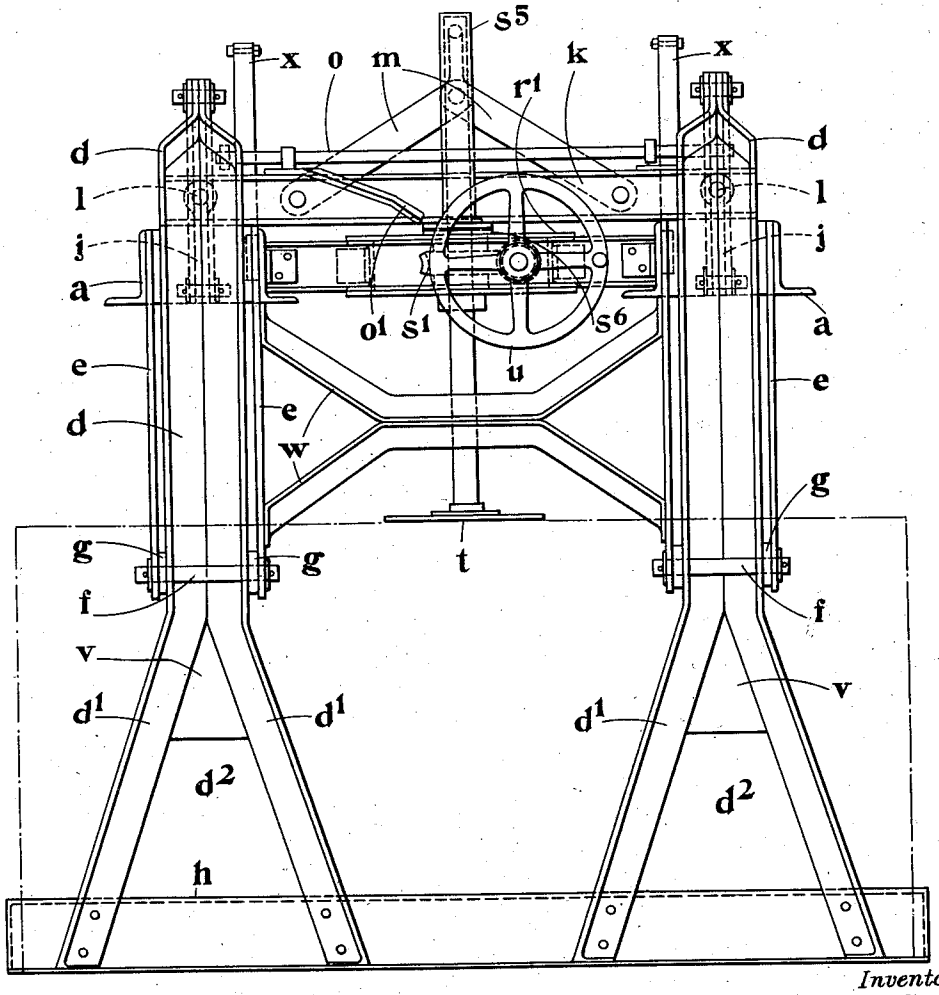


Fig. 1.

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Filed July 21, 1933 3 Sheets-Sheet 2

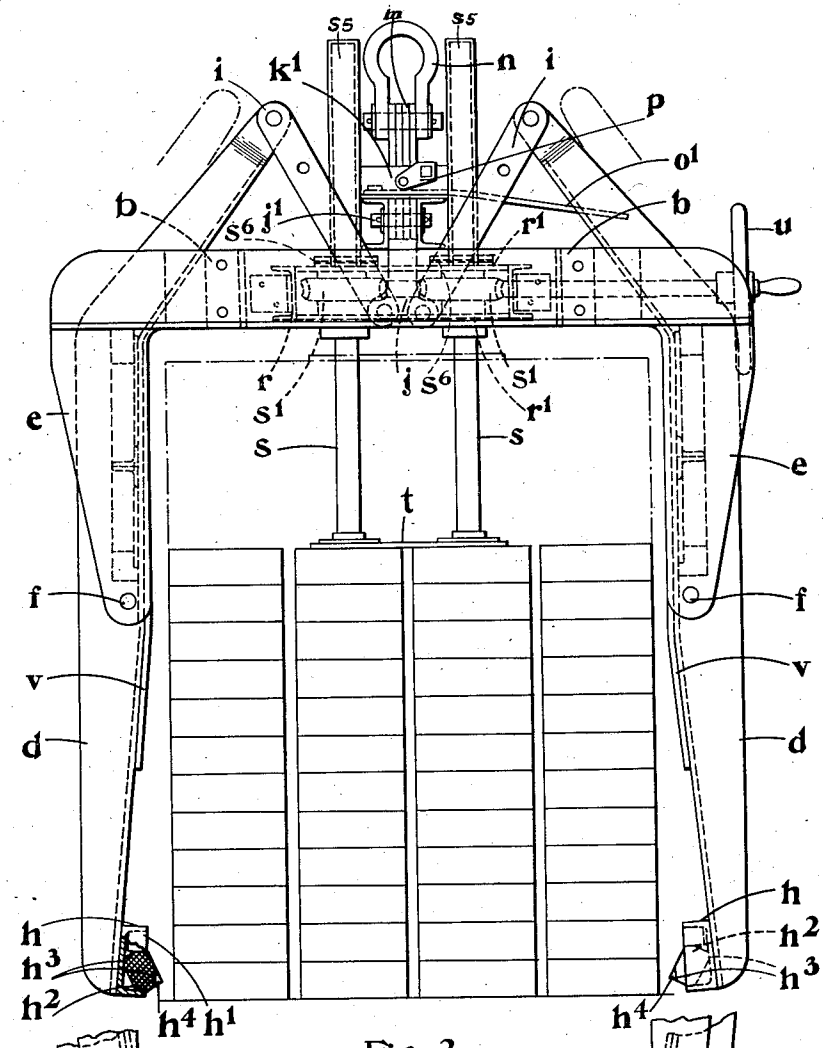


Fig. 2.

Fig. 4.

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APPARATUS FOR LOADING OR PILING BRICKS OR THE LIKE

Filed July 21, 1933 3 Sheets-Sheet 3

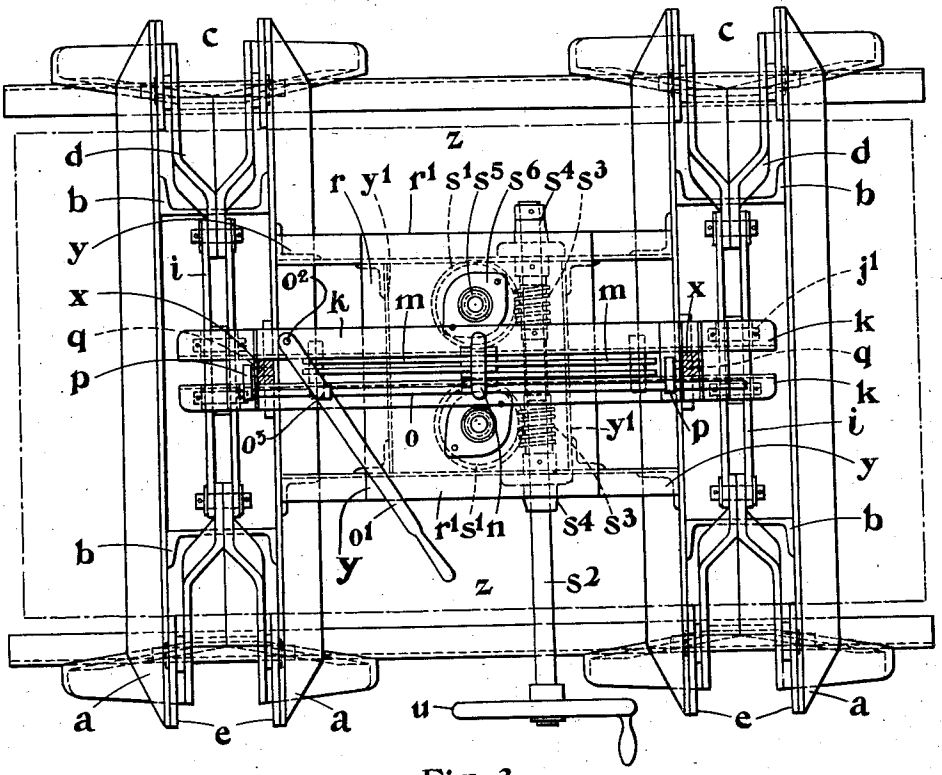


Fig. 3.

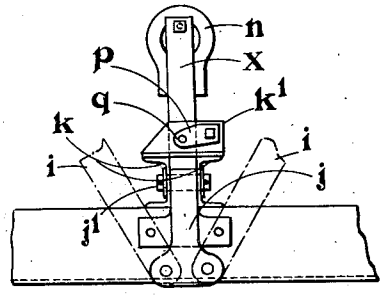
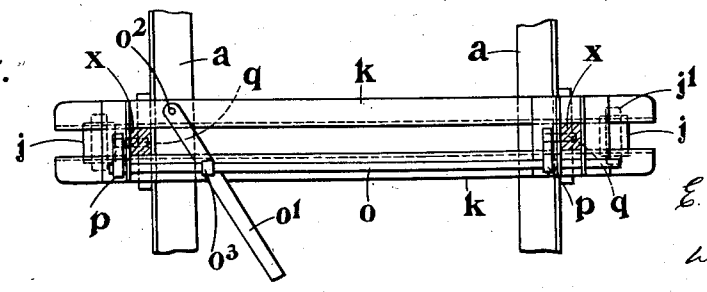


Fig. 6.

Fig. 7.



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UNITED STATES PATENT OFFICE

2,040,574

APPARATUS FOR LOADING OR PILING BRICKS OR THE LIKE

Edgar Rouse Sutcliffe, Lowton, Newton-Le-Willows, England

Application July 21, 1933, Serial No. 681,433
In Great Britain January 27, 1933

9 Claims. (Cl. 294—63)

This invention relates to apparatus for loading or piling bricks or the like of the kind in which a complete pile of bricks, stones or blocks are gripped as a unit in order to be raised and deposited, as for example in loading vehicles or vessels. In such a type of apparatus gripping levers are symmetrically arranged to contact with the outermost rows at opposite sides of the lowermost layer of the pile on the apparatus being raised, whereby as the hoisting gear is set into operation the gripping levers are caused to engage the pile under pressure derived from the weight suspended.

The invention has among its objects to improve the construction of apparatus of the type described.

According to the invention a frame is provided of a substantially inverted U-shape that is adapted to be applied in position over the pile of bricks or the like and the gripping levers are pivotally mounted at opposite sides at or adjacent the downwardly extending parts of the frame, whereby the lower ends of the gripping levers extend downwards to carry at positions beneath the downwardly extending parts of the U-shaped frame, transversely disposed holders having elastic means by which the gripping levers are adapted to engage the outermost rows at opposite sides in the lowermost layer of the pile with a gradually increasing pressure as the hoisting gear is operated. In this way under the weight of the apparatus to which the weight of the load is added pressure is imposed through the gripping levers across the lowermost layer held between the ends of the gripping levers, whereby the bricks or the like in the lowermost layer are firmly held by consequent frictional contact whereby all the bricks or the like in the layers above are supported upon the lowermost layer.

According to the invention moreover means are provided by which the apparatus may be adjusted in order that when disposed in position above the pile the lower ends of the gripping levers clear the ground. For this purpose a gear is mounted in the upper part of the U-shaped frame which by means such as a hand wheel is adapted to cause a base plate or base plates carried at the lower ends of vertically and centrally disposed screw-threaded spindles to come into contact with the top of the pile, and to support the frame and the gear upon the pile in that position, whereby the lower ends of the gripping levers are free to move into operative position clear of the ground and to engage the lowermost layer of the pile.

According to the invention moreover the gripping levers are provided with holders that are adapted for the reception of pieces of india rubber that are advantageously provided of such cross-section that the rubber is reversible on being worn or becoming badly mutilated in use and is adapted to be wedged in position by means of a wedge block or blocks of wood or other suitable material within the holder, so that the pieces of india rubber are thus tightly held within the holders to extend inwardly for the application of elastic pressure upon the pile of bricks, or the like in the manner described.

The invention also comprises the features which are hereinafter described.

The invention is illustrated by way of example in the accompanying drawings, in which

Figure 1 is a side elevation of a grab constructed according to the invention.

Figure 2 is a corresponding front elevation.

Figure 3 is a plan corresponding to Figures 1 and 2.

Figure 4 is a detail view indicating the gripping levers in their engaging position.

Figure 5 is a detail view in side elevation of the means for raising the grab.

Figure 6 is a corresponding front elevation.

Figure 7 is a detail plan view of the means by which the grab is locked.

In carrying the invention into effect according to the construction illustrated in the accompanying drawings, the frame of the apparatus may consist of two pairs of parallel disposed frame members *a*, *a* which may be of angle or other transverse cross-section, each pair of frame members *a*, *a* being advantageously connected together at positions short of their respective ends by vertically or otherwise disposed members *b*, *b* of a channel cross-section so as to form frame parts with interstitial spaces *c* at the respective ends of each pair of frame members *a*, *a* for the reception of the gripping levers *d*. The frame members *a*, *a* of each pair have secured thereto downwardly extending arms *e*, *e* by which pairs of frame members are formed of an inverted substantially U-shape and at the lower ends of each pair of arms *e*, *e* a gripping lever *d* is pivotally mounted on the pivot pin *f*. There are thus two gripping levers *d*, *d*, mounted at each side of the frame of the apparatus formed of the two pairs of frame members *a*, *a*, and the respective pairs of arms *e*, *e*, secured at the respective ends of each pair of frame members *a*, *a*.

Each gripping lever *d* is advantageously provided of a substantially U-shaped cross-section

that may be conveniently formed by using a pair of bars d^1, d^1 of an angular cross-section, so that thus the oppositely disposed outwardly extending parallel parts of the bars lie adjacent the sides of the vertically disposed arms e in which they are carried and are rendered integral and reinforced by means of a plate v to which the respective bars d^1 are connected by means of rivets or otherwise, washers g or other means being provided to permit of the free pivotal movement of the levers d within the respective pairs of downwardly extending arms e. The respective parts constituting the gripping levers d at a position beneath that at which they are pivotally connected to the lower ends of the pair of downwardly extending arms e, are splayed outward at d^2 so that the pair of bars d^1 serve to carry at or near their lower ends a horizontally disposed contact bar or holder h having advantageously a U-shaped cross-section with the cavity h^1 formed on the inner side, the horizontally disposed holder h being secured by means of rivets or otherwise to the respective bars d^1 of the lower arms of the gripping levers. At the upper end the parts of the gripping levers d are united and connected advantageously by means of pairs of toggle links i with the lower ends of centrally disposed bolts j provided in opposite positions on the grab. The bolts j thus serve to connect the inner lower ends of the respective pairs of toggle links i, and are adapted to have a vertical movement to bring the respective pairs of connected toggle links nearer the horizontal position corresponding to the closed position of the lower ends of the gripping levers d, for which purpose the bolts j are respectively connected at or near the opposite ends of a transversely disposed member k which may be conveniently formed of parallel disposed frame parts of a channel or other section, and are disposed apart with a space between in which the upper ends of the respective bolts j of the respective pairs of gripping levers d extend to be secured in position by means of transversely disposed pins j^1 or the like. The parallel disposed frame parts forming the member k are in the normal position adapted to lie across and upon the frame and may extend from the inner frame member of one pair of frame members a to the adjacent frame member of the second pair of frame members. The transversely disposed member k may be connected in a central position between the frame parts by means of a link or links m, m or otherwise with the hoisting shackle n, and may thus be raised in position above the frame so as to be no longer supported thereon, whereby the bolts j are raised, by which the toggle links i are moved to thrust the upper arms of the gripping levers d outwardly and to bring the respective holders h into the gripping position.

Means are provided on the transversely disposed member k by which it may be locked in position upon the frame, so that thus on its being raised, relative movement is not imparted to the respective bolts j to which the toggle links i are connected, and thus the gripping levers d are not thrust outwardly. Such means may for example consist of a movable locking bar o mounted to be moved lengthwise upon the transversely disposed member k, and at or near the ends of the movable bar o, arms p may be provided to carry locking pins q that are adapted on the lengthwise movement of the locking bar o in one direction to cause the locking pins q to enter holes within guide members x by which the member k is guided, the guide members x being secured at their lower ends to the inner member a of the respective pairs of frame members. This lengthwise movement may be effected by means of a hand lever o^1 pivotally secured on the transversely disposed member k at o^2, the lever o^1 slidably engaging with a bracket o^3 or the equivalent, secured on the movable bar o, such movement being suitably accommodated by mounting the lower part of the bracket o^3 within a lengthwise slot in the end of the hand lever o^1, or otherwise. The guide members x are provided at their upper ends with stops x^1 to limit the relative upward movement of the transversely disposed member k. It will however be understood that any other means may be provided to prevent the operation of the gripping levers d and to release the gripping levers or the parts connected to them on the frame being set in position to engage a pile of bricks or the like.

The parts of which the gripping levers d are formed may be substantially straight and normally in a vertical position up to a position adjacent the respective pairs of horizontally disposed frame members a, and the respective parts of which the gripping levers d are formed are so provided as to approach each other towards their upper inner ends at which they are connected by means of respective pairs of toggle links i to the lower ends of the vertically movable bolts j in the manner hereinbefore described.

In position between the respective pairs of frame members a by which the oppositely disposed gripping levers d are carried in the manner described, transversely disposed frame members y are provided to extend across the central interstitial space z and means provided by which they support a double worm wheel gear such as hereinafter described. For this purpose a casing or enclosure r adapted for support by the transversely disposed frame members y is provided. This enclosure is formed by end walls y^1 conveniently formed as frame members of a channel cross-section between and connected to the respective transversely disposed members y, and top and bottom plates r^1 respectively secured by riveting or otherwise to the top and bottom flanges of the transversely disposed members y and the end walls y^1. By such means the casing or enclosure may be provided for the reception of two vertically disposed screw-threaded spindles s in a central position with respect to the frame and in line with each other in a plane parallel with and equidistant from the respective planes in which the pairs of gripping levers d are disposed. Worm wheels s^1 are so mounted in the casing or enclosure r that their vertical axial movement is prevented, by which they may thus serve as nuts by which the vertically disposed screw-threaded spindles s passing centrally through them may be moved upwardly or downwardly to adjust the position of a base plate or base plates t at their lower ends as may be required, it being understood that the lower ends of the respective screw-threaded spindles s have a base plate or base plates t carried at their lower ends, and that the spindles s extend beneath the frame in a central position midway between the downwardly extending parts e, d thereof, and in such manner that when the frame is applied over the pile of bricks or the like to be raised, the spindles s serve as pillars upon which the frame and mechanism may be supported prior to the engagement of the gripping levers d, the lower ends of which are in this way disposed clear

of the ground and free to be brought into contact with the lowermost row of bricks or the like in opposite positions of the pile. For this purpose a worm spindle s^2 is provided to extend through the casing or enclosure r with two worms s^3 for engagement with the respective worm wheels s^1, it being understood that the worm spindles s^2 may be disposed parallel with the pairs of frame parts a by which the respective pairs of gripping levers d are carried, and that the worm spindle s^2 may extend outwardly to one side of the frame and have provided upon it an operating hand wheel u in convenient position for operation, to adjust the base plate or base plates t so that the weight of the apparatus may be taken by the pile in a position in which the lower ends of the gripping levers d are free from the ground and adjacent the lowermost layer and that the worm spindle s^2 may be supported within bearings s^4 carried externally to the transversely disposed frame members y. Furthermore tubular casings s^5 may be provided, closed at their upper ends and provided with flanges s^6 at their lower ends by which they may be secured to the top plate of the casing or enclosure r, so that by such means the screw-threaded upper ends of the spindles s are enclosed and protected in the use of the apparatus.

The upper end of the reinforcing plate v of each of the gripping levers d extends to a position beyond the pivot pin f by which the gripping lever d is carried at the lower ends of the pair of downwardly extending arms e of the carrying frame; and the reinforcing plate v may be riveted or welded to the respective parts of the lever d.

The inner arms of the respective pairs of downwardly extending arms e at each side may be connected together so as to constitute one integral part, as for example by means of a pair of horizontally disposed frame members w of angular or other cross-section, that may be disposed in contact and connected together by riveting or welding in a middle position but are respectively inclined upwards and downwards near the ends in a substantially V or Y shape, whereby the inner arms e at each side of the frame are effectively braced for the rigid support of the adjacent gripping levers d, d.

The respective holders h may be formed of robust channel section of such size as to accommodate a length or lengths of india rubber h^2 in the lower part of the channel, which may conveniently be secured in position by a wedge bar or bars h^1 of wood or other similar material adapted to be forced or hammered into position within the channel above the india rubber h^2, and firmly to hold the india rubber in position to protrude out of the channel and to contact with the lowermost row of bricks or the like of the pile, on the pile being engaged before being hoisted. The india rubber h^2 is moulded or cut to such a cross-section that it may on being withdrawn from the channel and reversed in position within it, have an outwardly extending lower part beneath the wedge. Thus on the india rubber h^2 being worn or mutiliated in use its effective life may be increased by thus being adapted to be set for use in reversed positions. Furthermore at its opposite corners the rubber may be cut on an inclined face h^3 so as thus to avoid the possibility of the india rubber being compressed by the lower edge of the holder h, and with a view to accommodate the india rubber on compression a series of vertical slots h^4 may be provided in the length of the strip or strips of rubber h^2. These slots may be provided of from 1½ inches to 2 inches apart throughout its length.

It will be understood that the construction hereinbefore described is inexpensive and is produced in the main in the utilization of rolled metal where this is advantageous. It will however be understood that the apparatus may be otherwise constructed as for example of cast parts or of parts otherwise produced, and that the worm gear may be replaced by any other gear for accommodating the carrying frame to the length of the pile, and that the gripping levers may be otherwise formed or constructed as may also the holders; and that the latter may be formed integral with the gripping lever or levers, or may in known manner be adapted for the reception of elastic elements comprising helical springs in place of india rubber.

By such means an apparatus may be provided of a robust and inexpensive construction adapted securely to hold the pile of bricks or the like in hoisting, and adapted also to be conveniently used.

I claim:

1. Apparatus for loading bricks or the like comprising a rigid frame of an inverted substantially U-shape adapted to be applied in position over a pile of bricks or the like, gripping levers pivotally mounted at opposite sides at the lower ends of the downwardly extending parts of the said rigid frame, the said gripping levers having their upper ends extending above the horizontal part of the said rigid frame, transversely disposed contact bars carried at the lower ends of the gripping levers at positions beneath the downwardly extending parts of the said rigid frame, means by which the contact bars are adapted to engage with elastic pressure the bricks or the like of two parallel outer rows in the lowermost layer, and means for the suspension of the said rigid frame comprising toggle links connected at their outer ends to the upper ends of the gripping levers.

2. An apparatus as specified in claim 1, comprising mechanism by which the apparatus is supported upon the pile of bricks or the like to be loaded and by which it may be adjusted in vertical position to bring the lower ends of the gripping levers clear of the ground and the contact bars in positions adjacent two parallel outer rows of the lowermost layer of the pile, the said mechanism comprising a pair of vertically adjustable elements disposed between the apparatus and the pile of bricks upon which it may be supported.

3. An apparatus for loading bricks or the like, comprising a rigid carrying frame of an inverted substantially U-shape adapted to be applied upon a pile of bricks or the like, gripping levers at opposite sides of the carrying frame and pivoted at the lower ends thereof, the upper ends of the said gripping levers extending above the horizontal parts of the said carrying frame, oppositely disposed sets of links having their outer ends upwardly directed and pivotally connected with the upper ends of the said gripping levers and having their inner ends downwardly directed and pivotally connected with the elements by which the carrying frame is suspended when in use, the lower parts of the said gripping levers extending beneath the vertical parts of the said carrying frame, elastic contact elements carried at the lower end of the gripping levers, and a pair of adjustable elements mounted on the carrying frame by which the elastic contact elements are

adapted to be located in contact with two parallel outer rows of the lowermost layer of the pile.

4. An apparatus for loading bricks or the like, comprising a rigid carrying frame of an inverted substantially U-shape adapted to be applied upon a pile of bricks or the like, gripping levers at opposite sides of the carrying frame, and pivoted at the lower ends thereof, the upper ends of the said gripping levers extending above the horizontal parts of the said carrying frame, oppositely disposed sets of links having their outer ends upwardly directed and pivotally connected with the upper ends of the said gripping levers and having their inner ends downwardly directed and pivotally connected with the elements by which the carrying frame is suspended when in use, the lower parts of the said gripping levers extending beneath the vertical parts of the said carrying frame, elastic contact elements carried at the lower end of the gripping levers, and adjustable means mounted on the carrying frame by which the elastic contact elements are adapted to be located in contact with two parallel outer rows of the lowermost layer of the pile, said means comprising vertically adjustable members mounted upon the carrying frame adapted to support the carrying frame in position upon the pile and worm and worm wheel gear by which the vertically adjustable members are operated for their vertical adjustment.

5. An apparatus for loading bricks or the like, comprising a carrying frame adapted to be applied upon a pile of bricks or the like, gripping levers at opposite sides of the carrying frame, elastic contact elements carried at the lower end of the gripping levers, adjustable means mounted on the carrying frame by which the elastic contact elements are adapted to be located in contact with two parallel outer rows of the lowermost layer of the pile, and means for the suspension of the carrying frame comprising a transversely disposed suspension member disposed above the carrying frame and adapted for suspension, and toggle links by which the said suspension member is connected to the respective pairs of gripping levers, and means by which the gripping levers are adapted to be immobilized, comprising a longitudinally movable locking bar mounted upon the said transversely disposed suspension member by which the said member is adapted to be locked to the carrying frame.

6. Apparatus for loading bricks or the like, comprising a rigid carrying frame of an inverted substantially U-shape adapted to be applied upon a pile of bricks or the like, the said carrying frame being constituted by a plurality of transversely disposed and rigid frame parts inverted and of substantially U-shape, means by which the said frame parts are connected together by frame members to constitute a rigid unitary carrying frame, gripping levers at opposite sides of the said carrying frame and pivotally mounted at the lower ends of the respective carrying frame parts, the upper ends of the said gripping levers extending above the horizontal part of the said carrying frame and the lower parts of the said gripping levers extending beneath the vertical parts thereof, elastic contact elements carried at the lower ends of the gripping levers and means for the suspension of the carrying frame comprising elements connected to the upper ends of the gripping levers.

7. Apparatus for loading bricks or the like, comprising a rigid carrying frame of an inverted substantially U-shape adapted to be applied upon a pile of bricks or the like, gripping levers at opposite sides of the said carrying frame and pivotally connected near the lower ends thereof, the upper ends of the said gripping levers extending above the horizontal parts of the said carrying frame, oppositely disposed sets of links having their outer ends upwardly directed and pivotally connected with the upper ends of the said gripping levers and having their inner ends downwardly directed and pivotally connected with the elements by which the carrying frame is suspended when in use, the lower part of the said levers extending beneath the vertical part of the said carrying frame and elastic contact elements carried at the lower ends of the said gripping levers, said elastic contact elements comprising contact bars connected to the lower ends of the gripping levers, the said contact bars having a channel cross-section open inwardly, india rubber mounted under compression within the channels in the said contact bars to protrude inwardly, and means for retaining the india rubber within the channels in the contact bars.

8. Apparatus for loading bricks or the like, comprising a rigid carrying frame of an inverted substantially U-shape adapted to be applied upon a pile of bricks or the like, gripping levers at opposite sides of the said carrying frame and pivotally mounted near the lower ends thereof and elastic contact elements carried at the lower ends of the said gripping levers, said elastic contact elements comprising contact bars connected to the lower ends of the gripping levers, the said contact bars having a channel cross-section open inwardly, india rubber pieces mounted under compression within the channels in the said contact bars to protrude inwardly and of a form by which they are adapted to be reversible in position, and means for retaining the india rubber within the channels in the contact bars.

9. Apparatus for loading bricks or the like, comprising a rigid carrying frame of an inverted substantially U-shape adapted to be applied upon a pile of bricks or the like, gripping levers at opposite sides of the said carrying frame and pivotally mounted near the lower ends thereof and elastic contact elements carried at the lower ends of the said gripping levers, said elastic contact elements comprising contact bars connected to the lower ends of the gripping levers, the said contact bars having a channel cross-section open inwardly, india rubber pieces mounted under compression within the channels in the said contact bars to protrude inwardly and of a form by which they are adapted to be reversible in position, means for retaining the india rubber within the channels in the contact bars and equidistant slots in the inwardly protruding edges of the india-rubber.

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