April 11, 1950 S. E. RIKE 2,503,689

BRICK HANDLING FORK

Filed Dec. 26, 1946 2 Sheets-Sheet 1

FIG. 1

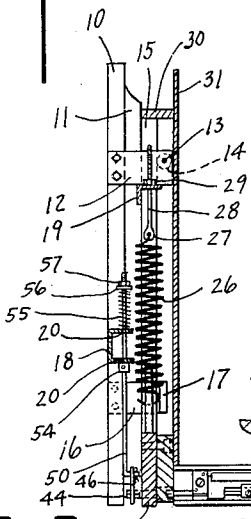

FIG. 2

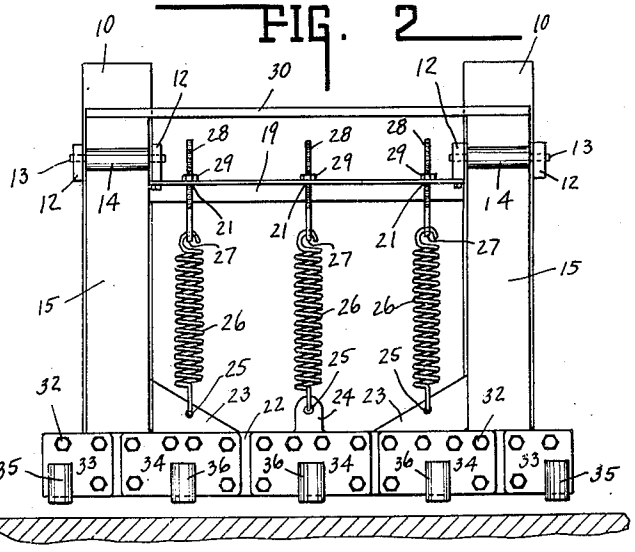

FIG. 3

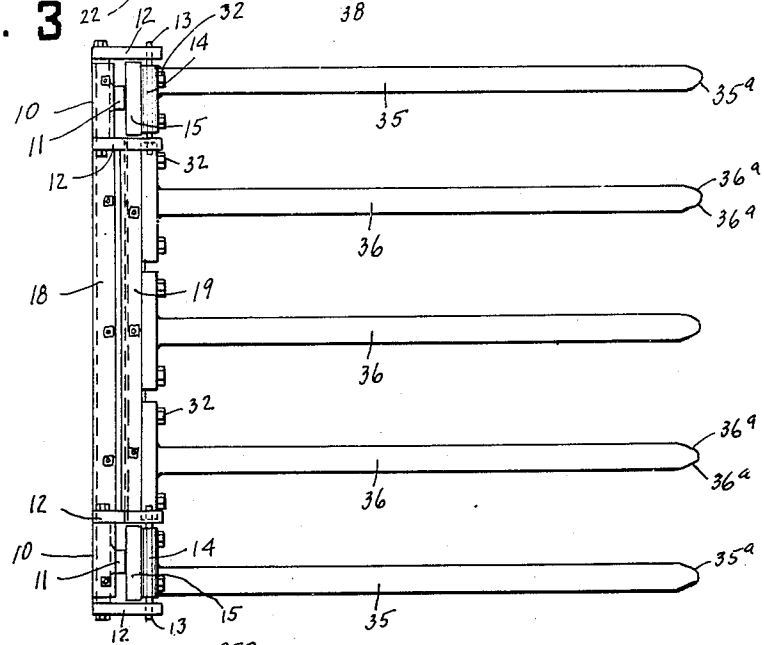

FIG. 10

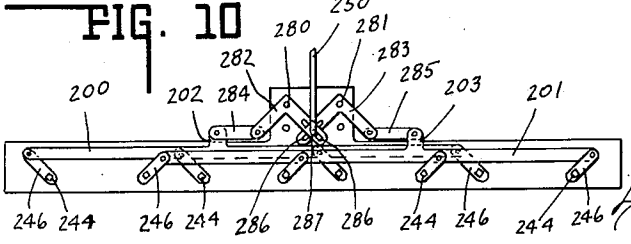

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FIG. 4

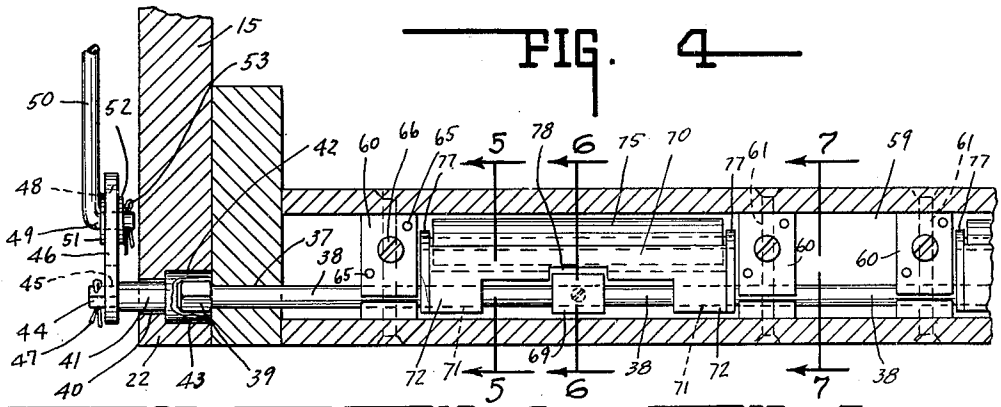


FIG. 5

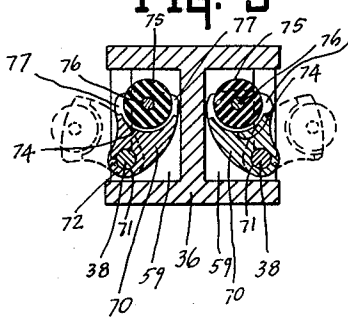


FIG. 6

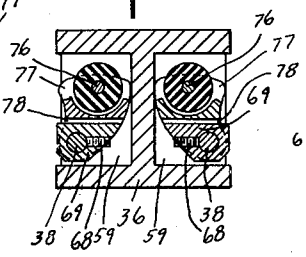


FIG. 7

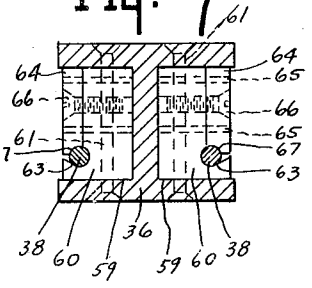


FIG. 8

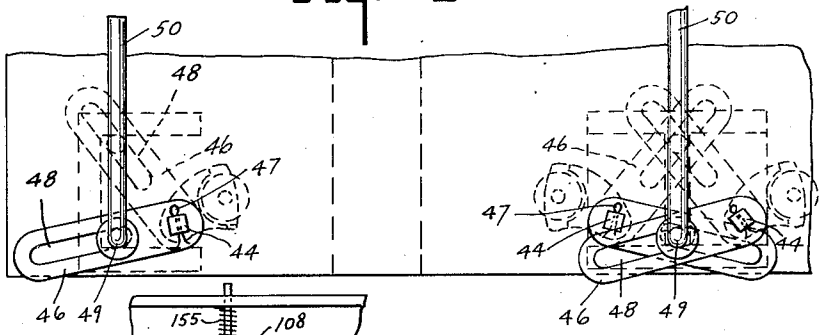
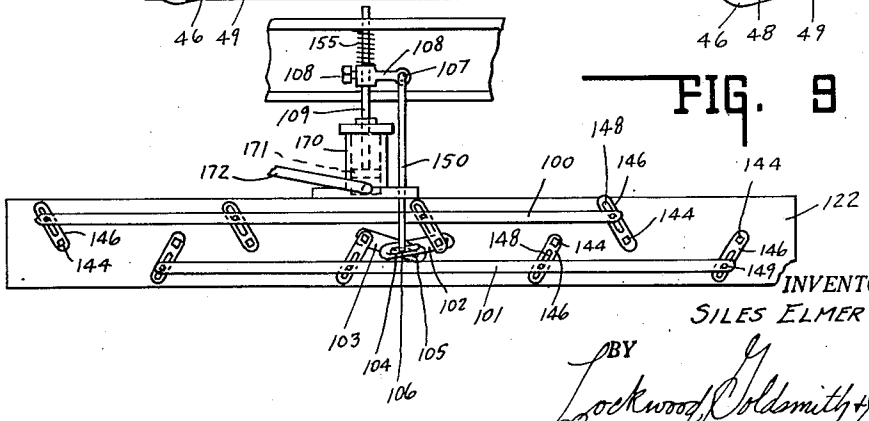


FIG. 9



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Patented Apr. 11, 1950 2,503,689

UNITED STATES PATENT OFFICE

2,503,689

BRICK HANDLING FORK

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Application December 26, 1946, Serial No. 718,320

6 Claims. (Cl. 214—65.2)

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This invention relates to a brick and like packaging fork.

Heretofore in the art of handling brick, etc., same have been suitably deposited layer upon layer and the unit simultaneously elevated and transported by a tow-motor and carrier known as a fork, the latter including parallel fingers, same being elevated prior to tow-motor travel and lowered when the unit has been transported to its initial destination.

To expedite operations and eliminate waiting periods so that the fork and tow-motor can be utilized substantially continuously for transportation purposes only certain of the brick are arranged in parallel row relation. These are known as skid brick and the rows as skid rows. Thereafter brick are stacked thereon.

A tow-motor with its fork is then presented to these lowermost skid bricks so that same are disposed between the fork fingers. Coextensive with each brick confronting face of a finger is a brick gripping element. As the brick mass weight is applied to the fingers the brick gripping element, substantially coextensive with each, is projected into skid row engagement so that the skid brick and supported pile can be picked up by the fork for transportation and when transported deposited at the new location for storage or shipment. In the former case, the mass readily can be picked up again and again as required or desired.

Devices of this latter type have certain disadvantages. If the skid row brick be misaligned slightly there is wearing and tearing of the skid brick clamping member. This is especially pronounced near the free end of the finger located portion thereof.

A second and even more disadvantage results from lack of brick uniformity. One thick brick in a skid row or one or more thin bricks therein will result in imperfect gripping of all skid brick.

When all brick is picked up and transported, even if all skid brick be initially gripped, the thin ones will drop out during transportation and when the unit mass is deposited, the package arrangement frequently is destroyed. Sometimes, the dropped (released) skid brick even momentarily stops transportation so the mass topples from the fingers.

The present invention has for its chief object the retention of all the advantages of the tow-motor and fork previously described and none of the disadvantages of same, especially those specifically mentioned hereinbefore.

The chief feature of the present invention resides in the segmentation of the skid brick gripping means on any brick confronting finger face.

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Another feature of the present invention resides in the utilization of single power means for opposite face mounted skid brick gripping means, this only being possible, with safety, when the latter are segmented.

A further feature of the invention resides in the use of a hydraulic or fluid pressure means, deriving pressure fluid from the tow-motor for skid brick gripping, etc.

Other objects and features of the invention will be set forth more fully hereinafter.

The full nature of the invention will be understood from the accompanying drawings and the following description and claims:

In the drawings

Fig. 1 is a vertical sectional view of a portion of a brick fork including the invention.

Fig. 2 is a front elevation of same with back plate removed.

Fig. 3 is a top plan view of the fork shown in Figs. 1 and 2 and with back plate removed.

Fig. 4 is an enlarged longitudinal sectional view through a finger of the fork, one of the gripping segments or elements being shown in elevation, and its power and base.

Fig. 5 is a transverse sectional view taken on line 5—5 of Fig. 4 and in the direction of the arrows.

Fig. 6 is a similar view taken on line 6—6 of said Fig. 4.

Fig. 7 is a similar view taken on line 7—7 of said Fig. 4.

Fig. 8 is a rear elevational view of the power for a single and a double gripping finger.

Fig. 9 is a schematic rear elevational view of a five finger fork hydraulic power system wherein the end fingers are of single gripping type and the intermediate fingers are of dual gripping type.

Fig. 10 is a similar view of a modified form of power mechanism.

Since the tow motor is conventional to the art no specific reference need be had thereto except to state it is a self-propelled vehicle upon which the operator may ride and control the travel thereof, said vehicle being reversible and steerable.

Such a vehicle includes a motor operable manually controlled power take-off and in many instances a pair of parallel chains raise and lower the fork upon the tow motor carrying same. The fork main support is usually equipped with manually controlled fluid pressure operable

means for laterally shifting slightly the fork proper for locating purposes, i. e., finger registration with spacing between skid rows.

Since the present invention resides more particularly in the fork proper reference will be had thereto and no further reference had to the tow motor, etc., or the means for laterally shifting the fork thereon.

In Figs. 1 to 3 of the drawings 10 indicates two substantially vertically disposed spaced members suitably secured to the main support that is laterally shiftable as aforesaid. To each is secured a parallel track 11. Straddling the upper portion of each member 10 is a U-shaped structure comprising plates 12 and axle 13, the latter supporting roll 14 disposed forwardly of track 11 and spaced therefrom.

Interposed between the track 11 and roller 14 is a floating frame member 15 which at its rear slides upon the track and at its front bears on roll 14.

Projecting forwardly from each member 10 below the aforesaid is the angular member 16 suitably secured to said member and having the laterally directed confining portion 17 in spaced relation to member 10. Thus the two members 15 or the floating frame is prevented, relative to the base, from any other than up and down sliding movement on tracks 11.

Disposed between and suitably connected at opposite ends to members 10 is the channel 18. Disposed between the same members, or more particularly the confronting members 12, see Fig. 3, and suitably secured thereto at opposite ends is the angle 19. The horizontally disposed webs thereof are suitably apertured as at 20 and 21 respectively.

The lower ends of floating frame members 15 are suitably connected as at 22, see Fig. 1, and gussetted as 23, see Fig. 2. Cross member 22 may include upwardly directed tongue 24, the gussets and tongue being apertured at 25.

A load spring 26 is hooked at one end in each aperture 25 and into eye 27 at its opposite end, said eye being the termination of a bolt 28 seated in aperture 21 of cross member 19. A nut 29 retains the bolt upon member 19 and determines the adjusted force of the associated load spring 26.

Suitably secured to floating frame members 15 and to the top thereof is the cross member 30 which projects forwardly therefrom an appreciable distance to serve as an upper anchoring base for a vertically disposed back plate 31 suitably secured thereto.

When frame members 10 are chain or like elevated by the tow motor, springs 26 elongate if a sufficient load be imposed upon the fork. If the load be greater than the capacity of springs 26, member 30 will engage the upper edges of the U-shaped structures 12, etc., and prevent further or excessive lowering of the load. There is therefore relative movement provided between what might be termed the main frame and the floating frame of the fork.

To the forward face of cross-member 27 is suitably secured, as at 32, the bases 33 and 34 of the single and dual fingers 35 and 36, same having tapered free ends 35^a and 36^a as shown. Each of the finger bases is suitably apertured at 37 to pass an oscillatory rod 38, see Fig. 4, and same at its rearward end terminates in a polygonal or like head 39.

In member 22 there is rotatably supported at 40 a short shaft 41 aligned with shaft 38. The bearing 40 is counterbored at 42 to nest the socket type head 43 on the end of shaft 41. This socket seats head 39 so that shafts 41 and 38, while connected and movable angularly as a unit, are axially separable whenever the finger base is detached from its support 22.

The shaft 41 projects rearwardly from member 22 and has its exposed end shaped to mount or be mounted upon a lever arm for arm operation of the aligned shafts. Herein exposed end 44 is polygonal and projects through a complementary hole 45 in a lever 46, the two being secured against separation as by cotter key 47.

Each link 46 is slotted longitudinally as at 48. Therein is slidably secured angular end 49 of rod 50, said end being retained by washer 51—52 and cotter key 53. Referring more particularly to Fig. 1 it will be observed that each rod 50 slidably extends through registering apertures 20 in channels 18 and outward extensions thereof or portions in longitudinal alignment therewith.

Each rod carries an adjustable collar 54. Above channel 18 and bearing thereon is a spring 55 which envelopes rod 50. Washer 56 and nut 57 adjust the force of said spring.

When the floating frame is weight lowered relative to the relatively stationary rear frame (actually the rear frame is tow motor power elevated as described) springs 55 are compressed and each of the rods 50 is bodily elevated as it were relative to the floating frame and therefore the angular end moves from a lower position to a higher position. This end slides in slot 48 in the associated lever 46 so that it and the shaft 41—38 rock. The purpose thereof is to effect clamping of the skid brick.

Reference will now be had to the right hand portion of Fig. 3 and Figs. 4 to 8, inclusive. In the left hand portion thereof is illustrated the rod and arm connection to the uppermost finger 35, see Fig. 3. The right hand portion illustrates the rod 50 connection to the two shafts 41—38 of the topmost dual finger 36, see Fig. 3. Fig. 8, accordingly, shows a single rod actuating the finger gripping means of the associated finger. Note in the latter connection end 49 of rod 50 rides in both slots 48 of both levers 46 for a dual finger and rocks the shafts thereof oppositely. In said figure the projected position of the finger gripping means is indicated by dotted lines and the lever positions corresponding thereto are similarly indicated.

Reference will now be had more particularly to Figs. 4 to 7 inclusive. As shown in Fig. 3 each finger 35 or 36 has a base detachably secured to cross-member 22 and when detached shafts 38 and 41 simultaneously separate. This permits finger replacement at will with no other work than removal and replacement.

Herein the several skid brick confronting faces of the fingers are suitably channeled as at 59. Shaft 38 extends substantially coextensive therewith, see Fig. 1. While Fig. 4 illustrates a single finger, Figs. 5 to 7 illustrate so-called dual fingers.

Suitably secured in the pocket or cavity are a plurality of bearing structures for shaft 38. Each includes a block base 60 pinned as at 61 to the finger and having shaft bearing portion 63. Cap 64 is pin aligned at 65 with the block and secured to same by screw 66 as shown. It includes cap shaft bearing and retaining face 67. Removal of all screws 66 releases shaft 38.

Each shaft 38 between a pair of bearings has adjustably and rigidly secured to it as at 68, see Figs. 4 and 6, a rocker element 69 so that it

rotates with said shaft. Between pairs of bearings and rotatably mounted at opposite ends on said shaft is a skid brick clamp support 70 apertured at 71 for shaft 38. These apertures are in lug portions 72 at opposite ends.

The elongated body portion 73 is channeled as at 74 to nest a resilient roller 75 carried by 76 secured at opposite ends to channel closing ends 77. The body 70 intermediate its ends and opposite recess 74 is externally recessed as at 78, see Figs. 4 and 6, to accommodate lug 69.

Whenever shaft 38 is oscillated lug 69 similarly oscillates and after initial rotation picks up the body 70 by engaging same at 78. Continued shaft rotation projects the elongated cylindrical resilient gripper from channel nested relation, see full lines Figs. 5 and 6, into projected skid brick gripping position, see dotted lines in Figs. 5 and 8.

Upon separation of a finger from base 22, loosening of all set screws 68 and removal of all caps 64, the shaft 38 can be pulled thereby releasing all parts for repair or replacement if unduly worn, etc.

By virtue of the segmented character of the skid brick clamping means and the lost motion connection between same and operating lug 69 it will be obvious that "fat" or "thin," or "hard" or "soft" brick can be accommodated with equal facility as normal brick are accommodated. Hence, the present invention does not "drop" or release initially clamped skid brick or omit the clamping thereof upon initial elevation.

Since it is customary to place the skid brick in eight parallel rows, each successive pair abutting and with pairs sufficiently spaced apart to pass the fingers when the gripping means is channel nested and usually there are four bricks to the row laid end to end and on edge. Herein four gripping elements 75 are provided and each is of a length greater than half a brick so that each skid brick engaged thereby is centrally contacted as it were.

The invention herein disclosed contemplates the presentation of the several fingers to the mass of brick piled upon the skid brick so that the fingers are disposed with the skid brick therebetween. When the main frame is power elevated the floating frame lags behind.

This relative movement throws outwardly from the several fingers the individual skid brick gripping segments for the positive gripping of all skid brick, regardless of size variation. This brick mass or unit, when properly elevated and transported to a new location can be lowered until the skid brick engage the new supporting surface.

Further lowering of the main frame permits automatic release of the skid brick and finger retraction of the gripping elements. When the upper surface of the fingers lies below the lower faces of the first course of brick upon the skid brick the fingers can be withdrawn from the brick unit and all then will bear upon the supporting surface.

The tow motor and fork then can return for another load. The foregoing permits rapid removal of brick from a kiln and transfer thereof to shipping vehicles or to storage as desired.

The back plate 31 and bases 33 and 34 prevent brick from toppling rearwardly from the pile or unit and prevent "overunning" in the "picking up" operation.

Reference will now be had to Fig. 9 wherein a further modification of the broad fork invention is illustrated. As initially set forth herein the fork proper is laterally adjustable by normally controlled hydraulic means supplied by fluid pressure derived from the tow motor device.

This pressure supply may also be utilized for skid brick clamping as now described. Projecting from the rear face of cross-member 122, similar to member 22, see Fig. 4, are the several exposed squared ends 144 of shafts similar to that shown in said Fig. 4.

Note that, similar to Fig. 8, all shafts are coplanar and each has secured thereto a lever 146. All levers that actuate grippers engaging right faces of the skid rows are similarly directed while the other levers are similarly directed, the two directions being angular to each other. One bar 100 connects one such group of levers together and another bar 101 connects the other of such group of levers together.

Such bar to lever connection, see Fig. 9, is substantially as shown in Fig. 4 and the right hand portion of Fig. 8, that is, each bar 146 carries a pin 149 riding in an elognated slot 148 in said lever 146.

To any two adjacent shafts 144 there is also secured two additional lever arms 102 and 103 and each includes a longitudinally directed slot therein 104 and 105 respectively. Riding therein is angular end 106 carried by the lower end of rod 150.

Thus when rod 150 is elevated, see Fig. 9, each of the bar 101 connected shafts 144 is rocked counter-clockwise and each of the bar 100 connected shafts 144 is simultaneously rocked clockwise. This corresponds to skid brick gripping. Lowering of rod 150 corresponds to skid brick release.

Rod 150 at its upper end is pivoted at 107 to arm 108 adjustably secured at 108a to rod 109. A spring 155 normally constrains rod 150 to lowered position. This corresponds to the brick gripper means nesting in the finger channels.

Power means independent of relative movement between frames may be utilized for skid brick clamping that is to effect raising of rod 150. Herein cylinder 170 is carried by the front frame. Therein is piston 171 carried by the lower end of rod 109. Line 172 to the lower end of cylinder 170 is connected at its opposite end to a source of fluid pressure on the tow motor device and is manually controlled to effect pressure supply to said cylinder or release therefrom, the rate or degree obviously being governable by the degree of control valve movement.

When pressure is supplied to cylinder 170 after the tow motor has disposed the fork fingers beneath the brick unit and between the skid brick rows thereof, rods 109 and 150 are raised (against spring 155) and all shafts 144 are rotated as described to effect skid brick clamping.

Holding of the pressure in cylinder 170 with the piston 171 elevated holds the finger clamping means in clamping position. When the brick unit is elevated, transported and deposited in the new location pressure is released from line 172 and piston 171 and rods 109 and 150 are spring lowered (assisted by gravity) to effect skid brick release, that is, clamping means nesting in the finger channels.

Whenever relative frame movement is to be utilized for gripper projection and retraction the several shafts 44 for those fingers may be connected together as shown in Fig. 9 and a single

rod and spring utilized instead of the five rods and springs shown in Figs. 1 and 2.

A modification of the foregoing but utilizing the basic principle thereof, as well as that shown in Fig. 8, in other words, a positive pressure and single spring or relative frame movement and single spring type of power is illustrated in Fig. 10.

Herein bars **200** and **201** are connected to levers **246** carried by shafts **244**. Herein bar **200** mounts lateral extension **202** and bar **201** mounts lateral extension **203**. Rod **250** is vertically slidable as before.

Pivotally supported on fixed points **280** and **281** are the angle levers **282** and **283**. Lever **282** at one end is link connected as at **284** to extension **202**. Lever **283** at one end is link connected as at **285** to extension **203**. Each of the other ends of said levers is longitudinally slotted as at **286** and therein is pin **287** carried by the lower end of rod **250**.

Whenever rod **250** is raised all shafts **244** connected to bar **200** rotate clockwise and all shafts **244** connected to bar **201** rotate reversely and both rotate for projection of the skid brick gripping means. Lowering of rod **250** retracts the gripping means to brick release position.

Whenever the brick gripping means is segmented as shown herein any number of brick can be picked up and transported and the capacity is not limited to a full area unit of brick.

While the invention has been illustrated and described in great detail in the drawings and foregoing description, the same is to be considered as illustrative and not restrictive in character.

The several modifications described herein as well as others which will readily suggest themselves to persons skilled in this art, all are considered to be within the broad scope of the invention, reference being had to the appended claims.

The invention claimed is:

1. In a brick packaging unit having a pair of relatively movable frames and spaced substantially parallel elongated fingers carried by and projecting from one frame, the combination of a plurality of elongated brick clamping segments disposed in longitudinal alignment along each brick confronting face of each finger for skid brick clamping, each brick confronting face of a finger being longitudinally chambered, the longitudinally aligned segments being mounted thereon, means for simultaneously moving all segments in any one alignment into positions parallel to that alignment and corresponding to brick clamping and release, and oppositely movable means for moving said last mentioned means for substantially simultaneous clamping and releasing respectively of all skid brick.

2. A unit as defined by claim 1 wherein certain of said fingers are of dual opposed gripping character and other of said fingers are of singular gripping character, all of the first mentioned means being substantially coplanar, means connecting alternate first mentioned means together, other means connecting the other first mentioned means together, the said oppositely movable means having connection to each of the said connecting means.

3. A unit as defined by claim 2 wherein spring means constrain said oppositely movable means to one direction.

4. In a brick packaging unit having a pair of relatively movable frames and spaced substantially parallel fingers carried by and projecting from one frame, the combination therewith of a plurality of brick clamping segments disposed in longitudinal alignment along each brick confronting face of each finger for skid brick clamping, means for simultaneously moving all segments in any one alignment into positions according to brick clamping and release, opposite moving means for moving said last mentioned means for simultaneously clamping and releasing respectively of all skid brick certain of said fingers being of dual opposed gripping character and other of said fingers being of singular gripping character, all of the first mentioned means being substantially coplanar, means connecting alternate first mentioned means together, other means connecting the other first mentioned means together, the said oppositely movable means having connection to each of the said connecting means, spring means constraining said oppositely movable means to one direction, and fluid pressure operable means opposing said spring means oppositely moving said oppositely movable means.

5. In a brick handling fork the combination of a base, a plurality of spaced parallel elongated fingers detachably secured at one end thereto, a rock shaft carried by each finger and disposed longitudinally thereof, brick gripping means associated with each finger and operatively supported thereby and rockable into and out of brick gripping position when the shaft is rocked correspondingly, each shaft being exposed by the finger at the base anchored end thereof, a shaft for each first mentioned shaft and projecting beyond the base, the shafts being axially aligned and complementary head and socket connecting means between the confronting ends of aligned shafts and separable upon finger-base separation.

6. In a brick handling fork the combination of a finger supporting base, an elongated finger secured at one end thereto, an elongated shaft means disposed adjacent each of two opposite brick confronting faces of the finger, a lever carried by each shaft means on the base exposed end thereof, and a single means operatively associated with both levers for simultaneously actuating both shaft means oppositely each lever including an elongated longitudinally disposed slot therein, the slotted ends of the levers lapping each other, said single means including a member simultaneously seatable in both slots.

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