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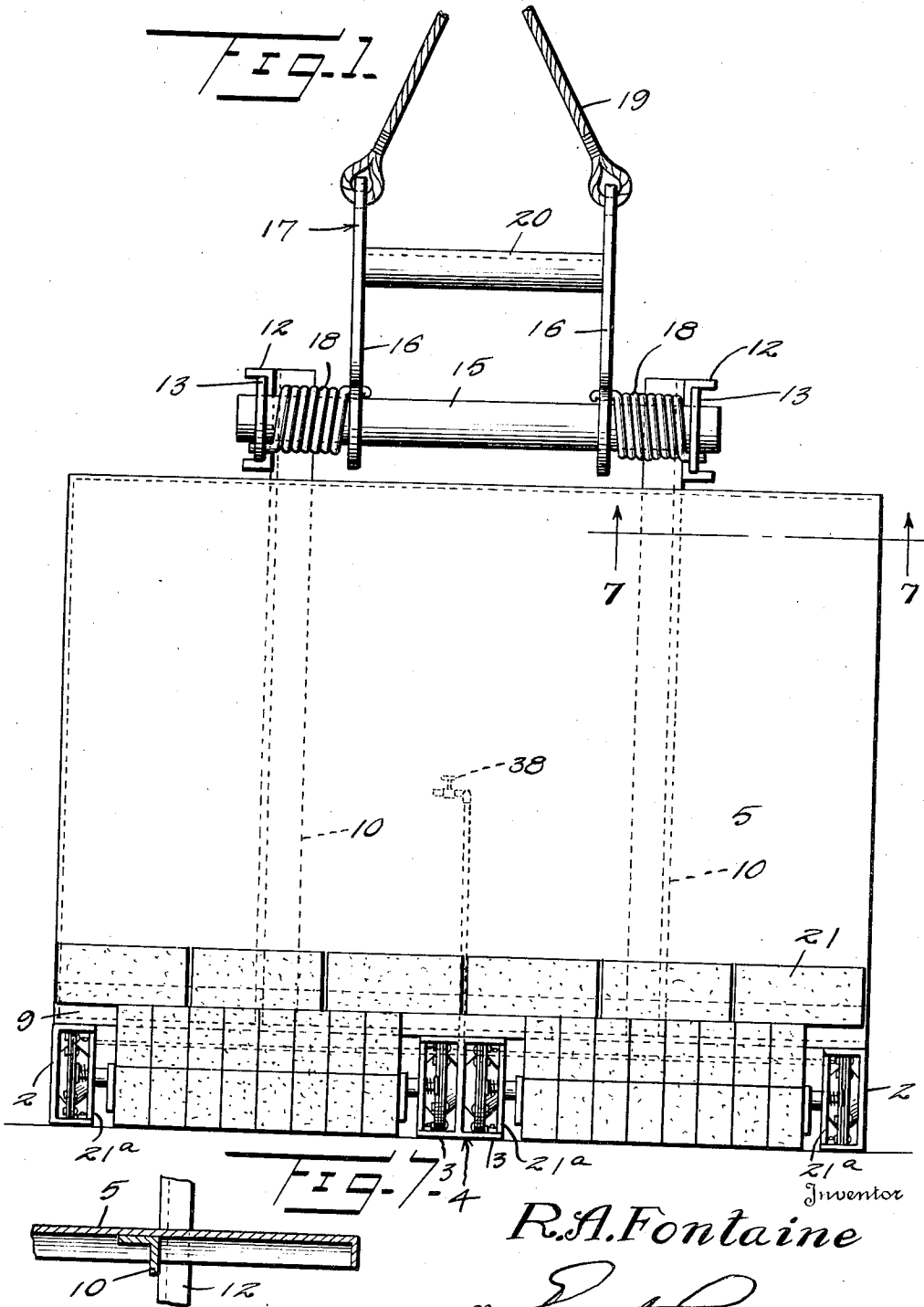
R. A. FONTAINE

2,211,499

GRAB FORK

Filed April 30, 1938

3 Sheets-Sheet 1



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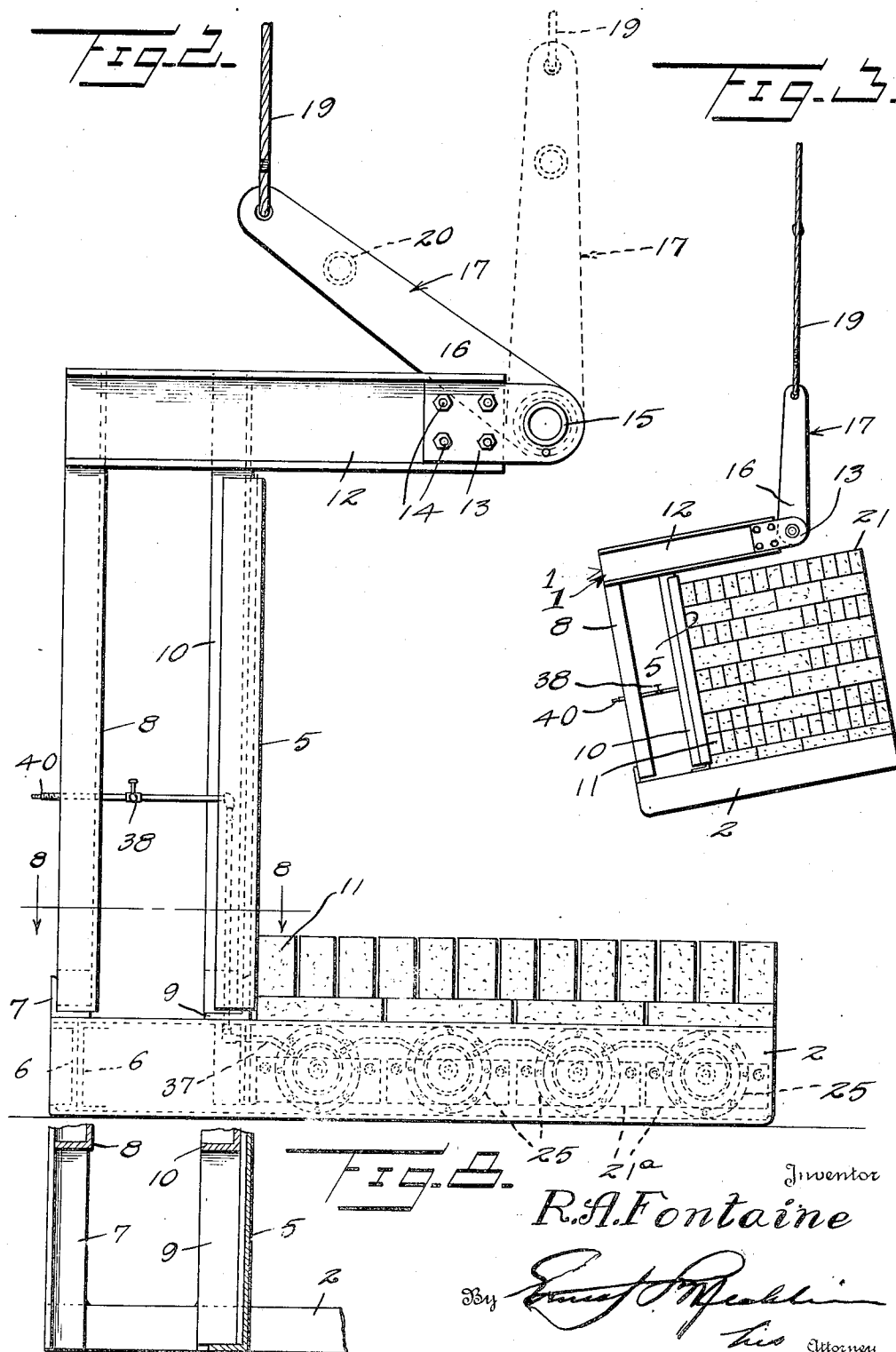
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3 Sheets-Sheet 2



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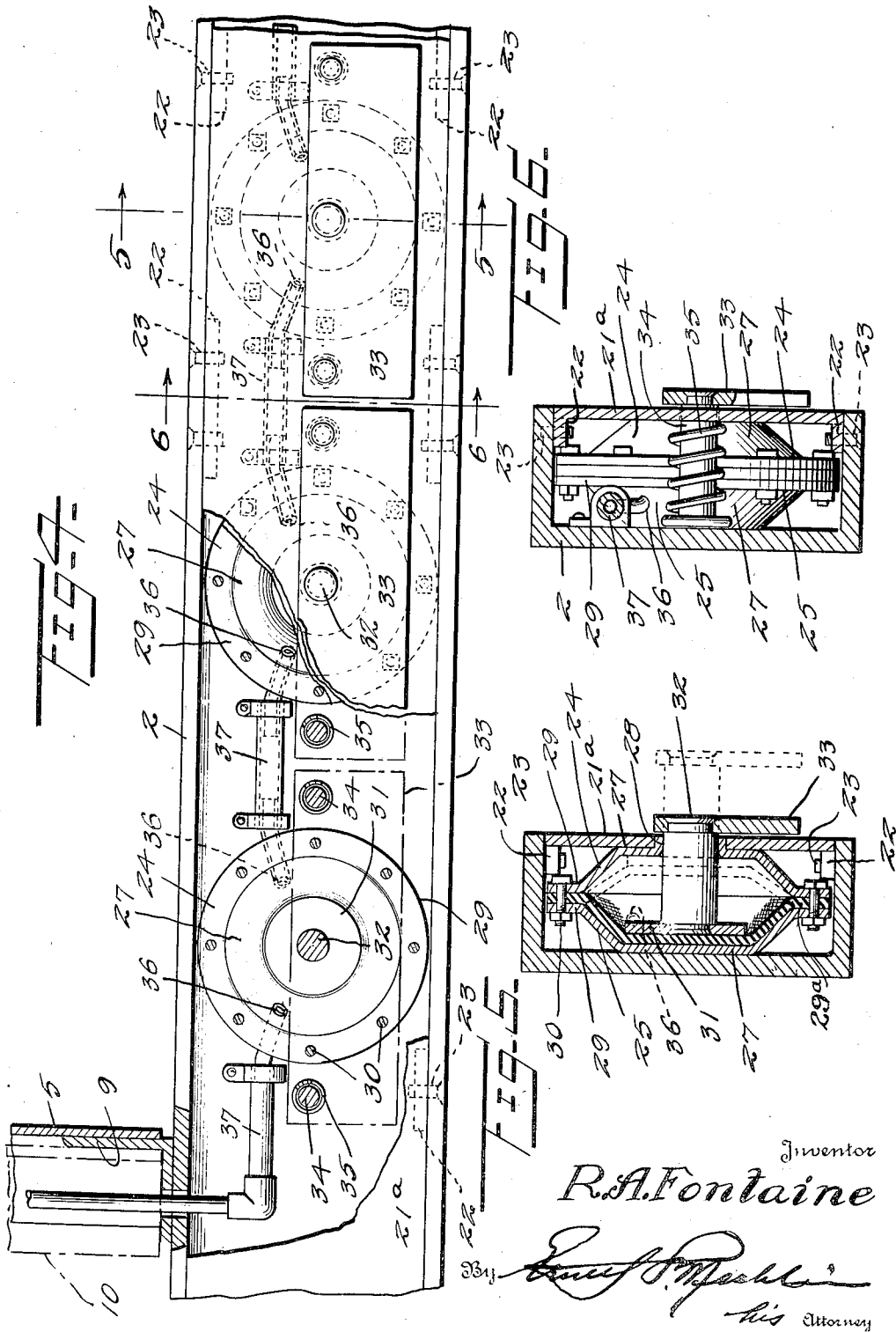
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3 Sheets-Sheet 3



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GRAB FORK

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11 Claims. (Cl. 294—63)

The invention relates to a gripping fork or hack grab adapted to be handled by an overhead hoist or crane for transporting and depositing, without disturbing the arrangement or order of a stack or hack of bricks.

5 The principal object of my invention, generally stated, is to provide a grab fork provided with pneumatically actuated gripping members adapted to fit between and to engage the bottom row of a stack or hack of bricks so as to permit the fork, by means of an overhead hoist, to transport and deposit a stack or hack of bricks without disturbing the shape of the hack or the position of the individual bricks relative to each other so that
10 hacks of bricks may be readily transported from one point to another and deposited upon trucks, barges or the like.

15 Still another object of the invention is to provide a pneumatically operated gripping fork or grab provided with a series or plurality of tines which are adapted to enter spaces provided in the bottom row of a hack or stack of bricks so that the pneumatically operated gripping members may engage and clamp the bottom course of
20 bricks so that the latter will form the support for the overlying brick of a hack or stack upon the elevation of fork.

25 Still another object of the invention is to provide a grab fork comprising a plurality of channel and angle bars preferably of standard shapes and sizes so connected and arranged as to provide a light and inexpensive construction, the parts of which can be readily purchased on the open market and which may be assembled without the
30 necessity for machining or finishing operations.

35 Still another object of the invention is to provide, in connection with a grab fork of the character described, a series of independently operable gripping plungers which are inexpensive to construct and highly efficient in operation.

40 Still another object of the invention is to provide a grab fork of the character described with a lifting bail adapted to operate against spring pressure in order that when the fork is unloaded the tines will be presented in substantially parallel relation to the support upon which the stack or hack of bricks may stand and which when the
45 fork is loaded causes the tines to be arranged at an angle to the vertical plane of a hoist in order that the back of the stack or hack may engage and be supported by a plate connected to and carried by the uprights which join the tines to the support for the bail member.

50 To these and other ends, the invention consists in the novel features hereinafter described
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and illustrated on the accompanying drawings, in which:

Figure 1 is a front elevation of the improved grab fork illustrating the same in gripping connection with a series of bricks.

5 Figure 2 is a side elevation of the same illustrating in dotted lines the position of the bail member upon the initial operation of the hoist.

Figure 3 is a side elevation showing the improved grab fork carrying the hack or stack of bricks and the position that the grab fork occupies with respect to the horizontal when so loaded.

10 Figure 4 is a detail, partially in section and partially in side elevation, showing the means for operating the pneumatic gripping mechanism.

Figures 5 and 6 are respectively sectional views taken on the lines 5—5 and 6—6 of Figure 4.

Figure 7 is a sectional view taken on line 7—7 of Figure 1.

20 Figure 8 is a fragmentary sectional view taken on line 8—8 of Figure 2.

Throughout the specification and drawings like parts are designated by like reference characters.

25 My improved grab fork 1 is preferably formed by providing as tines a plurality of channel beams 2—2, which beams are arranged on opposite sides of the grab fork and have their channel portions inwardly facing. At the center of the fork I may provide a plurality of channels 3—3 arranged
30 back to back or, as illustrated, may form these two channels as an integral H-beam 4. The beams 2 and 4 are adapted to extend outwardly of the face plate 5 a sufficient distance so as to extend fully beneath the normal width of a stack or hack of bricks. As illustrated in the drawings such a stack may comprise thirteen rows of bricks when the bricks are arranged in a vertical position. Connected to the channel beams 2 and to the H-beam 4, and extending beneath the
35 flanges thereof, are a plurality of channel beams 6 extending at right angles to the direction of the beams 2 and 4 and forming the rear connection therebetween, and resting on top of the upper flanges of the beams 2 and 4 is a transversely extending angle iron 7 which is rigidly
40 connected to the flanges of the beams 2, 4 and 6. The angle iron 7 preferably forms a support for vertically extending angle irons 8 which are positioned inwardly of the beams 2 and in fact substantially intermediate each beam 2 and the center beam 4. There is also provided a second angle beam 9 arranged parallel to but spaced inwardly of the angle 7, which angle beam 9
45 overlies the flanges of the beams 2 and 4 and is
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rigidly connected thereto. Extending upwardly from the angle beam 9 and in respective alinement with the angle beams 8 are a pair of beams 10 to the outer flanges of which is connected the face plate 5 against which the inner row of bricks 11 of the hack or stack is adapted to engage. The respective pairs of beams 8 and 10 are each connected by a channel beam 12, the two channel beams having respectively connected to the outer free ends thereof bearing members 13, preferably by means of bolts 14, said bearing members supporting an axle or shaft 15 upon which the members 16 of the bail member 17 are adapted to pivot. Preferably interposed between each member 13 and the adjacent member 16 of the bail 17 I provide torsion springs 18, one end of each spring extending through a suitable opening provided in the adjacent member 16, the opposite end of each spring extending through a suitable hole provided in the adjacent bearing member 13. The torsion springs are so arranged and disposed that they normally maintain the bail 17 in the full line position shown in Figure 2.

When the fork alone is elevated by the cables 19 connected to the upper end of the bail above the brace 20, the center of gravity of the fork is positioned in substantial alinement with the cable 19 when the bail is in normal position, so that under this condition the beams 2 and 4 are maintained substantially parallel with the ground or support upon which the stack of bricks 21 is supported. The tension of the springs 18 is such that when the fork is loaded the bail member extends at slightly more than a right angle to the plane of the channel bars 12 and since these bars are arranged parallel to the bars 2 and 4 it will be obvious, as illustrated in Figure 3, that the grab fork will take an inclined position so that the rear row of bricks 11 will contact the face plate 5 and be supported thereon and that the bars 12, 2 and 4 will be arranged at an angle to the horizontal. As soon, however, as the lowermost ends of the bars 2 and 4 contact a support the springs 18 will cause the bail to move rearwardly so as to permit the bars 2 and 4 to assume a horizontal position.

Each of the bars 2 and 4 is preferably provided with a plate member 21^a which is adapted to close the channel therein. These plates are provided with lugs 22 which are adapted to seat respectively against the upper and lower faces of the flanges of the channel beam to which they may be readily connected by means of screws or bolts 23.

Interposed between the plates 21^a and the web of each channel member is a plurality of circular metal disk members 24 and 25 which are each preferably provided with a boss 27. The bosses of each pair of disks are faced in opposite directions, the outer face of the boss on disk 25 being adapted to engage the web of the adjacent beam while the outer face of the boss on the disk 24 engages the inner face of the plate 21^a. The boss 27 of each of the disks 24 is preferably provided with a circular flanged recess 28, the flange of which may extend through the plate 21^a. The circular disks 24 and 25 are preferably provided with parallel circumferential flanges 29 which are connected by a plurality of bolts and nuts 30. Interposed between the circumferential flanges of each pair of disks is a rubber diaphragm 29^a, the connection between the disks 24 and 25 affording an air-tight connection between the diaphragm and the adjacent disk 25. The diaphragm is pref-

erably molded so that its normal conformation coincides with the conformation of the disks 25.

Engaging the base of the diaphragm opposed to the disk 25 of each pair of disks is a circular plate 31 rigidly connected to and forming the head of a plunger member 32, the latter extending through the opening 28 in the disk 24 and through the plate 21^a and having connected to its outer extremity a plate 33, preferably of rectangular form. At the opposite ends of the plates 33 are connected the outer ends of headed plunger members 34, the stem of each plunger extending through a suitable opening provided in the plates 21^a. Interposed between the head of each plunger and the respective plate 21^a is a coil spring 35, said springs serving to yieldingly maintain said plates 34 in contact with the outer face of the adjacent plate 21^a.

Each of the disks 25 is provided with one or more openings 36 by means of which compressed air may be admitted through the pipe 37 simultaneously to all of the disks 25 housed in the beams 2 and 4. The admission of compressed air causes the diaphragm 29 to move outwardly of the disks 25, carrying with it the plunger 32 and causing the plates 33 to assume the position indicated in Figure 1. The movement of the plates 33 causes the springs 35 to be compressed and as soon as the valve 38 of the air pipe 37 is opened permitting the escape of the compressed air the springs 35 will return the plates 33 and through associated plungers of the diaphragms 29^a to the position indicated in full lines in Figure 5, the dotted line position in this figure representing the position the parts occupy upon the admission of compressed air in rear of each diaphragm 29.

It will thus be obvious that when the fork is moved to the position underlying a stack or hack of bricks it is only necessary to connect an air hose to the valve portion 40 of the pipe 37, whereupon the compressed air will move all of the diaphragms 29^a and consequently cause the plates 33 to press against the adjacent bricks of the lower tier of bricks in the stack. This pressure is sufficient to force the bricks into intimate engagement with each other with sufficient pressure to permit the entire stack or hack of bricks to be lifted without disturbing the arrangement of the bricks in the stack or hack. After the bricks have been deposited in any desired location it is only essential to operate the release valve 38 whereupon the compressed air will escape and the springs 35 return the plates 33 to normal position whereupon the grab fork may be moved without disturbing the bricks and return for an additional load. By providing the disks 24 and 25 and by interposing between these disks an inexpensive rubber diaphragm I am enabled to build a grab fork which is adapted to be pneumatically operated and which avoids the necessity for fine machining and is therefore inexpensive to make, strong and reliable in action and, by eliminating from the fork the complicated cylinders, pistons and other instrumentalities which have heretofore been used, I am able to produce a fork which is comparatively light in weight, efficient in operation, and sturdy in construction.

Having now described my invention, what I claim is:

1. A gripping fork for handling a hack of bricks, comprising a frame having substantially parallel upper and lower members, means for rigidly connecting the same adjacent corresponding end portions thereof, said lower members being arranged in pairs and constituting the tines

of said fork, fluid pressure actuated means mounted in each tine, said means including a plurality of bodily movable plates, said plates on one tine confronting corresponding plates on the cooperating time for gripping therebetween, upon the application of fluid pressure, the interposed bricks of said hack, and spring means for returning said plates to normal position upon the release of said pressure.

2. A gripping fork for handling a hack of bricks, comprising a frame having substantially parallel upper and lower members, means for rigidly connecting the same adjacent corresponding end portions thereof, said lower members being arranged in pairs and constituting the tines of said fork, fluid pressure operated means including a plurality of spaced face plates, mounted in each of said tines said plates being bodily movable transversely of said time for gripping bricks of said hack between the confronting faces of corresponding plates on cooperating tines, and spring means carried by each of said plates for returning the same to normal position upon the release of said fluid pressure means.

3. A gripping fork for handling a hack of bricks, comprising a frame having substantially parallel upper and lower members, means for rigidly connecting the same adjacent corresponding end portions thereof, said lower members being arranged in pairs and constituting the tines of said fork, and means including a plurality of pairs of disks mounted in each of said tines and provided with members movable transversely thereof for gripping between each pair of adjacent tines bricks of said hack.

4. A gripping fork for handling a hack of bricks, comprising a frame having substantially parallel upper and lower members, means for rigidly connecting the same adjacent corresponding end portions thereof, said lower members being arranged in pairs and constituting the tines of said fork, and pneumatically operated means including a plurality of pairs of disks mounted in each of said tines and provided with members movable transversely thereof for gripping between each pair of adjacent tines bricks of said hack.

5. A gripping fork for handling a hack of bricks, comprising a frame having substantially parallel upper and lower members, means for rigidly connecting the same adjacent corresponding end portions thereof, said lower members being arranged in pairs and constituting the tines of said fork, and pneumatically operated means including a plurality of pairs of disks and a diaphragm member mounted within each pair, and a member in each pair of disks, said last named member being movable transversely thereof for gripping between each pair of adjacent tines bricks of said hack.

6. A gripping fork for handling a hack of bricks, comprising a frame having substantially parallel upper and lower members, means for rigidly connecting the same adjacent corresponding end portions thereof, said lower members being arranged in pairs and constituting the tines of said fork, pneumatically operated means mounted in each of said tines and bodily movable transversely thereof for gripping between the confronting faces of said means bricks of said hack, and means connected to said upper members for attaching lifting means to said fork, said last

named means including a pivoted bail and torsion spring means for maintaining the tines of said fork substantially at right angles to a plane passing through said lifting means when said fork is supported in elevated position prior to the loading thereof.

7. A gripping fork for handling a hack of bricks including a plurality of pairs of tines, each of said tines comprising a substantially rectangular chamber, a plurality of pairs of disk members mounted therein, a plunger member mounted within each pair of said disks, plate members connected to each of said plungers, and means for actuating said plunger members for forcing said plates away from said tines.

8. A gripping fork for handling a hack of bricks including a plurality of pairs of tines, each of said tines comprising a substantially rectangular chamber, a plurality of pairs of disk members mounted therein, a plunger member mounted within each pair of said disks, plate members connected to each of said plungers, means for actuating said plunger members for forcing said plates away from said tines, and means for yieldably resisting said movement of said plates.

9. A gripping fork for handling a hack of bricks including a plurality of pairs of tines, each of said tines comprising a substantially rectangular chamber, a plurality of pairs of disk members mounted therein, a plunger member mounted within each pair of said disks, plate members connected to each of said plungers, and means for pneumatically actuating said plunger members for forcing said plates away from said tines.

10. A gripping fork for handling a hack of bricks including a plurality of pairs of tines, means for connecting said tines, each of said tines having a chambered portion, a plurality of pairs of disk members mounted therein, a diaphragm member interposed between each pair of disk members, a plunger bearing against said diaphragm, said plungers extending without said chamber, a plate connected to said extending portion of each plunger, a pipe connected to each pair of disk members, the connection between each pair of disk members and said pipe being disposed on the opposite side of each diaphragm from said plungers, and means for connecting said pipe to a source of compressed air for actuating said plunger members through the respective diaphragms.

11. A gripping fork for handling a hack of bricks including a plurality of pairs of tines, means for connecting said tines, each of said tines having a chambered portion, a plurality of pairs of disk members mounted therein, a diaphragm member interposed between each pair of disk members, a plunger bearing against each diaphragm, said plungers extending without said chamber, a plate connected to said extending portion of each plunger, a pipe connected to each pair of disk members, the connection between each pair of disk members and said pipe being disposed on the opposite side of each diaphragm from said plunger, means for connecting said pipe to a source of compressed air for actuating said plunger members through the respective diaphragms, and means for causing said plungers to return to normal position upon the release of said compressed air.

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