April 29, 1958 A. G. ANDERSON 2,832,629

GRAPPLING APPARATUS

Original Filed Sept. 8, 1954 2 Sheets-Sheet 1

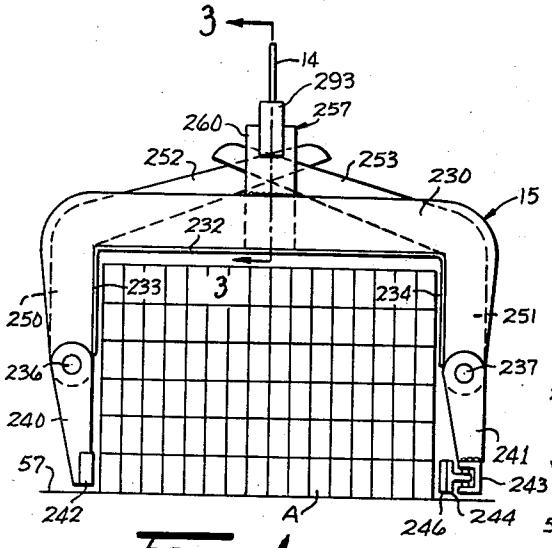


Fig-1

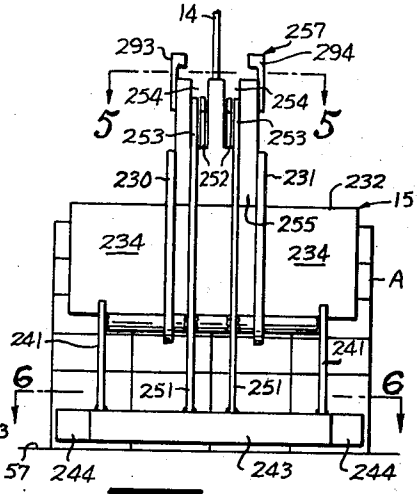


Fig-2

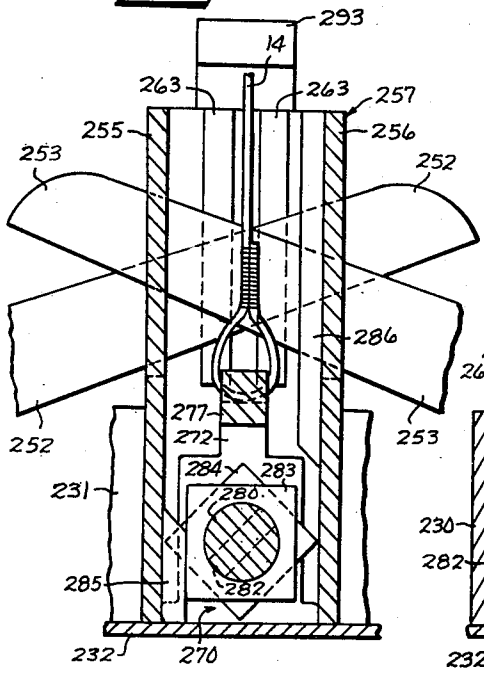


Fig-4

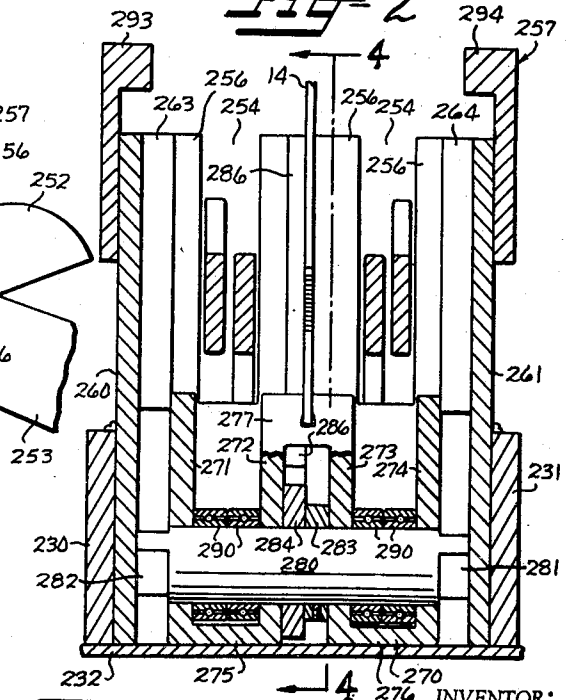


Fig-3

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GRAPPLING APPARATUS

Original Filed Sept. 8, 1954 2 Sheets-Sheet 2

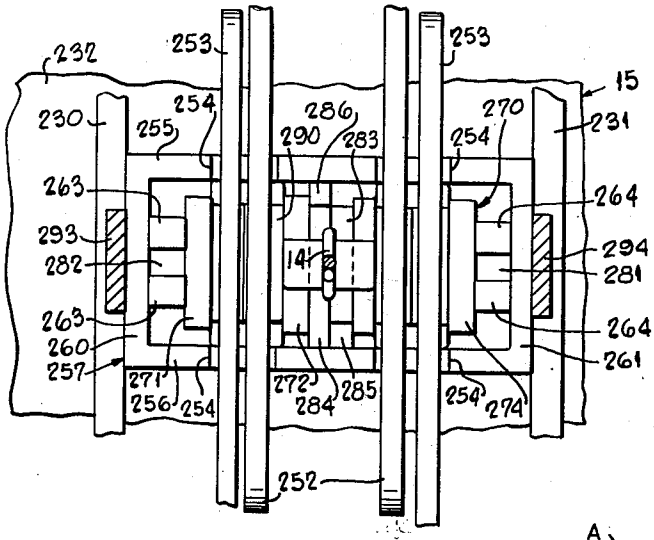


Fig-5

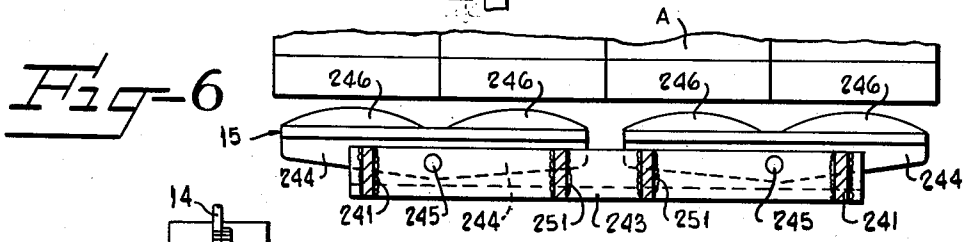


Fig-6

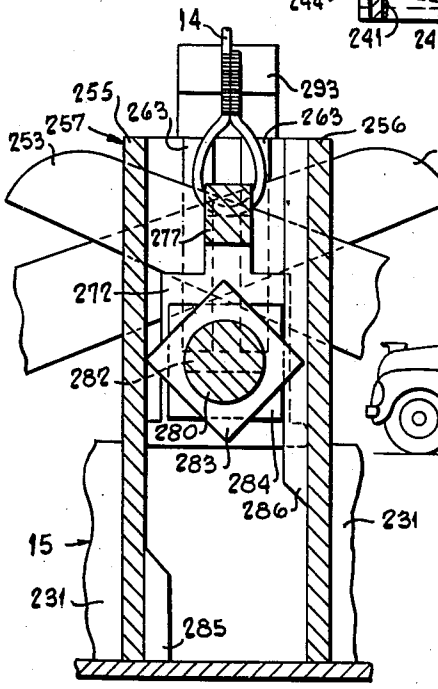


Fig-7

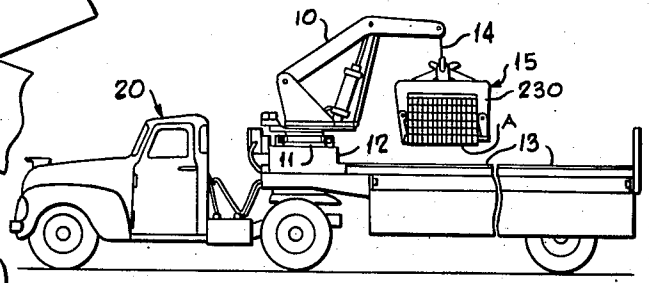


Fig-8

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2,832,629

GRAPPLING APPARATUS

Allan G. Anderson, Cheraw, S. C.

Original application September 8, 1954, Serial No. 454,761. Divided and this application August 17, 1955, Serial No. 528,983

19 Claims. (Cl. 294—63)

This invention relates to apparatus for loading and unloading stacked or bulky materials, such as hacks of bricks and the like and, more especially, to grapple apparatus for lifting stacks of bricks or other materials and depositing the same.

It is an object of this invention to provide a novel form of grab or grappling device operated by a lifting cable, which grab or grappling device comprises a pair of tongs or grappling arms which are automatically operable to tightly engage opposite sides of the bottom layer of a stack of bricks or similar material upon alternate upward movements of the grappling device and which will, upon the intervening upward movements thereof, automatically release the bottom layer of the stack of bricks or similar material.

It is another object of the invention to provide novel means for positively controlling the engaging and disengaging position of the pair of tongs or grappling arms.

It is a further object of the invention to provide novel gripping jaws for the pair of tongs or grappling arms.

This application is a division of my application Serial No. 454,761 filed September 8, 1954 and entitled Apparatus for Loading and Unloading Bricks and the Like.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds when taken in connection with the accompanying drawings, in which—

Figure 1 is an elevation of the grappling device showing the jaws thereof having just released the corresponding stack of bricks or similar articles therefrom;

Figure 2 is a view looking at the right-hand side of Figure 1;

Figure 3 is an enlarged fragmentary vertical sectional view taken substantially along line 3—3 in Figure 1;

Figure 4 is an enlarged fragmentary vertical sectional view taken substantially along line 4—4 in Figure 3;

Figure 5 is an enlarged fragmentary plan view, partially in section, taken substantially along line 5—5 in Figure 2;

Figure 6 is an enlarged fragmentary plan view, partially in section, taken substantially along line 6—6 in Figure 2, and showing the gripping jaws at one side of the grappling device;

Figure 7 is a view similar to Figure 4, but showing the gripper operating or tong operating sear shaft in a different position from that shown in Figure 4;

Figure 8 is a side elevation of a mobile vehicle or conveyance shown in the form of a truck-trailer combination showing the improved grappling device secured to the lifting cable of the crane.

Referring more specifically to the drawings, a crane assembly indicated at **10** is mounted for rotation or oscillation about a vertical axis on a secondary or auxiliary carriage **11**. The auxiliary carriage **11** is mounted for lateral movement on a main or primary carriage **12** which is mounted for longitudinal movement on a trailer or truck bed or platform **13** of a truck **20**. A lifting cable or pliable element **14** of the crane assembly **10** connects

the novel grappling device broadly designated at **15** for elevating and lowering the same while carrying a hack or stack of bricks or similar material A.

For purposes of description, it shall be assumed that the grappling device **15** has been lowered in Figures 1 to 4 from an elevated position such as shown in Figure 8 to where the stack of bricks or other articles A is resting upon a supporting surface such as the truck bed **13** or is being supported upon any other surface such as the ground upon which the tractor-trailer combination is positioned.

The grappling device **15** comprises a pair of spaced, side-by-side substantially U-shaped inverted frame members **230, 231** to the lower surfaces of the horizontal portions of which an inverted U-shaped plate **232** is suitably secured and which has down turned portions **233, 234** secured to the proximal surfaces of the vertical legs of the inverted U-shaped frame members **230, 231**. It will be noted in Figure 2 that the plate **232** and its portions **233, 234** extend outwardly substantially beyond opposite sides of the respective inverted U-shaped frame members **230, 231** to thereby prevent any bricks in the upper portions of the hack or stack from being dislodged during movement of the hack or stack A from one place to another. Horizontal shafts **236, 237** are journaled in the lower portions of the vertical legs of the inverted U-shaped frame members **230, 231** and opposite ends of the shaft **236** have the upper ends of gripper arms **240** fixed thereon and opposite ends of the shaft **237** have the upper ends of gripper arms **241** fixed thereon.

It will be noted in Figure 2 that the arms **241** are spaced outwardly substantially relative to the distal surfaces of the frame members **230, 231**. The gripper arms **240** are arranged in the same manner as the gripper arms **241** and support opposite ends of a gripping bar or jaw bar **242**. The lower ends of the gripper arms **241** have opposite ends of a channel-shaped gripper bar **243** suitably secured thereto, and it will be observed in Figure 6 that there is, supported between the flanges of the channel-shaped gripper bar **243**, a plurality of pivoted gripper jaws **244**, of which two are shown in Figure 6.

Each of the pivoted gripper jaws or grappling jaws **244** is pivotally mounted, as at **245**, between the upper and lower flanges of the channel-shaped jaw bar **243** and the inner vertical plate portion of each of the jaws **244** is provided with one or more resilient or rubber pads **246** suitably secured thereto. Each pad **246** preferably has convex inner or article engaging surface thereon. In this instance, there are two such resilient pads **246** shown on the inner face of each of the pivoted jaws **244** and it will be noted that there is one of the pads **246** provided for each horizontal row of bricks or other articles A to thereby insure that each individual row of bricks is tightly clamped against the jaw bar **242** when the jaw bar **242** and the pivoted jaws **244** are moved inwardly toward each other, as will be later described.

Suitably secured to the central portions of the jaw bars **242, 243** are the lower end of respective pairs of substantially L-shaped levers **250, 251**, the medial portions of the substantially vertical legs of which are fixed to the respective shafts **236, 237** at points between the frame members **230, 231**. It will be observed in Figures 1, 2 and 4 that the levers **250, 251** are provided with inwardly and upwardly inclined arms **252, 253**, respectively, whose proximal portions overlap each other as they extend through corresponding slots **254** formed in opposite side walls **255, 256** of the box-like housing which forms a part of a gripper activating and deactivating unit broadly designated at **257**. Said box-like structure also includes spaced end walls **260, 261** and it will be observed in Figures 3 and 4 that the lower edges of said walls **255, 256, 260, 261** rest upon the plate **232** and the end walls

260, 261 are suitably secured to the proximal surfaces of the horizontal portions of the inverted U-shaped frame members 230, 231. The proximal surfaces of the end walls 260, 261 of the said box-like structure have respective pairs of spaced projections 263, 264 thereon defining respective grooves therebetween and it will be observed in Figures 3 and 4 that the lower edges of these projections 263, 264 are spaced substantially above the plate 232.

Guided for vertical movement between the proximal surfaces of the projections 263, 264 is a W-shaped sear block broadly designated at 270 and which includes spaced upright projecting portions 271 to 274, inclusive, the upright portions 271, 274 being connected at their lower ends to the lower ends of the intermediate upright portions 272, 273 by respective horizontal portions 275, 276 and the upper ends of the intermediate upright portions 272, 273 being bridged by a horizontal portion 277.

The term "sear" is used herein since the various parts so identified are instrumental in automatically cocking and uncocking the gripper elements generally in the manner of a pistol or gun.

It will be noted that the lower end of the cable 14 is suitably connected to the portion 277 of the sear block 270. Journaled in the upright portions 271 to 274, inclusive, of the sear block 270 is a sear shaft 280 whose opposite ends terminate substantially flush with the distal surfaces of the upright portions 271, 274 of the sear block 270 and, extending outwardly from the sear shaft 280 beyond the upright portions 271, 274 are ground flattened portions forming sear keys 281, 282 which are, at times, adapted to engage the lower surfaces of the projections 263, 264 on the walls 260, 261 of said box-like structure. At other times, the shaft 280 is rotated, by means to be later described, to where the sear keys 281, 282 are alined with and thus may pass into the slots or grooves defined between the adjacent pairs of projections 263, 264.

Fixed on the shaft 280 between the closely spaced intermediate portions 272, 273 of the sear block 270 is a pair of substantially rectangular or square sear cams 283, 284. It will be observed in Figures 4 and 7 that the corners of the sear cam 283 are disposed in alinement with the flat surfaces of the sear cam 284 and vice versa. It will also be noted that the distance across the corners of the sear cams 283, 284 is only slightly less than the distance between the side walls 255, 256.

The proximal surfaces of the side walls 255, 256 are provided with projections or ribs 285, 286 thereon which extend inward and whose inner surfaces are spaced from the vertical axis of the box-like structure defined by the walls 255, 256, 260, 261 a distance slightly greater than the distance between opposite flat edges of each of the rectangular or square cams 283, 284. The projections 285, 286 serve as sear shaft rotating elements and are disposed in off-set relationship and in the vertical planes of the respective sear cams 283, 284. It will be observed in Figures 4 and 7 that the projection 285 extends upwardly from adjacent the lower edge of the side wall 255 and terminates in an inwardly and downwardly inclined cam surface which is spaced substantially below the horizontal plane of the lower surface of the projection 286. The lower surface of the projection 286 is also beveled to form a cam surface thereon which extends inwardly and upwardly at an angle. The proximal or upper and lower edges of the respective sear shaft rotating elements or projections 285, 286 are necessarily spaced vertically apart sufficiently so that the upper right-hand corner of cam 284, in each instance, will clear the lower edge of the projection 286 as the upper edge of the projection 285 is engaged by the then inclined lower left-hand surface of the corresponding point of the square cam 283 in the course of downward movement of the sear block 270 relative to the projections 285, 286 from, say, the position shown in Figure 4.

It is apparent that in the course of such downward movement, one corner of the cam 283 engages the beveled or inclined upper end of the projection 285 to thus impart one-eighth revolution to the cams 283, 284, shaft 280 and its key portions 281, 282. On the other hand, the upper surface of projection 285 should also be spaced sufficiently below the lower surface of projection 286 so that, in the course of upward movement of the sear block 270, as imparted thereto by the lifting action of the cable 14, the then left-hand corner of the cam 283 will clear the upper end of the projection 285 as the then right-hand corner of the cam 284 engages the lower surface of the projection 286 to impart another one-eighth revolution to the cams 283, 284, the shaft 280 and the key portions 281, 282.

It is thus seen that, when the weight of the grappling device 15 is supported by means other than the cable 14, such as by a stack of articles A or by the lower surfaces of the bars 242, 243 engaging the surface 57, the sear block 270 and parts supported thereby will occupy substantially the position shown in Figures 3 and 4. However, upon upward movement of the cable 14, as effected by the crane assembly 10, the sear block 270 moves upwardly relative to the walls 255, 256, 260, 261, in the course of which the right-hand corner of the cam 284 in Figure 4 engages the lower cam surface on the projection 286 to thereby effect one-eighth revolution of movement to the cams 283, 284, the shaft 280 and the sear keys 281, 282.

It is apparent that this will cause the flat surfaces of the sear keys 281, 282 to extend in substantially horizontal planes so that, with further upward movement of the sear keys 281, 282, their upper surfaces will engage the lower surfaces of the projections 263, 264, as shown in Figure 7, to thereby raise the grappling device 15 without exerting upward pressure on the proximal portions of the arms 252, 253 of the respective levers 250, 251. Since the arms 252, 253 overlie the stack of articles A, it is apparent that they substantially overbalance the vertical portions of the levers 250, 251 and the parts attached thereto so that, as the sear keys 281, 282 engage the lower ends of the projections 263, 264 and raise the frame members 230, 231, they also raise the lever 250, 251 and the jaw bar 242 and the pads 246 on the jaws 244 (Figure 6) remain clear of the stack of articles A in the course of upward movement thereof.

Now, upon the next succeeding and alternate downward movement of the cable 14, and upon the weight of the grappling device 15 being supported either by a stack of articles such as the articles A or the surface upon which the stack of articles is resting, the sear block 270 and associated parts move downwardly relative to the box-like structure including plates or wall members 255, 256, 261 and, in the course of such downward movement, one of the then horizontally extending pointed portions of the cam 283 engages the upper end of and is rotated by the projection 285 (Figures 4 and 7) to again impart one-eighth revolution to the cams 283, 284, the shaft 280 and the sear keys 281, 282.

Thus, on the next upward movement of the sear block 270, as effected by the cable 14, the right-hand portion of the cam 284 again engages the lower end of the projection 286 to impart another one-eighth revolution thereto so the cams 283, 284, shaft 280 and sear keys 281, 282 will occupy a position revolved ninety degrees from that shown in Figure 7. It is thus seen that, with further upward movement of the sear block 270, the sear keys 281, 282 then pass upwardly between the corresponding pairs of projections 263, 264.

Referring to Figure 3, it will be observed that the shaft 280 has anti-friction bearings or follower members 290 thereon disposed between the portions 271, 272 and 273, 274. In this instance, there are two bearings 290 disposed between the portions 271, 272 and there are two bearings

disposed between the portions 273, 274. Thus, as the sear keys 281, 282 move upwardly between the respective pairs of projections 263, 264, the bearings 290 engage the lower surfaces of the overlapping portions of the corresponding pairs of arms 252, 253 to thereby impart upward movement to the proximal portions thereof which will, in turn, cause the jaw bar 242 to move inwardly in engagement with one end of the lowermost tier or articles A and this will also cause the resilient members 246 on the jaws 244 carried by the jaw bar 243 to move inwardly in engagement with each row of articles in the bottom tier of articles A.

Thus, the bottom tier of articles A is tightly clamped between the pads 246 on the jaws 244 and the jaw bar 242 so that, with further upward movement of the cable 14 and the sear block 270, upward movement is then imparted to all of the parts of the grappling device 15 along with the stack of articles A.

The stack of articles A is then lifted by pressure exerted on the bottom tier of articles through the arms 252, 253. In the absence of an article or articles between the jaw bars 242, 243, when the sear keys 281, 282 move upwardly between projections 263, 264, the upper ends of portions 271, 274 of sear block 270 engage respective stops 293, 294 fixed to the side walls 260, 261. The remaining parts of the grappling device 15 then move upwardly with the sear block 270.

It is apparent that, when the cable 14 is lowered with a stack of articles and becomes slackened, the jaw bars 242, 243 then move apart from each other to release the stack of articles therefrom and will remain in this position as the grappling device 15 is subsequently raised and until the grappling device 15 is again lowered and upward movement is again initially imparted thereto in the manner heretofore described.

In the drawings and specification there has been set forth a preferred embodiment of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only, and not for purposes of limitation, the scope of the invention being defined in the claims.

I claim:

1. A grappling device having one end connected to a pliable element for being elevated and lowered by the same comprising a pair of spaced substantially parallel inverted U-shaped frame members, a pair of levers having substantially vertical lower portions and inwardly diverging partially overlapping upper portions, the lower portions of said levers being journaled intermediate their ends between the lower portions of the inverted U-shaped members, a jaw bar fixed to the lower portion of each of said levers, a sear block mounted for vertical movement between substantially the central portions of the horizontal portions of said frame members and to which the lower end of the pliable element is connected, a rotatable sear shaft journaled in said sear block and having a sear key integral with at least one end thereof and projecting outwardly beyond the sear block, an abutment carried by at least one of said frame members and having its lower surface spaced substantially above the sear key when the sear block is in lowered position, means engageable with said sear shaft for rotating the same predetermined amounts upon each vertical movement of said sear block relative to the inverted U-shaped frame members, said last-named means being so arranged as to cause the sear key to engage the lower end of said abutment upon alternate lifting movements of said pliable element and said sear block, the proximal overlapping portions of the diverging arms of said levers overlying said seal block at a point on a level above the level of the abutment whereby said sear key will engage the abutment and lift the grappling device therewith without creating a lifting force on the proximal overlapping portions of said levers, and said means for rotating the seal shaft being

so arranged as to cause the key to miss the abutment upon lifting movements thereof intervening between said alternate lifting movements thereof so the sear block will engage the overlapping portions of said levers to cause the lowermost ends of the levers to move inwardly toward each other so the jaw bars thereon will clamp articles therebetween.

2. A grappling device having one end connected to a pliable element for being elevated and lowered by the same for handling stacked articles such as brick and the like comprising a frame, a sear block mounted for vertical movement in said frame and to which the lower end of the pliable element is connected, a pair of levers pivotally supported in said frame at points in opposed spaced substantially parallel relationship, article gripping means on the lower ends of said levers, said levers having inwardly diverging overlapping portions on their upper ends whose proximal overlapping portions overlie said sear block, a sear shaft journaled in said sear block and extending transversely relative to said overlapping portions of said levers, a transverse sear key on at least one end of said sear shaft and projecting outwardly beyond said sear block, a pair of spaced abutments carried by said frame and normally spaced above said sear key, the distance between the abutments being greater than the width of said key and less than the length of said key, means engageable with said sear shaft for imparting substantially a one-eighth revolution of rotation to said sear shaft upon each upward and each downward movement of said sear block relative to said frame, and the lower surfaces of said abutments being spaced below the level of the proximate overlapping portions of said levers whereby, upon alternate lifting movements of the pliable element and sear block, the flat surface of the sear key will engage the lower ends of said abutments to thereby impart upward movement to said frame and, upon intervening lifting movements of the pliable element and said sear block, the sear key will pass between said abutments and will thereby transmit the lifting force to the proximal overlapping portions of the levers to cause the gripping means on the lower ends thereof to move inwardly and grip the articles therebetween with further lifting movement of the grappling device.

3. A structure according to claim 2 having means for limiting upward movement of the sear block relative to the frame in the course of each of said intervening lifting movements thereof in the absence of articles being disposed between the article gripping means on the lower ends of said levers.

4. A structure according to claim 2 wherein the gripping means associated with at least one of said levers comprises a plurality of pivoted jaws each having at least one convex surface thereon for engaging the corresponding surfaces of the articles to be lifted thereby.

5. A structure according to claim 4 wherein said convex surfaces are each made from a resilient member fixed to the inner surface of the corresponding jaw.

6. A structure according to claim 2 wherein said sear block is provided with projections in its upper portion defining an opening therebetween whereby said projections on the sear block move upwardly astride the proximal overlapping portions of said levers upon said intervening lifting movements thereof, and said shaft having bearing means thereon disposed in said opening between the projections on said sear block so said bearing means engage the lower surfaces of the proximal overlapping portions of the lever arms upon said intervening lifting movements of the pliable element and the sear block.

7. A structure according to claim 2 wherein the means for rotating said sear shaft substantially a one-eighth revolution with each upward and each downward movement of the sear block relative to the frame comprises first and second substantially square sear cams fixed on said shaft and wherein the points of the first cam extend radially of the planes of the flat surfaces of the second

cam and vice versa, a first cam projection fixed to said frame and being engageable by the first sear cam in the course of each upward movement thereof relative to the frame for imparting substantially a one-eighth revolution in rotation to the sear cams and the sear shaft, a second cam projection spaced from the first cam projection a distance slightly greater than the distance across the flat surfaces of said sear cams and having its upper surface spaced below the level of the lower surface of the first cam projection, and said second cam projection being engageable by the second sear cam in the course of each downward movement thereof for also imparting substantially a one-eighth revolution in rotation to the sear cams and the sear shaft.

8. A grappling device having one end connected to a pliable element for being elevated and lowered by the same comprising a frame, a pair of levers having downwardly extending lower portions and inwardly extending upper portions, said levers being journaled intermediate their ends in said frame, article gripping means on the lower portion of each of said levers, a sear block mounted for vertical movement in the central portion of said frame and to which the lower end of the resilient member is connected, a rotatable sear shaft journaled in said sear block and having a sear key integral with at least one end thereof and projecting outwardly beyond the sear block, an abutment carried by said frame and having its lower surface spaced substantially above the sear key when the sear block is in lowered position, means engageable with said sear shaft for rotating the same predetermined amounts upon each vertical movement of said sear block relative to the frame, said last-named means being so arranged as to cause the sear key to engage the lower end of said abutment upon alternate lifting movements of the pliable element and said sear block, the proximal upper portions of said levers at least partially overlying said sear block at a point on a level above the level of the abutment whereby said sear key will engage the abutment and lift the grappling device therewith without creating a lifting force on the proximal upper portions of said levers, and said means for rotating the sear shaft being so arranged as to cause the key to miss the abutment upon lifting movements thereof intervening between said alternate lifting movements thereof so the sear block will engage the upper portions of said levers to cause the lowermost ends of the levers to move inwardly toward each other so the jaw bars thereon will clamp articles therebetween.

9. A structure according to claim 8 having means for limiting upward movement of the sear block relative to the frame in the course of each of said intervening lifting movements thereof in the absence of articles being disposed between the article gripping means on the lower ends of said levers.

10. A structure according to claim 8 wherein the gripping means associated with at least one of said levers comprises a plurality of pivoted jaws each having at least one convex surface thereon for engaging the corresponding surfaces of the articles to be lifted thereby.

11. A structure according to claim 10 wherein said convex surfaces are each made from a resilient member fixed to the inner surface of the corresponding jaw.

12. A structure according to claim 8 wherein said sear block is provided with projections in its upper portion defining an opening between whereby said projections on the sear block move upwardly astride the upper portions of said levers upon said intervening lifting movements thereof, and said shaft having bearing means thereon disposed in said opening between the projections on said sear block so said bearing means engage the lower surfaces of the upper portions of the lever arms upon said intervening lifting movements of the pliable element and the sear block.

13. A structure according to claim 8 wherein the means for rotating said sear shaft substantially a one-eighth revolution with each upward and each downward movement of the sear block relative to the frame comprises first and second substantially square sear cams fixed on said shaft and wherein the points of the first cam extend radially of the planes of the flat surfaces of the second cam and vice versa, and means are provided carried by said frame for engaging the first sear cam in the course of each upward movement thereof relative to the frame for imparting substantially a one-eighth revolution in rotation to the sear cams and the sear shaft, and to engage the second sear cam in the course of each downward movement thereof for also imparting substantially a one-eighth revolution to the sear cams and the sear shaft.

14. A structure according to claim 8 wherein the means for rotating said sear shaft substantially a one-eighth revolution with each upward and each downward movement of the sear block relative to the frame comprises first and second substantially square sear cams fixed on said shaft and wherein the points of the first cam extend radially of the planes of the flat surfaces of the second cam and vice versa, a first cam projection fixed to said frame and being engageable by the first sear cam in the course of each upward movement thereof relative to the frame for imparting substantially a one-eighth revolution in rotation to the sear cams and the sear shaft, a second cam projection spaced from the first cam projection a distance slightly greater than the distance across the flat surfaces of said sear cams and having its upper surface spaced below the level of the lower surface of the first cam projection, and said second cam projection being engageable by the second sear cam in the course of each downward movement thereof for also imparting substantially a one-eighth revolution in rotation to the sear cams and the sear shaft.

15. In an article handling device having a cable, and means for raising and lowering said cable, an improved grapplying device for handling stacked articles such as brick and the like comprising a frame, a sear block mounted for vertical movement in said frame and to which the lower end of said cable is connected, a pair of levers pivotally supported in said frame at points in opposed spaced substantially parallel relationship, article gripping means on the lower ends of said levers, said levers having inwardly extending upper portions whose proximal portions at least partially overlie said sear block, a sear shaft journaled in said sear block and extending transversely relative to said upper portions of said levers, a transverse sear key on at least one end of said sear shaft and projecting outwardly beyond said sear block, a pair of spaced abutments carried by said frame and normally spaced above said sear key, the distance between the abutments being greater than the width of said key and less than the length of said key, means engageable with said sear shaft for imparting substantially one-eighth revolution of rotation to said sear shaft upon each upward and each downward movement of said sear block relative to said frame, and the lower surfaces of said abutments being spaced below the level of the proximate upper portions of said levers whereby, upon alternate lifting movements of said cable and sear block, the flat surface of the sear key will engage the lower ends of said abutments to thereby impart upward movement to said frame and, upon intervening lifting movements of said cable and sear block, the sear key will pass between said abutments and will thereby transmit the lifting force to the proximal upper portions of the levers to cause the gripping means on the lower ends thereof to move inwardly and grip the articles therebetween with further lifting movement of the grappling device.

16. A structure according to claim 15 wherein projections are provided in the upper portion of said sear block and define an opening therebetween whereby said projections on the sear block move upwardly astride the upper portions of said levers upon said intervening lift-

ing movements thereof, and means are provided on said shaft disposed in said opening between the projections on said sear block to engage the lower surfaces of the upper portions of the lever arms upon said intervening lifting movements of the cable and the sear block.

17. A grappling device having one end connected to a pliable element for being elevated and lowered by the same comprising a pair of spaced substantially parallel inverted U-shaped frame members, a pair of levers having substantially vertical lower portions and inwardly diverging partially overlapping upper portions, the lower portions of said levers being journaled intermediate their ends between the lower portions of the inverted U-shaped members, a jaw bar fixed to the lower portion of each of said levers, a sear block mounted for vertical movement between substantially the central portions of the horizontal portions of said frame members and to which the lower end of the pliable element is connected, a rotatable sear shaft journaled in said sear block and having a sear key integral with at least one end thereof and projecting outwardly beyond the sear block, an abutment carried by at least one of said frame members and having its lower surface spaced substantially above the sear key when the sear block is in lowered position, rotatable means mounted on said sear shaft for movement therewith, driving means engageable with said rotatable means and for rotating the same and said sear shaft predetermined amounts upon each vertical movement of said sear block relative to the inverted U-shaped frame members, said driving means being so arranged as to cause the sear key to engage the lower end of said abutment upon alternate lifting movements of said pliable element and said sear block, the proximal overlapping portions of the diverging arms of said levers overlying said sear block at a point on a level above the level of the abutment whereby said sear key will engage the abutment and lift the grappling device therewith without creating a lifting force on the proximal overlapping portions of said levers, and said driving means for rotating the sear shaft being so arranged as to cause the key to miss the abutment upon lifting movements thereof intervening between said alternate lifting movements thereof so the sear block will engage the overlapping portions of said levers to cause the lowermost ends of the levers to move inwardly toward each other so the jaw bars thereon will clamp articles therebetween.

18. A structure according to claim 17 wherein said rotatable means mounted on the sear shaft comprises a pair of opposed and axially alined members provided with drive means engaging portions, and said driving means

comprises a first member positioned on the frame and being engageable with one of the opposed members in the course of each upward movement thereof relative to the frame for imparting substantially a one-eighth revolution to one of the opposed members and the sear shaft, and a second member spaced below the first member and being engageable by the other opposed member in the course of each downward movement thereof for also imparting substantially a one-eighth revolution to said other opposed member and the sear shaft.

19. A grappling device having one end connected to a vertically movable element for being elevated and lowered by the same, said grappling device comprising a frame, lever means pivotally mounted on opposite sides of the frame and having vertically arranged lower portions and partially overlapping upper portions, a sear block mounted for vertical movement in a medial portion of said frame below said overlapping upper portions of said lever means and to which the lower end of the vertically movable element is connected, a rotatable sear shaft journaled in said sear block and having a sear key integral with a least one end thereof and projecting outwardly beyond the sear block, an abutment carried by said frame and having its lower surfaces spaced substantially above the sear key when the sear block is in lowered position, means engageable with said sear shaft for rotating the same predetermined amounts upon each vertical movement of said sear block relative to said frame to cause the sear key to engage the lower end of said abutment upon alternate lifting movements of said vertically movable element and said sear block, the overlapping portions of said lever means overlying said sear block above said abutment whereby said sear key will engage the abutment and lift the grappling device therewith without creating a lifting force on the overlapping portions of said lever means, and said means engageable with said sear shaft for rotating the same being so arranged as to cause the sear key to miss the abutment upon lifting movements thereof intervening between said alternate lifting movements thereof to permit the sear block to engage the overlapping lever portions of said lever means to cause the lowermost ends of the vertically arranged lever means to move inwardly toward each other to clamp articles therebetween.

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