Oct. 24, 1950 A. A. NOACK ET AL 2,527,103

BRICK FORK

Filed May 17, 1946 4 Sheets-Sheet 1

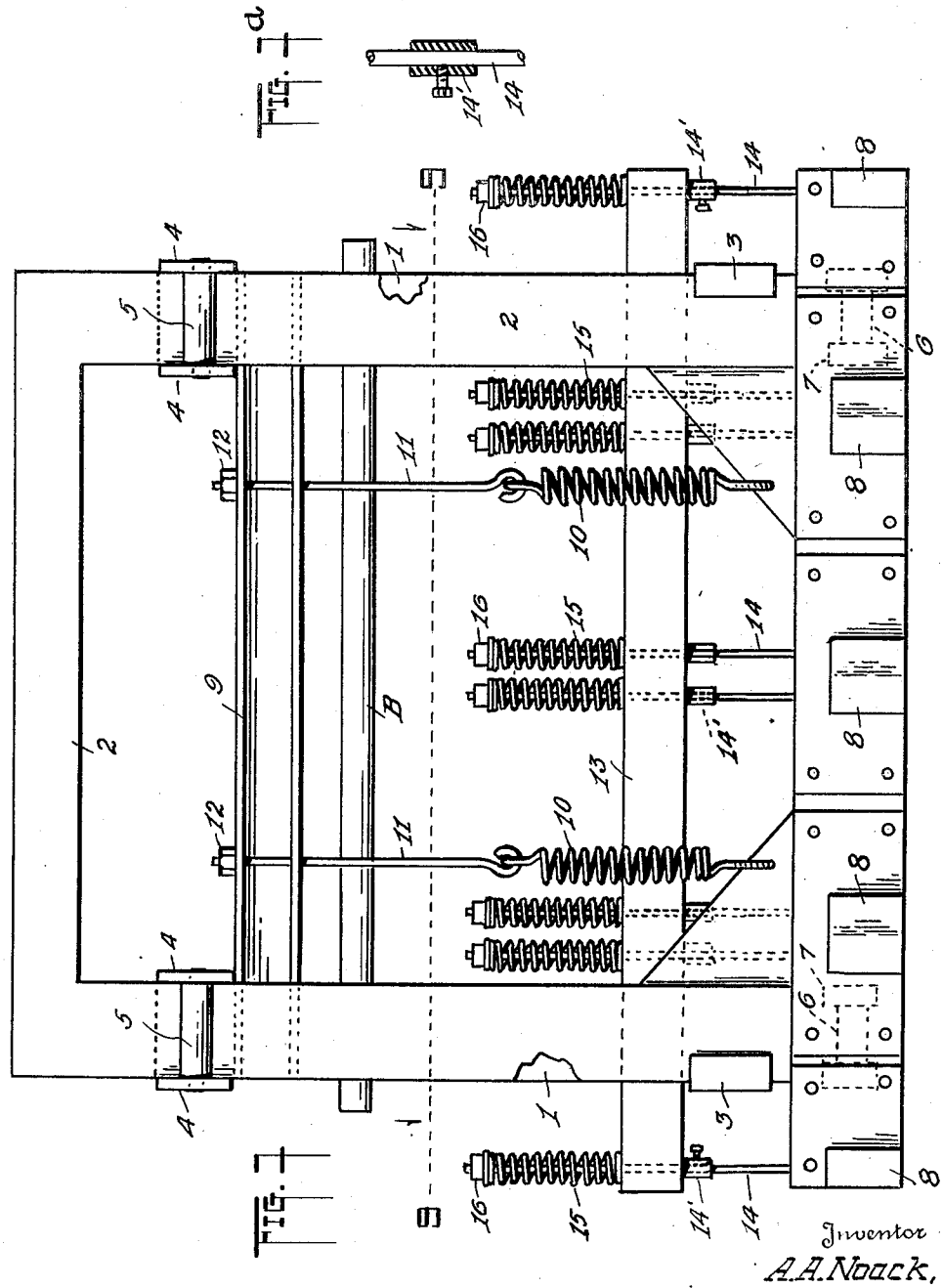


FIG. 1

FIG. 1a

Inventor
A. A. Noack,
C. H. Schmidgall,

By L. M. Thurlow

Attorney

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BRICK FORK

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FIG. 2.

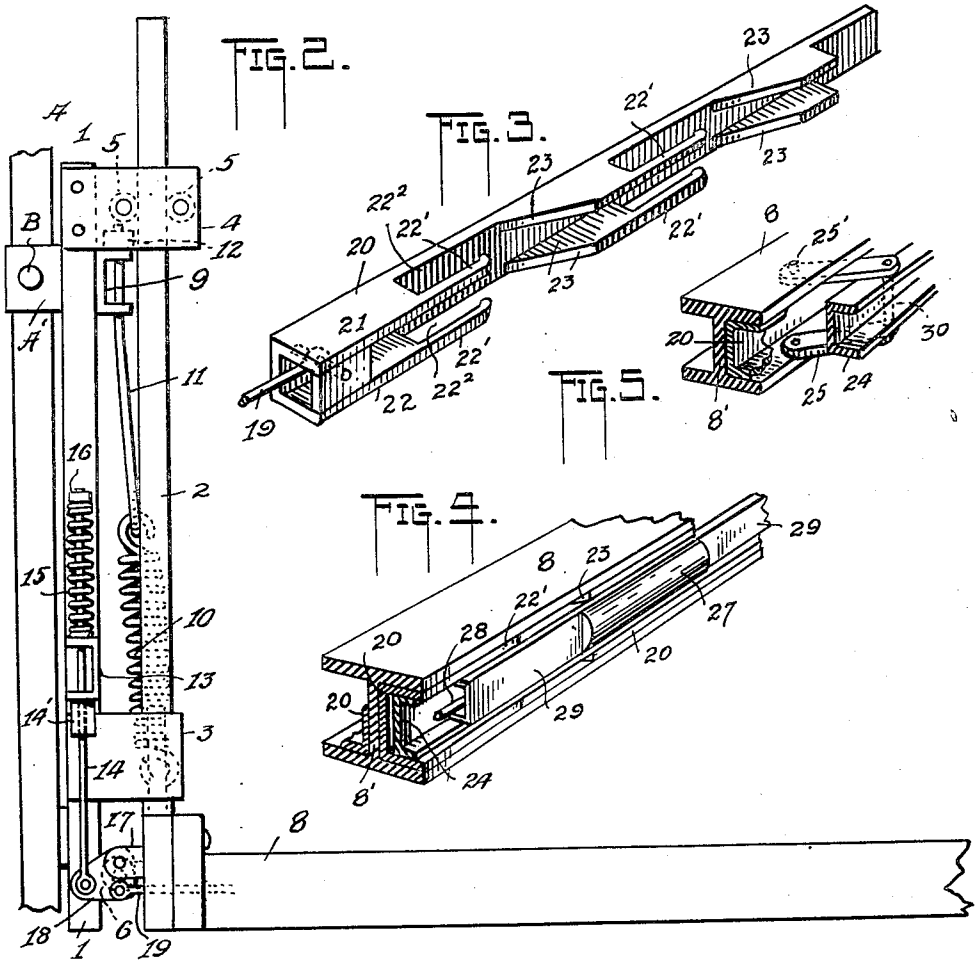


FIG. 3.

FIG. 5.

FIG. 4.

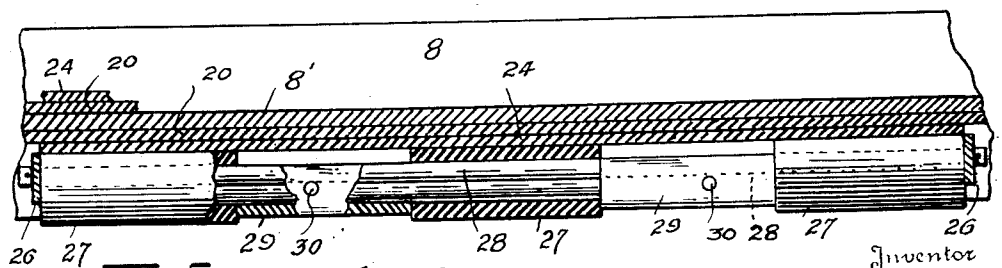


FIG. 6.

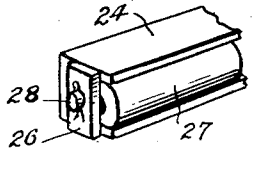


FIG. 7.

Inventor
A. A. Noack,
C. H. Schmidgall,
By L. M. Thurlow
Attorney

Oct. 24, 1950 A. A. NOACK ET AL 2,527,103

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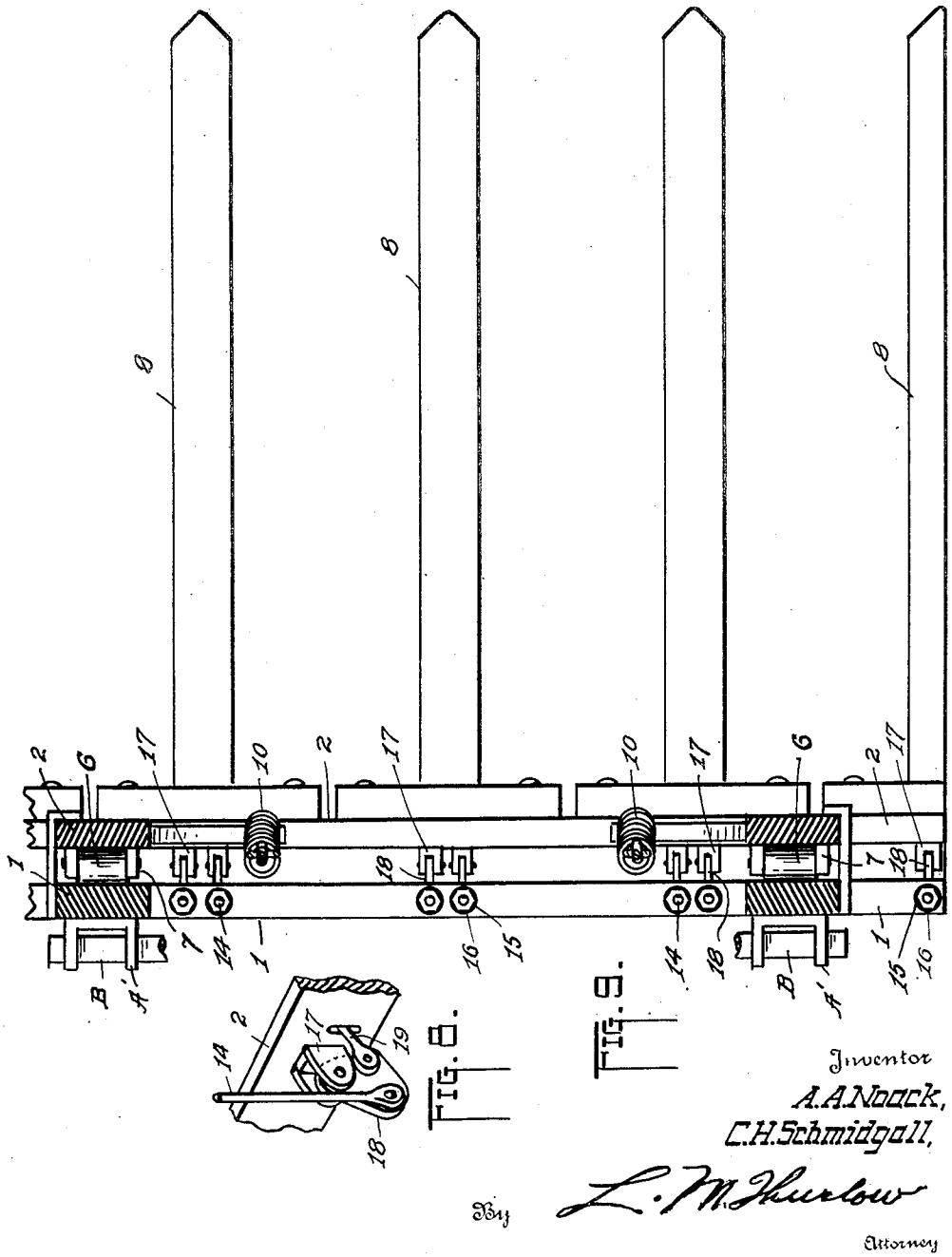


FIG. 6.

FIG. 8.

Inventor
A.A.Noack,
C.H.Schmidgall,
By L. M. Thurlow
Attorney

Oct. 24, 1950 A. A. NOACK ET AL 2,527,103

BRICK FORK

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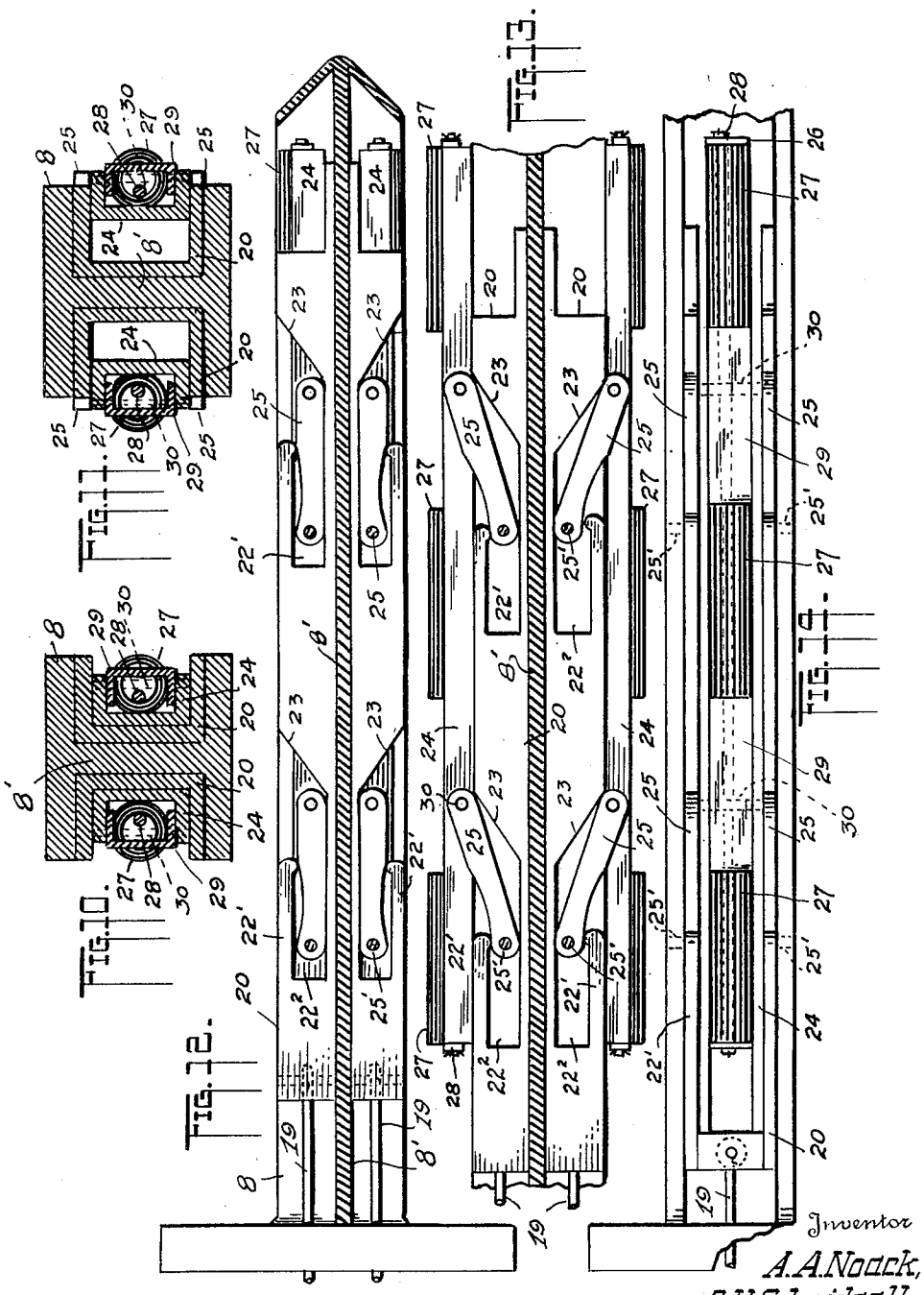


FIG. 11.

FIG. 10.

FIG. 12.

FIG. 13.

FIG. 14.

Inventor
A. A. Noack,
C. H. Schmidgall,
By L. M. Thurlow
Attorney

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UNITED STATES PATENT OFFICE

2,527,103

BRICK FORK

Andrew A. Noack and Carl H. Schmidgall, Peoria, Ill.; said Noack assignor to said Schmidgall

Application May 17, 1946, Serial No. 670,645

23 Claims. (Cl. 214—65.2)

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This invention pertains to improvements in so called "Brick Forks," being that type of apparatus employed in lifting and transporting stacked bricks, tile, and the like, said invention having for its novelty a new form of mechanism within the fingers or tines of the fork, as well as an exterior mechanism for operating such inner mechanism.

An object is to provide mechanism within tines or fingers of the fork that is of simple and rugged construction, that is positive in action, and not liable to fail or give trouble.

Another object is to provide a brick gripping structure mounted in a tine to swing to and from a brick gripping position by the operation of a wedging member shiftable longitudinally within said tine and connected with an elevating means on any usual lift-truck.

Further, an object is to mount outside of the tines of a brick fork the power employed for outwardly and inwardly moving the brick-gripping member of the tines by which to simplify the tine structure and provide for a more reliable and positive action.

Again an important object is to provide an operating member within a fork-tine of such type that in the lowering or elevating the fork the gripping members are automatically retracted or outwardly extended without the need of operating power-means inside the tine for any purpose.

That the invention in all its details may be fully understood the appended drawings are provided to form part hereof.

Figure 1 is a front elevation of the brick fork according to the present invention.

Figure 1a is a vertical section of a stop, several of which are illustrated in Figure 1.

Figure 2 is a side elevation of the invention, as applied to a lifting member forming part of a lift truck not shown.

Figure 3 shows in perspective a slide employed within a finger or tine shown in other figures of said drawings.

Figures 4 and 5 are perspectives of parts also employed in the fingers or tines.

Figure 6 is a plan, in longitudinal section, of part of a tine shown in the various figures.

Figure 7 is a perspective of parts shown in Figure 6.

Figure 8 is a perspective of a bell crank connection illustrated in Figure 2.

Figure 9 is a plan of a portion of the brick fork shown in horizontal section taken on line 9—9 of Figure 1.

Figures 10 and 11 are transverse sectional elevations of a tine, parts therein being shown in retracted and extended positions, respectively, shown on a larger scale.

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Figures 12 and 13 are plans in longitudinal section of operating parts within any one of the fingers or tines shown in the preceding figures, said parts being illustrated in two positions of adjustment, and

Figure 14 is a side elevation of one of the fingers or tines.

The mechanism shown, and herein to be described, is of that type wherein the fingers or tines of the so called "brick fork" are designed to be shifted beneath and to engage and lift an orderly arranged stack of bricks or other like parts. It is well to state that, so far as known, it has been the practice to install within the tines such members as springs to operate the brick-gripping members in at least one direction, and to depend wholly upon the expanding force thereof.

In the present arrangement, however, as will be brought out, the power for gripping pressure is wholly applied through a shiftable wedging member or slide so constituted as to impart an outward gripping action to a load gripping member, and to retract the same, according to direction of movement of said member or slide. Such a provision provides for a positive and effective gripping action, and for retraction, as well as simplifying the entire tine mechanism.

In the drawings, A indicates a part of any usual and well known tackle operated by the power of a lift-truck, or other type of mechanism, not shown.

As part of the present structure, 1 indicates a frame, in this instance, from which may extend rearwardly toward said member A, a pair of brackets A', for example, to receive therethrough a lifting-bar B, see Figures 2 and 9.

Forward of and paralleling the frame 1 is a second frame 2, Figure 2, this being shiftable with respect to the said frame 1 in a vertical direction, being retained in respect to the former by means of guide members 3 affixed to said frame 1, by suitable means. At the upper extremity of frame 1 also may be secured two pairs of guides 4, there being a pair of rollers 5 between the member of each said pair of guides, said guides embracing the frame 2 at both sides as in said Figure 2. Also a pair of rollers 6 lie between the lower portions of the two frames, these being carried by brackets 7 as in Figures 1 and 9. Thus said frame 2 is allowed free vertical guided movement.

Affixed to the lower portion of the frame 2 on

its forward side is a series of fingers or tines 8 which parallel each other and lie at right angles to the plane of said frame. The bodies of the tines may be members of single parts, or may be made up of plates welded to each other, the outermost tines being single channel members while the intermediate ones are H-shaped or double channeled as shown best in Figures 10 and 11.

Normally, the weight of the frame 2 and its tines 8 is elastically supported from the frame 1, the latter in this instance, having secured thereto near its top a bar 9, for example, suspended from which is a pair of springs 10 by rods 11 adjustable at the said bar 9 for any given spring tension by nuts 12.

The lower ends of the springs are conveniently connected to parts of the frame 2 for the support of that member.

Slidable vertically in a bar 13 of the frame 1 is a series of rods 14 which extend above the latter and are inclosed by springs 15 resting upon said bar, nuts 16 on the rods serving as spring tension members, there being a stop 14' fixed on each rod abutting the bar 13.

These several rods 14 lie in a line along the bar 13 and each lies vertically above and in line with a channel of each of the several tines 8, as in Figure 9, for example. Affixed to the rear of the frame 2 at its lower extremity is a bracket arrangement 17, Figures 1, 2 and 8, each of which lies in line with the said rods 14 on each of which bracket is pivotally mounted a bell-crank 18, and each rod 14 is pivoted to one arm of the latter. A rod 19 is also pivoted to the bell-crank, and each lies at right angles to rods 14, said rods 19 extending into the tine-channels for purposes presently to be described.

The tines may be open at their ends adjacent the frame 2, but at their forward ends are closed, naturally, as suggested in Figure 9, and they are pointed at the latter free ends so that they will guide themselves between the usual supporting spaced bricks of the brickstack to be lifted.

Lying within each channel of the tines is a slide 20 best understood by a study of Figure 3. In general, this slide is of a U-form, in the present instance, the yoke portion thereof lying upright and abutting the vertical wall 8' of a tine, the opposite spaced limbs 21 and 22 therefore, lying in horizontal positions closely adjacent the upper and lower walls of said tine, the opening between the limbs facing outwardly, the structure as a unit being free to shift longitudinally within the channel.

In said Figure 3, see also Figures 12 and 13, the two sides 21, 22 are recessed at 22^2 to provide, in this instance, two opposite pairs of fingers 22' spaced from the upright wall, or yoke portion, the terminals of the fingers being preferably rounded and extended slightly toward said upright wall.

In positions spaced from the terminals of said fingers 22' the said opposite side walls extend away from the vertical wall or yoke as at 23 at a desired angle, as shown, for a purpose to appear, see said Figures 3, 12 and 13.

In the present instance but two pairs of fingers 22' and two angular surfaces 23 are shown but where tines are longer or shorter, perhaps, a greater or less number of such fingers and said surfaces may be employed. The recess in each portion 21, 22 lies inward from, and behind the finger 22' and opens around the end of the same and also is open to the channel at the finger at the open side thereof toward the surface 23.

Attached pivotally to one end of the slide 20, or that end nearest to which the bases of the fingers 22' lie, is the previously mentioned rod 19 that has connection with the bell-crank 18, so that oscillations imparted to the said bell-crank will, through said rod 19, impart endwise reciprocating movements to the said slide.

Lying within the slide 20 is a channel member 24 adapted to swing outwardly. In Figures 12 and 13 arms or levers 25, are shown, and in Figure 5 a pair, upper and lower, may be seen.

These arms lie in the same plane with the fingers 22', each in a described recess behind the same, one of their ends being pivoted at 25' each to the upper and lower limbs of the tine 8 while their other ends are pivoted to the named channel member 24, and, as may be seen, said arms lie at times within the recess of the slide 20 behind said fingers 22', or partially extended, as shown, according to the position of said slide 20.

In Figure 12, the arms 25 lie behind the fingers. However, when the slide 20 is moved toward the left in a pull applied to it the surfaces 23 will engage the ends of the arms carrying the channel member 24 forcing the latter outwardly, and always parallel to the longitudinal line of the tine as in Figure 13. In an opposite direction of such movement of the slide the fingers 22' will engage and swing the arms inwardly to house said channel member, the surfaces 23 meanwhile receding. Thus are the outward and inward movements of the channel members accomplished.

The ends of said channel member 24, as in Figures 6 and 7, each has a bridging portion 26. Within the channel of said member a series of gripping members 27 are inserted, these being of rubber or other suitable material, and seated in the bottom of the channel, while a rod 28 extends lengthwise through the gripping members holding them in place. Spacers 29 of channel form lie between the said gripping members and pins 30 secure the spacers in position and at the same time form the pivots for the connection of the channel member with the named arms or levers 25.

Naturally, the spacing of the gripping members provides for an even gripping on uneven surfaces of the bricks of the load to be handled.

It is observed that the only parts within the several tines are the longitudinally shiftable members 20, and the carrying parts for the gripping members shifted thereby. The power employed to project the carrying parts to extended positions for grasping the load, and for retracting said parts is the mechanism outside the tines including the structure 1, 2 and the parts carried thereby and the springs 10 as will be understood in the following:

Viewing Figure 2, the springs 10 normally support the frame 2 together with the tines 8 in the position shown ready to enter beneath the load to be lifted.

The tines having been placed in load lifting position the power of the lift-truck in use is applied to elevate the part A to elevate both frames 1 and 2. As the tines arise into contact with the load as the lifting effort continues, the said springs 10 are placed under the greater tension by the weight of the load. While the frame 2 is momentarily stationary at the time the tines meet the load the frame 1 is moving upward slightly with respect to frame 2. As said frame

1 is thus moving the rods 14 connected to the bell-cranks, and having the fixed stops 14' thereon are likewise moving upward by reason of the abutment of the said stops against the bar 13 with the result that the bell-cranks are swung and thereby each pulls upon a slide 20 by the rod 19 connected thereto. The springs 15 at this time have been slightly compressed in the initial movement of the bell-crank. The described action causes the angular surfaces 23 of said slide to abut the ends of the arms 25 forcing them and the erstwhile housed channel member 24 outwardly to carry the gripping members 27 of opposed tines into joint gripping action on the standing brick load.

Since the slides 20 have thus been shifted they are permanently held in this position and maintain the parts in gripping position.

At the time of delivery of the load the part A when lowered places the tines of the fork on the ground while the frame 1 continues downward whereupon the stop 14', also lowered, causes the rod 14 to swing the bell-crank, the rod 19 of which shifts the slide 20 in a direction opposite that first described, the fingers 22 being thus forced against the arm or levers 25, swinging them to the position shown in Figure 12, the actuated parts thus taking up their retracted housed positions.

Thus a very positive action is provided for in furnishing a member shiftable lengthwise of the tine, which in itself, laterally shifts the gripping portions to and from their housed positions while maintaining them at either extreme due to the structure employed and by reason of the external power provided by the lifting gearing of the lift-tractor and the weight of the load handled.

Though structures have been illustrated and described that answer the requirements any other equivalent arrangement may be used without departing from the spirit of the invention, and which may still lie within the meaning of the appended claims.

What is claimed is:

1. In combination with the tine of a brick fork having an abutment portion, mechanism including a member shiftable longitudinally of said tine and bearing against said abutment portion, said member outward from the latter having a face lying at an angle to the direction of shift thereof, a load gripping structure including an arm pivoted at one end on the tine adjacent said member in the path of movement of and adapted to be engaged by said face and swung laterally at its other end toward load engaging position, and operating means to impart movement to the member along said tine.

2. In combination with the tine of a brick fork having an abutment portion, mechanism including a member shiftable longitudinally in said tine and bearing at one side against said abutment portion, and having at its opposite side a face oblique to the line of movement of said member, a load gripping structure including an arm pivoted at one end on the tine and normally lying in the path of said movement of the member in one direction to receive said face upon one side thereof, said member including a part engageable with the arm at its other side, and operating means to impart shifting movement in one direction to the member to engage the arm for swinging it outwardly, and for shifting said member in an opposite direction to engage said part with the arm to swing the same inwardly toward the tine.

3. The invention as recited in claim 2 wherein the named part is fixed relative to the shiftable member.

4. In combination with a channeled tine of a brick fork, mechanism including a channeled member seated in the channel of said tine and opening toward the open side of the tine channel and shiftable in a longitudinal direction, a second channel member adapted to nest in said channel member, two pairs of arms, each pair being pivoted at one of their ends on the tine and spaced from each other in a longitudinal direction, said arms at their other ends pivotally carying the said second channel member adapted to swing to carry the latter into and outward from the tine parallel thereto, yieldable gripper members carreid by said second channel member, and means to retain the gripper members in the latter.

5. In combination with a channeled tine of a brick fork, mechanism including a channeled member seated in the channel of said tine, the same opening toward the open side of the tine channel and shiftable in a longitudinal direction, a second channel member adapted to nest in the said channel member, two pairs of arms, each pair being pivoted at one of its ends on the tine and spaced from each other in a longitudinal direction, and said arms being pivoted to and carrying the said second channel member adapted to swing to carry the latter into and outward from the tine parallel thereto, yieldable gripper members carried by said second channel member, the first named channel member having provision in opposite direction of shift thereof to engage the arms at opposite side thereof in alternate manner to swing the second named member outwardly from the tine channel and to retract the same.

6. In combination with a power lifted part and a frame provided with the channeled tines of a brick fork, of mechanism including a load gripping structure carried by and adapted to lie within a tine of said fork, an arm pivoted at one of its ends to said tine and at its other end pivoted to said structure, a longitudinally shiftable member in said tine provided with means to engage in alternate manner the opposite sides of the arm to swing it and the gripping structure in opposite directions laterally in the shifting of said member, means to elastically support the said frame and the tines from the power lifted part, and means operatively connected to the named shiftable member in the tine said means being attached to and supported from the power lifted part.

7. In combination with a power lifted part and a frame provided with the channeled tines of a brick fork, of mechanism including a load gripping structure carried by and adapted to lie within a tine of said fork, an arm pivoted at one of its ends to said tine and at its other end pivoted to said structure, a longitudinally shiftable member in said tine provided with means to engage in alternate manner the opposite sides of the arm to swing it and the gripping structure in opposite direction laterally in the shifting of said member, means to elastically support the said frame and the tines from the power lifted part, and means operatively connected to the named shiftable member in the tine said means being attached to and elastically supported from the frame lifted part, the said shiftable member being operated in one direction to extend the gripping structure when the lifting part is raised to

lift the load, and when moved in the other direction positively engaging the said gripping structure to retract it when the power lifted part is lowered to release the load.

8. In a brick fork including a tine, in combination, a member shiftable longitudinally on the tine and having two spaced extensions facing each other in substantially the same plane, a gripper carrying part, an arm pivoted at one end on the tine and at its other end pivotally carrying said part, the arm and part adapted to swing laterally of the tine, said spaced extension adapted to separately and alternately engage the arm and swing it laterally in opposite directions in the longitudinal shift of said member.

9. In a brick fork tine, in combination, a member shiftable on the tine, means for shifting said member, a gripper carrying part, an arm pivoted at one end of the tine and at its other end pivotally carrying the said part, for swinging the same, the member having a finger on a wall thereof spaced from another wall of said member to provide a recess between the said finger and the last named wall for enclosing the arm in one of the positions of the same, and an extension on the member spaced from the free end of the finger adapted to engage the arm, the finger and the extension adapted in the opposite shifting movements of the member to separately and alternately swing the arm and the named gripper part in opposite directions.

10. In a brick fork mechanism, in combination with a power lifted part, an upright frame carried thereby, a second upright frame shiftable with respect to first named frame, a spring attached at one end to the latter and attached at its other end to and for supporting and lifting said second frame, a tine carried by said second frame including load gripping mechanism, a bell-crank lever pivotally mounted between its ends on said second frame, a member operatively connected to the gripping mechanism and pivotally attached to one arm of the lever, a spring structure fixed at one end on the first named frame including an extension attached to the other arm of the lever, and means to terminate the pull of said spring on the said lever substantially at the time the weight of the second named frame and its load is in the act of being lifted by the first frame through the first-named spring.

11. In a brick form mechanism, in combination with a power lifted part, an upright frame carried thereby, a second upright frame shiftable with respect to the first frame, a spring attached at one end to the first frame and attached at its other end to the second frame and supporting it, a tine carried by said second frame including load gripping mechanism, a lever pivotally mounted between its ends on the named second frame, a member operatively connected to the gripping mechanism and pivotally attached to one end of the lever, a spring structure fixed at one end of the first frame and including an extension attached to the other end of the said lever, and a stop member on the extension adapted in the pull of the last named spring to abut said first frame, the pull of said spring being terminated by said stop member at the time the second named frame is lifted by the first named spring.

12. The invention as recited in claim 11, and wherein the stop member is adjustable on the extension of the second named spring.

13. In a brick fork including a channeled tine,

a channel member mounted to swing into and out of the tine channel, means for carrying and swinging said channel member, a gripper member seated in the latter for engaging a load to be lifted, a rod extending along the channel within the same and extending through said gripper member longitudinally thereof, and means carried by the channel member to receive abutment of said rod thereon for retaining said gripper member in seated position.

14. In a brick fork mechanism, the combination with power lift mechanism, the tines of a brick fork and load gripping mechanism, of means connecting the power lift mechanism yieldingly with said gripping mechanism, a structure yieldingly supported by the said lifting mechanism and carrying the said tines, and including means to halt the gripping action of the gripping mechanism at the moment the power mechanism assumes in its lifting action the weight of the said tines and the gripped load.

15. In a brick fork, in combination with a tine of said fork, a load gripping structure attached to and swingable on said tine in a lateral direction with respect thereto, and a wedging member carried by and longitudinally shiftable on the tine, said member being adapted to move longitudinally in one direction and having one part to engage said load gripping structure and extend it to load engaging position and another part to move in a reverse direction to engage the said structure and withdraw it to a retracted position.

16. In a brick fork, in combination with a tine of said fork, a pivot secured to said tine, an arm extending longitudinally of said tine and mounted on said pivot, with a load gripping structure attached to and pivoted on said arm and shiftable in a lateral direction with respect to the tine; and an arm operating member carried by and longitudinally shiftable on the tine, said member having two opposed arm operating surfaces and being movable in one direction to engage the arm with one of said surfaces to swing said arm outwardly and extend the load gripping structure to load engaging position, and movable in a reverse direction of movement to engage said arm with the other of said surfaces to swing the arm inwardly and shift the load gripping structure to a retracted housed position, said operating member being adapted to maintain the said load gripping structure positively in either of its said positions.

17. In combination with a tine of a brick fork having open housings on its opposite edges, a plurality of swingable arms, each of said arms being pivoted on said tine and swingable outwardly therefrom in opposite lateral directions, said arms carrying a plurality of load gripping structures shiftable on the tine; means to shift said operating means in either of two directions to simultaneously extend said arms and load gripping structures to load engaging position; or to simultaneously withdraw the said load gripping structures and carry them to retracted positions within the open housings on the opposite edges of the tine.

18. In combination with a power elevated part and a load lifting brick fork, a load gripping structure attached to and adapted to swing laterally from a tine of said fork, an operating member carried by and longitudinally shiftable on the tine; said operating member being operatively connected with the said power elevated part by a bell crank and a link secured to said

bell crank and extending to said power elevated part; said bell crank and link being so constructed and arranged as to swing said load gripping structure outwardly to its load engaging position responsive to upward movement of said power elevated part with respect to said fork; and to swing it to a retracted position responsive to downward movement thereof.

19. In combination with the tine of a brick fork, a pair of flanges forming a longitudinal channel thereon, an arm located between said flanges and pivoted at one end on said flanges, a load gripping structure pivotally carried on the other end of the arm adapted to swing with said arm in a lateral direction in respect to said tine, and an operating member mounted on the tine and adapted to shift longitudinally of said tine; said member including engaging surfaces to swing the operating member in either of two directions to withdraw the arm and load gripping structure within the space between the flanges or to swing said arms outwardly to project the load gripping members into engaging positions beyond said flanges.

20. In combination with a channeled tine of a brick fork, a pair of spaced arms pivoted at one of their ends to the tine with a load gripping structure swingably mounted between the other ends of said arms, a channel shaped operating member extending longitudinally of said tine to shift longitudinally in said tine and adapted to actuate the gripping structures therein, said channel member having opposed flanges with matching recesses shaped to receive the said arms and to create longitudinally extending fingers alongside said arms; said flanges of the member each also including cams spaced from the ends of the fingers in a longitudinal direction and oblique to the longitudinal line of the tine; the arms in their retracted position lying within the named recess and in the path of movement of the cam surfaces and in their extended position lying in the path of movement of said fingers.

21. A brick fork tine comprising, in combination, a frame member consisting of a main beam having a vertical wall with upper and lower horizontal flanges extending outwardly therefrom in opposite directions to define a pair of oppositely disposed open channels on the opposite sides of the tine; a plurality of pivots extending between the upper and lower flanges of said frame member and a plurality of arms carried on said pivots; and a load gripping member longitudinally disposed in each of said channels and adapted to be projected through the open sides thereof; said load gripping members being pivoted to and carried by said arms whereby said members are adapted to swing outward from the tine parallel thereto and on opposite sides thereof.

22. In a brick fork including a plurality of fork tines in parallel relation with laterally shiftable load gripping structures in each tine, the

combination of a power elevated part comprising a main frame having a pair of vertical members spaced apart from each other and joined by a plurality of horizontal members extending therebetween, a secondary frame including a pair of vertically extending members spaced apart from each other and horizontal members extending therebetween, with the aforesaid fork tines supported on and extending outwardly from one of said horizontal members; vertically shiftable guide members between said frames to permit free relative elevational movement therebetween, spring suspension means extending between said frames and supporting the secondary frame on the main frame; together with a plurality of separate and independent gripper actuating linkages between said frames; each of said linkages including a compensating spring and individually adjustable members whereby the action of all the grippers on all of the tines may be coordinated.

23. In a brick fork including a plurality of fork tines in parallel relation with laterally shiftable load gripping structures in each tine, the combination of a power elevated part comprising a main frame having a pair of vertical members spaced apart from each other and joined by a plurality of horizontal members extending therebetween, a secondary frame including a pair of vertically extending members spaced apart from each other and horizontal members extending therebetween, with the aforesaid fork tines supported on and extending outwardly from one of said horizontal members; vertically shiftable guide members between said frames to permit free relative elevational movement therebetween, spring suspension means extending between said frames and supporting the secondary frame on the main frame; together with a plurality of separate and independent gripper actuating linkages between said frames; each of said linkages consisting of a longitudinal member extending into one of the tines of the fork to actuate a gripping structure thereof, a bell crank pivoted on said secondary frame and secured to the outer end of said longitudinal member, and a link secured to said bell crank and to the main frame, said linkages each including a compensating spring and individually adjustable members whereby the action of all the grippers on all of the tines may be coordinated.

ANDREW A. NOACK.
CARL H. SCHMIDGALL.

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