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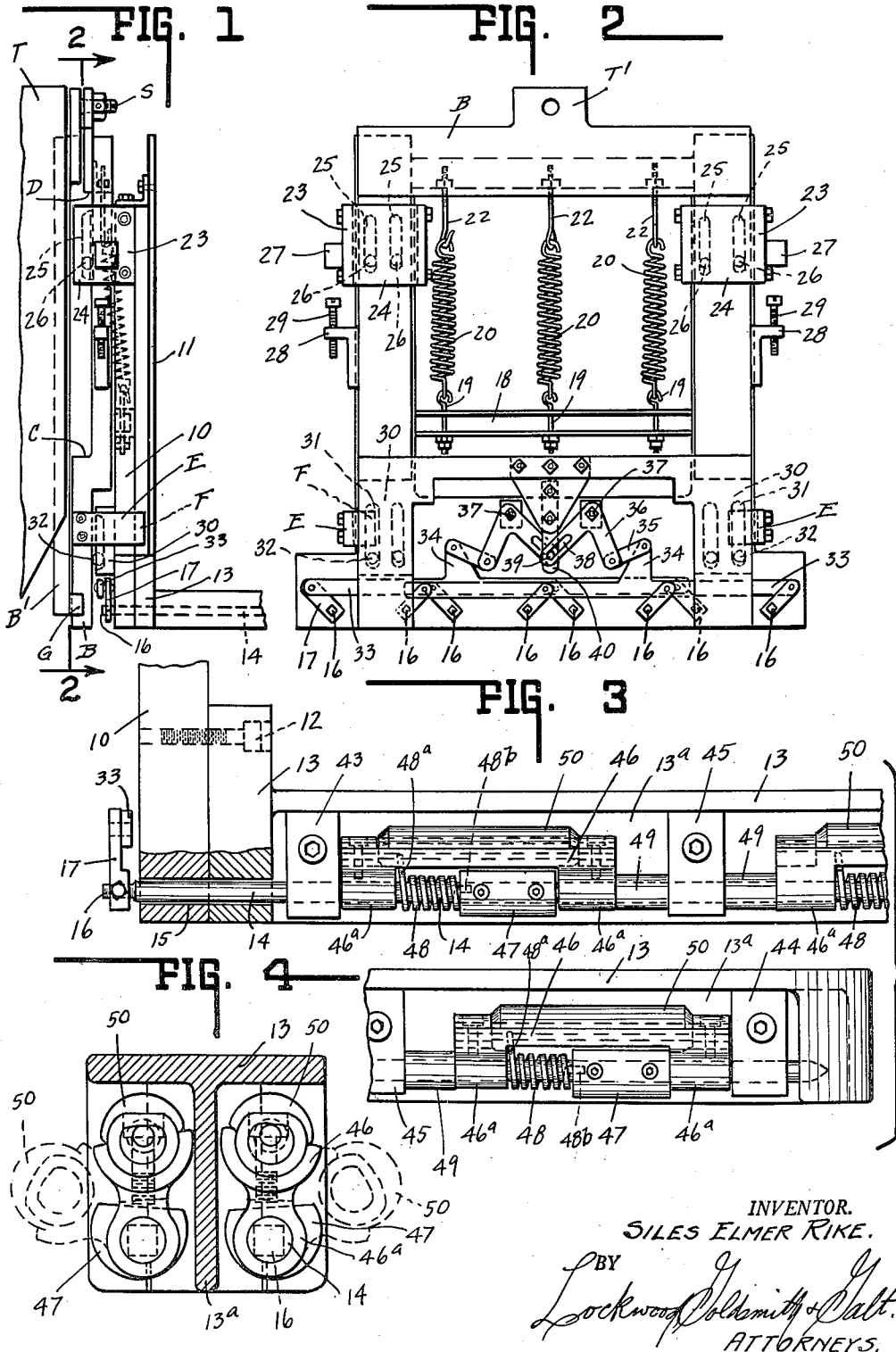
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BRICK HANDLING FORK MECHANISM

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2 SHEETS—SHEET 1



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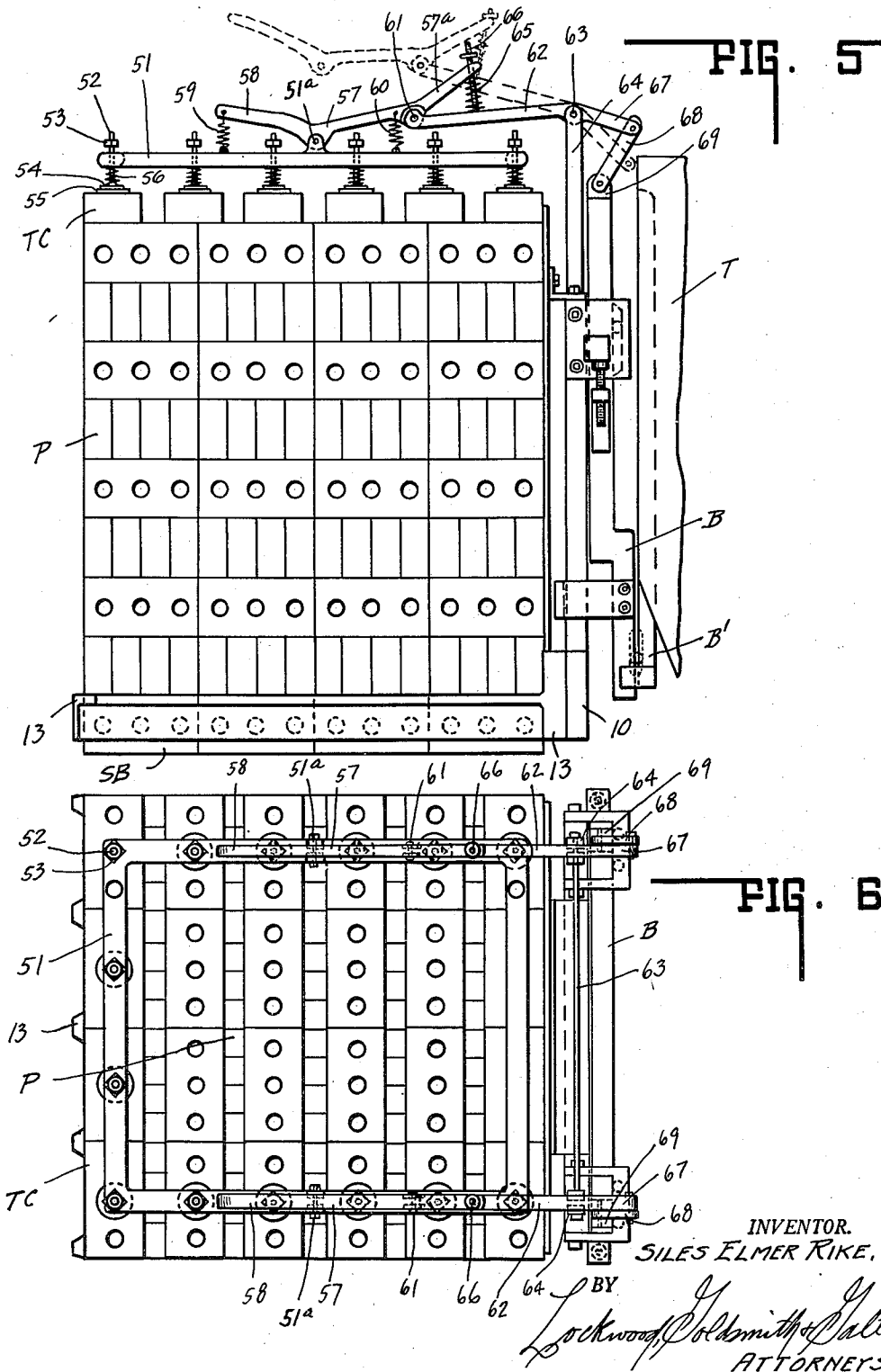
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2 SHEETS--SHEET 2



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BRICK HANDLING FORK MECHANISM

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7 Claims. (Cl. 214-65.2)

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This invention relates to a brick handling fork mechanism.

Brick handling forks have long been used in the industry to pick up a stack of brick while in stacked relation and transport the same to another location and there deposit said brick. This deposit may be made for storage or upon a vehicle for transportation purposes.

Essentially such prior art devices comprise a traction device with a power lift mechanism for elevating a fork, the fork extending below the brick and supporting the same in outboard relation, as it were, each fork comprising a plurality of fingers and usually a common back plate.

This application is a continuation in part of application Serial No. 718,320, filed December 26, 1946, and now Patent No. 2,503,689, granted April 11, 1950, entitled "Brick Handling Fork" and application Serial No. 734,095, filed March 12, 1947, now Patent No. 2,486,324, granted October 25, 1949, and entitled "Segmental Gripper Structure." The latter application relates to skid brick gripping mechanisms applied to fingers of a fork structure. The former relates to the same subject matter and the fork construction broadly.

The present invention, as stated, constitutes an improvement upon the inventions disclosed in the two previously mentioned applications.

One chief object of this invention is to simplify the constructions disclosed and claimed in the preceding applications.

A second chief object of the invention is to provide a stack clamp structure which will hold all bricks in stacked relation upon the fork while the brick are being transported, since it has been found that in the transportation of a stack of brick the traction device, such as a tow motor, if it encountered a local obstruction, subjects the fork to a bump or vibration and the topmost brick may become disarranged and even jarred from the stack.

One chief feature of the invention relates to the simplified arrangement of the gripping structures which are finger associated and the actuating mechanisms therefore and the simplification of the latter, the power being derived for skid brick gripping purposes incident to the elevation of the fork in brick elevating by means on the tow motor upon which the fork is mounted.

Another feature of the invention resides in the stack gripping structure for maintaining a fork mounted stack of bricks in stacked relation, the clamping association for brick retention being

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effected simultaneously with and by the elevation of the brick through the relative movement of the fork with respect to its support upon the tow motor incident to brick elevation.

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 side elevational view of the associated portions of a brick handling fork and a supporting tow motor portion.

Fig. 2 is a rear elevational view of a portion of the fork structure, the same being taken substantially in the plane of line 2-2 of Fig. 1 and in the direction of the arrows.

Fig. 3 is a side elevation of a fork tine and associated fork portions, the latter being broken away and shown in section and the skid brick gripping elements and the specific operating mechanism for the same, intermediate portions of the tine operating mechanism and skid brick gripping elements being omitted.

Fig. 4 is a transverse sectional view of a double tine or finger with skid brick gripping elements shown in the retracted position, dotted lines indicating the same in the extended or skid brick gripping position.

Fig. 5 is a side elevation of a portion of a tow motor, the fork supported thereby with a stack of brick thereon and the clamping mechanism holding the same in stacked relation, the parts being shown in a position corresponding to that assumed while the brick are elevated.

Fig. 6 is a top plan view of the stack clamping structure.

In Fig. 1 of the drawings, T indicates a power elevatable portion of a traction device commonly known as a tow motor and which is provided with a base B' to which in turn at its upper end is secured a stud S that suspendingly supports the base B of the fork structure through the apertured tongue T' thereof.

The base B' includes spaced forwardly directed portions or guides G and disposed therebetween is the base B aforesaid. The base B is offset forwardly as at C and D.

Extending forwardly from the lower portion of the base B are the plates E with inturned ends F. Thus the base is suspendingly and guidingly supported by the elevatable portion of the tow motor and this base provides spaced guides E for the movable frame 10 of the fork. This frame 10 carries a plate 11, as shown.

To the lower end and the forward face of the frame 10 there is secured as at 12 the several fingers or tine elements 13. Oscillatably supported thereby and longitudinally coextensive therewith is the rock shaft 14 and the same extends through opening 15, see Fig. 3, and its exposed end 16 is polygonal in cross-sectional outline and mounted thereon is a lever arm 17 to which reference will be had later.

The frame 10, which is generally rectangular, includes a transverse channel 18 and hooks 19 secured thereto are connected to the lower ends of the tension springs 20, the upper ends of which are connected by hooks 22 to the base B at the upper cross bar portion as shown.

The frame 10 has channel structures 23 secured thereto and the same straddles the adjacent portions of the base B and the back portion thereof 24, see Fig. 1, provides for base encompassment. This back portion 24 is provided with elongated grooves 25 and herein there are two to each plate and disposed in each groove is an anti-friction ball 26, same providing anti-friction bearing between plate 24 and base B.

The outer plates 23 may include projections 27 and the base B may include the outwardly directed portions 28 that adjustably mount the stops 29. These limit the maximum permissive relative movement between the frame and base.

Near the lower portion of the structure, it will be observed that the frame 10 mounts plates 30 which confront the base B and these plates are channeled as at 31 and herein there are two to each plate and disposed therein are the anti-friction balls 32 that bear upon the plate groove and the base B.

It will be observed that the anti-friction elements are disposed near the top and bottom of the frame and base and are oppositely disposed with respect to the latter, that is, forwardly and rearwardly thereof as illustrated.

When the fork is unloaded the several springs 20 normally maintain the frame, the fingers or tines, and the plate 11 in elevated relation.

When the several fingers are disposed between the rows of skid brick and beneath the brick supported thereon and elevational power is applied by the tow motor portion T to elevate the sub-base B', the base B aforesaid is elevated and in general as previously disclosed in the co-pending applications and as will be more fully described hereinafter, the skid brick are gripped by the gripping elements carried by the fingers so that they and the stack of brick thereon are now supported by the said fingers.

The weight of these brick extend the springs 20 as the sub-base is elevated, and such elevational movement in turn obviously results in relative movement between the frame and the base and the weight being cantileverly applied to the fingers normally tends to rock the frame, the plate 11 and the fingers clockwise, see Fig. 1. However, the upper end of the aforesaid base and plate cannot move forwardly because the balls 26 are disposed behind the base, as it were.

Neither can the lower ends of the plate and base move to the left, see Fig. 1, incident to this cantilever applied load because the balls 32 are forwardly disposed with respect to the base and bear thereon. Hence, the frame, plate and fingers are normally confined during the raising and lowering movements, etc., to substantially linear travel in a direction parallel to the general direction of the base.

Reference will now be had more particularly

to Fig. 2. Referring to the co-pending applications it will be observed that there are three intermediate double fingers or tines and two end fingers or tines and that the several tines are spaced apart slightly greater than the space occupied by two skid brick which provide channels for tine or finger reception. The fingers are but slightly longer than four brick in length as shown in Figs. 5 and 6.

As set forth, the end fingers are singular in character. Hence, a single shaft 16 projects therefrom whereas the three intermediate fingers which are multiple in character, see Fig. 4, more particularly, include two projecting shafts 16. Each, as previously described, has secured to it an arm 17. Herein successive arms are oppositely directed and all similarly directed arms are connected together by a bar 33, and are pivotally connected to said bar.

Herein two bars 33 are provided as shown and the major portion of the length of these two bars, which are disposed in parallel relation, lap each other. Each of the bars 33 includes an upwardly directed projection 34 and pivoted thereon is a link 35, in turn pivotally connected to one end of an angle lever 36. The angle lever 36 is pivotally supported at 37 upon the frame. The two adjacent ends of these two angle levers lap each other and each includes an elongated slot 38, the two slots registering as shown.

Disposed therein is a pin 39 and this pin is carried by a depending strap 40 carried by the base so that when the base elevates and the frame lowers incident to brick load being taken thereby, the angle levers are actuated which in turn moves the bars 33 to rock each of the shafts 16 in the desired direction, which in this instance is such as to "throw out" the skid brick grippers from the full line position shown in Fig. 4 to the dotted line position so that the skid brick are gripped.

Referring to Fig. 4 it will be observed that each finger 13 through the major portion of its length is substantially T-shaped in cross section insofar as the dual fingers are concerned and would be L-shaped in cross section insofar as a single finger is concerned. The shaft 14, see Fig. 3, lower portion, is rotatably mounted as at 41 in the free end of the finger.

There is provided, as stated, since the structure is arranged to grip four brick disposed lengthwise, four grippers and the same are longitudinally aligned and operatively associated with and carried by the shaft 14.

Adjacent the frame end is a shaft mounting 43 and adjacent the free or pointed end is a shaft mounting 44. Therebetween are three intermediate shaft mounting bearings 45, only two of which are shown in Fig. 3. The same are suitably secured to the central web 13^a or the side web of the T or L-shaped finger and by the Allen screw illustrated.

Rotatably supported on the shaft between each pair of shaft supports is a finger structure indicated generally by the numeral 46. This is substantially U-shaped in section and the shaft passes through the arms 46^a thereof and between said arms and rigid with said shaft is an anchor sleeve 47. A torsion coil spring 48 has one end 48^a associated with the U-shaped member 46 and the other end 48^b is associated with said sleeve 47. Thus it may be said that each finger is oscillatably mounted upon the oscillatable shaft and is normally biased toward the projected position.

Disposed between each intermediate shaft

bearing 45 and the adjacent ends of the U-shaped members are the spacing sleeves 49. Note that there are no spacers adjacent shaft bearings 43 and 44. Thus when the shaft is oscillated to bodily project the U-shaped grippers into skid brick engagement, if the skid brick be a thin brick, the maximum throw will be utilized and thus the brick firmly gripped or engaged.

If the skid brick be a "fat" brick, then the engagement results in the spring being subjected to force and the U-shaped member is not positively rocked as far as it would have been rocked as in the former instance. The skid brick, therefore, regardless of size within the normal manufacturing tolerances, are substantially gripped with the same force. Note that the arrangement is such that the U-shaped gripper which includes the semi-cushioned engaging portion 50 is positively projected through the shaft and member 47 into skid brick engagement.

Reference will now be had to Figs. 5 and 6. Herein the stack or pile of brick are designated by the letter P and therebeneath, see Fig. 5, are the skid brick SB and thereabove in opposed relation are the tie or cap brick TC. These are disposed crosswise relative to the fingers, whereas the skid brick are disposed lengthwise thereof. As before, the fingers are designated by the numeral 13, the movable frame by the numeral 19, the base by the letter B, the sub-base by the letter B' and the tow motor by the letter T. Herein disposed above the tie or cap brick is a tubular rectangular cross-section frame 51. The same is apertured at suitable intervals to slidably support the stems 52, retained for example by the nut 53, and the lower end of said stem terminates in a head 54 mounting a rubber cushion cap 55.

A spring 56 is interposed between the head 54 and the pipe 51 and normally constrains the cushion cap into tight cap brick engagement for holding it or the uppermost brick in clamped relation with respect to the finger supported brick P.

Pivotally supported at 51^a midway between the ends, at each side of the rectangular frame 51, is a lever 57 and said lever has one arm 58 connected by spring 59 to the tubular frame 51. The other arm is also connected by a spring 60 to the tubular frame and the springs are balanced, as it were.

Pivotally connected as at 61 is a lever 62 which lever is pivotally supported at 63 upon a standard 64 carried by the frame 10 or a support comprising an extension thereof.

A spring 65 is interposed between an extension 57^a of the lever 57 and the lever 62 and is held in position by the member 66. Thus the parts 62 and 57^a are normally constrained to separated relation.

The lever 62 includes an extension 67 that is pivotally connected to a link 68 in turn connected to an extension 69 carried by the base. Now when there is no load on the fingers, then the fingers are elevated with respect to the base regardless of the relative position of both with respect to the ground or a supporting surface. Therefore, the parts, insofar as the aforesaid linkage is concerned, are disposed as shown by the dotted lines in Fig. 5. When, however, the load is on the fingers and relative movement between the frame and the base has been effected by elevation of the fingers or fork, then the parts aforesaid assume the full line position illustrated and thus the general linkage, disposed

in parallelism upon the two sides of the open rectangular frame, is normally constrained to separated relation and all are held in elevated relation including the cap brick engaging elements.

When the linkage aforesaid has been actuated to hold the cap brick clamped to the pile of brick, then the several brick engaging elements individually adjust themselves and cushioning action is provided by the spring 56. Herein the pivotal member 62 comprises a lever structure as shown in Fig. 6 so that when relative movement occurs incident to fork elevation, with brick load thereon, the frame is caused to descend substantially horizontally and the balanced arrangement prevails by virtue of the springs 59 and 60 and upon clamping engagement, individual clamping is adjusted by virtue of spring 56 and for prevention of excessive clamping, which might result in breaking of the linkage, the two springs 65 accommodate any additional linkage actuation not required for effecting clamping.

The invention claimed is:

1. In a brick handling fork having relatively movable and elevatable and lowerable base and frame members, the combination of brick supporting fingers cantileverly supported by the frame, tension means connecting the base and frame together and brick load extensible, and means interconnecting the base and frame to either comprising a plurality of vertically spaced balls therebetween, the balls being carried by the frame and bearing upon opposite sides of the base.

2. In a brick handling fork having relatively movable frame and base members bodily movable, and a brick supporting finger cantileverly supported by the frame, the combination of a shaft disposed longitudinally with respect to the finger and projecting through the frame member, means operable in and by the relative movement for oscillating said shaft, a plurality of skid brick grippers oscillatable upon the finger and longitudinally aligned, means on the shaft for effecting gripper movement outwardly from the finger for skid brick engagement, yielding means between the shaft mounted means and the gripper, means supporting said shaft upon the finger and rigid therewith, and sleeve spacing means between the grippers and said shaft mounting means.

3. In a brick handling fork having relatively movable frame and base members, fingers rigid with and cantileverly supported by the frame member, tension means connecting the members together and extensible when the fingers are loaded, means limiting such relative movement, and a rotatable shaft for each finger and projecting therefrom and through the frame member, eccentrically rotatable brick engaging grippers mounted on said shaft, the combination of a lever arm on the projecting end of said shaft, a reciprocatory bar for arm oscillation, a bell crank lever, a link connecting the bell crank lever at one end to the bar, a member disposed adjacent the bell crank and carried by the base member, and a pin and slot connection between the last mentioned member and said bell crank lever for the purpose described.

4. In a brick handling fork arranged for tow-motor attachment and having a fingered frame and a base adapted for towmotor mounting and elevation and lowering, the frame and base having limited relative vertical movement when the frame is under load, the combination of sup-

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ported finger load engaging means disposed above the fingers for clamping the load thereon, and means positively operable in both directions by the relative movement between the base and frame for effecting clamping and releasing operation of the clamping means; said clamping means comprising frame pivoted lever means and base carried link means connected thereto, the load engaging means comprising horizontally disposed support means, a plurality of individual load engaging elements yielding supported thereby, means connecting said lever means to said support means; said connecting means comprising V-shaped means pivoted at its vertex to the support means, and tension means at opposite sides of the pivotal axis connecting the V-shaped means to the support means, one arm of the V-shaped means having pivotal connection to said lever means.

5. Structure as defined by claim 4 wherein the lever means connected arm of the V-shaped means is extended and overlies said lever means, and having compression means interposed between the lapping portions of the V-shaped means and the lever means.

6. Structure as defined by claim 5 wherein the support means is a quadrilateral outlined frame

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with a central opening, the outline thereof having a width but slightly less than that of the fork width and a length but slightly less than that of the length of the fingers.

7. Structure as defined by claim 6 wherein the V-shaped means is at least of dual character, one being disposed at each side of the support means frame, and the lever means is of plural character, there being one for each V-shaped means.

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