Aug. 24, 1954 J. N. GARRETT 2,687,226

LIFT TRUCK ATTACHMENT FOR HANDLING HOLLOW BODIES

Filed April 26, 1952 3 Sheets-Sheet 1

Fig. 1.

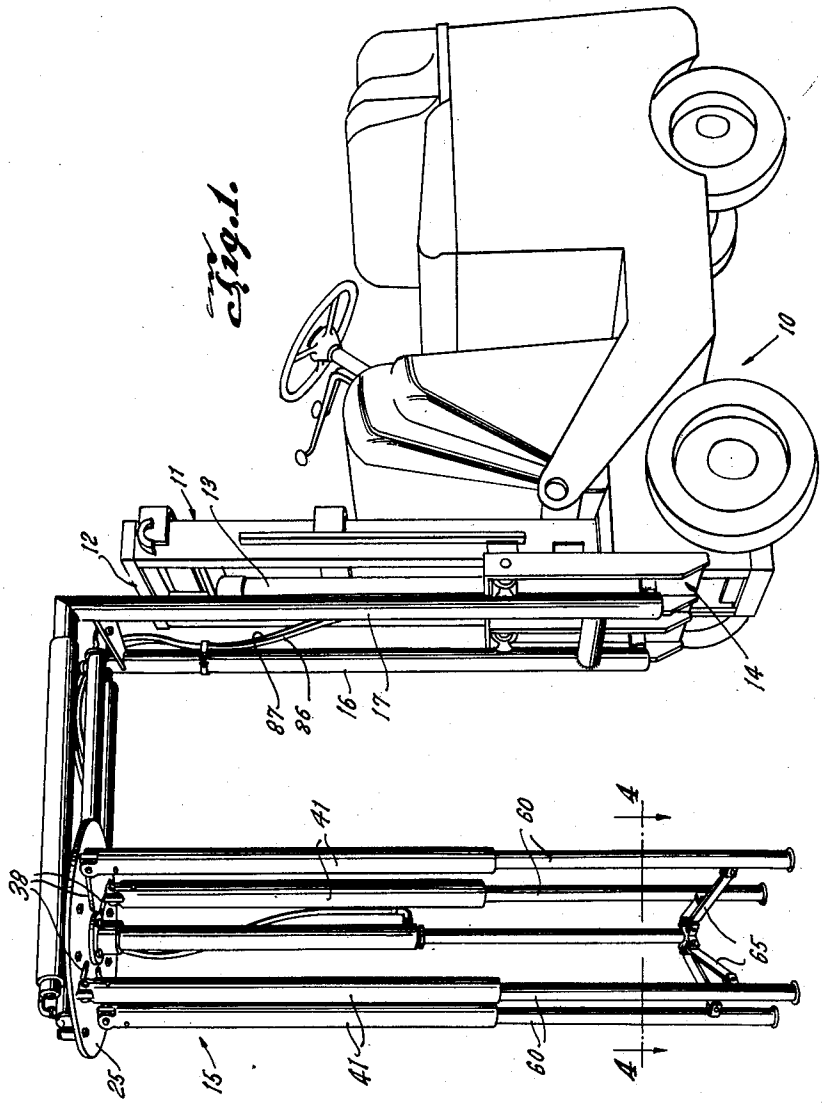

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Fig. 2.

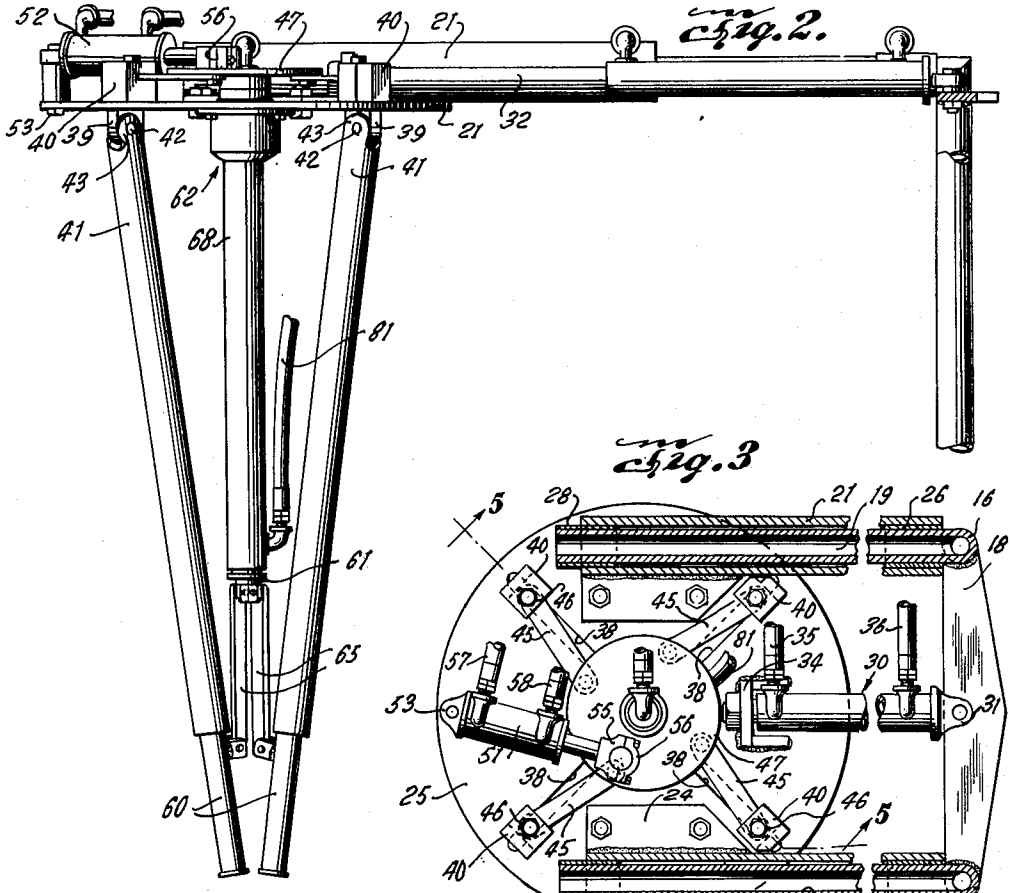

Fig. 3

Fig. 4.

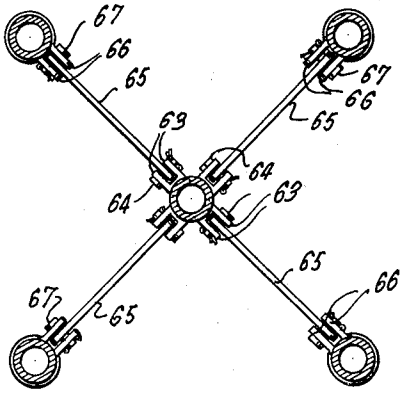

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Fig. 5.

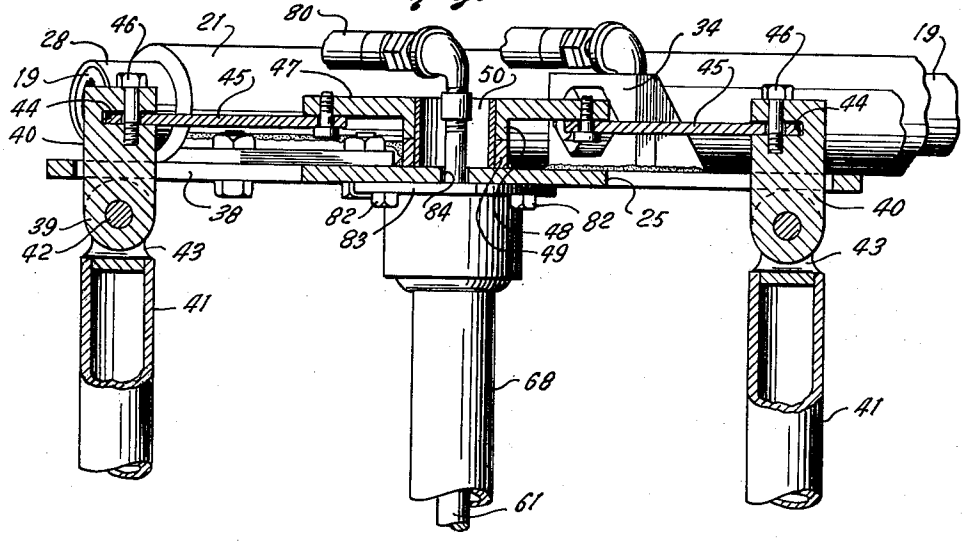
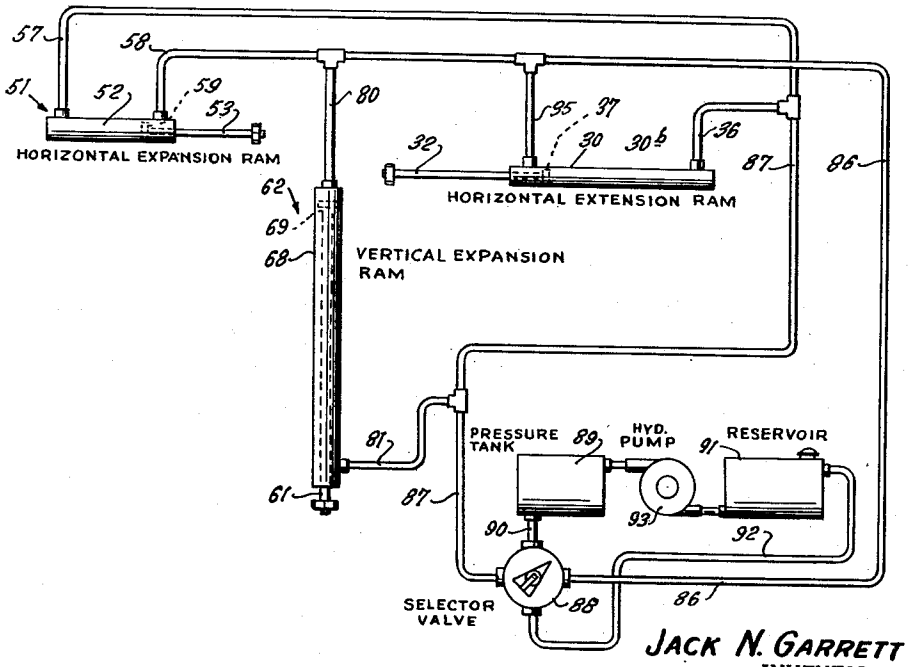


Fig. 6.



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LIFT TRUCK ATTACHMENT FOR HANDLING HOLLOW BODIES

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Application April 26, 1952, Serial No. 284,596

13 Claims. (Cl. 214—620)

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This invention relates to article handling apparatus and more particularly to an attachment for lift trucks by means of which a plurality of tires or similar articles may be picked up and transported from one place to another.

Vehicle tires, coils of wire, or other articles of similar configurations are usually stacked vertically one upon another. The tires are heavy, especially those used on airplanes and trucks, and therefore the effort and time are expended in stacking and moving the tires. It is desirable therefore that a device be provided for lifting and transporting stacks of tires. The device must not employ hooks, spikes, blades or other pointed or sharp implements which may damage the tires. The device also must be of simple construction and be easily operable in order to be of utmost value.

Accordingly, it is an object of the invention to provide a new and improved device for lifting and transporting tires or the like.

It is another object of the invention to provide a new and improved attachment for lift trucks by means of which tires or the like may be lifted or transported.

It is still another object of the invention to provide a new and improved device for lifting and transporting tires or the like which employs no sharp or pointed implements which might damage the tires.

It is a further object of the invention to provide a new and improved attachment for lift trucks by means of which tires or the like may be lifted and transported and which employs no sharp or pointed implements which may damage the tires.

For a better understanding of the invention, reference may be had to the following description taken in connection with the accompanying drawings and its scope will be pointed out in the appended claims.

In the drawings,

Figure 1 is a perspective view of a lift truck provided with the attachment for lifting tires showing the telescoping legs in fully extended position;

Figure 2 is a fragmentary side view of the attachment showing the legs in fully telescoped position and with some parts removed;

Figure 3 is a top plan view of the attachment, with some parts shown in section;

Figure 4 is a sectional view taken on the line 4—4 of Figure 1;

Figure 5 is a sectional view taken on the line 5—5 of Figure 3; and,

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Figure 6 is a schematic diagram of the hydraulic system of the attachment.

Referring now to the drawings, the numeral 10 designates a conventional industrial lift truck having a conventional lift rack 11 and an extension member 12 slidably mounted thereon and actuated for raising and lowering by a hydraulic ram 13. Extension member 12 has slidably secured to it a vertically slidable bracket 14. The bracket 14 is connected to the lift rack by chains, not shown, which extend over sprockets (not shown) mounted on the extension member 12 so that the bracket 14 rises on the extension member 12 as the latter rises on the lift rack 11 under the force exerted by the hydraulic ram which is powered from a pump driven by the motor of the lift truck. This construction of the lift truck is conventional and will not, therefore, be described further.

The attachment 15 for lifting tires or the like comprises a pair of vertical tubular supporting members 16 and 17 which are welded at their lower ends to the bracket 14 of the lift truck and are connected together adjacent their upper ends by a cross-member 18 also welded to the vertical supporting member. The vertical supporting members 16 and 17 have horizontal extensions 19 and 20, respectively, which telescope in sleeves 21 and 22, respectively, welded to brackets 23 and 24, respectively. The sleeve 22 and bracket 24 are not shown in Figure 2. The brackets 23 and 24 are rigidly secured to a circular suspension plate 25. Bearings 26 and 27 are rigidly secured to the sleeves 21 and 22, respectively, and the horizontal extensions slide therein. Bearings 28 and 29 are secured to the outer ends of the horizontal extensions 19 and 20, respectively, and slide in the sleeves 21 and 22. The bearings 26 to 29 assure easy sliding movement of the sleeves on the horizontal extensions.

The horizontal extension ram 30 has its cylinder 30*b* connected to the cross-member 18 by a bolt 31 while its piston rod 32 is secured by a nut 33 threaded on the end of the piston to a bracket 34 welded to the suspension plate. Hydraulic fluid may be admitted or expelled from either end of the cylinder 30*b* through the conduits 35 and 36. It will be apparent that if hydraulic fluid under pressure is delivered to the cylinder 30*b* on one side of piston 37 through the conduit 36 and fluid on the other side of the piston is allowed to escape through the conduit 35, the piston will move outwardly causing the circular suspension plate 25 to move outwardly on the horizontal extensions 19 and 20. If the flow of fluid in the conduits 36 and 35 is reversed, the suspension plate will be moved inwardly on the horizontal

extensions. The horizontal extension ram may be employed, therefore, to control the position of the suspension plate relative to the vertical supporting members 16 and 17.

The circular suspension plate 25 is provided with a plurality of radial slots 38 through which depend the lugs 39 of the mounting blocks 40 slidably mounted on the suspension plate. A tubular leg 41 is pivotally suspended from each lug 39 by means of a pin 42 which extends through registering apertures in the lug 39 and the pair of ears 43 provided on the upper end of each leg 41.

The mounting blocks 40 are provided with horizontal recesses 44 into which extend the outer ends of links 45. The links are pivotally connected to the mounting blocks by bolts 46 which extend through the recesses 44 and suitable apertures in the outer ends of the links 45 into threaded bores in the mounting blocks. The inner ends of the links 45 are pivotally connected to an oscillating plate 47 by bolts 48 which extend through suitable apertures in the inner ends of the links into threaded apertures in the oscillating plate.

The oscillating plate 47 is provided with a flange 48 which rests on an annular flange 49 welded to the circular suspension plate. A bushing 50 extends upwardly through the annular flange 48 of the oscillating plate so that the oscillating plate may rotate about the bushing.

The oscillating plate is rotated back and forth by a horizontal expansion ram 51 whose cylinder 52 is pivotally connected to the circular suspension plate 25 by a bolt 53 and whose piston rod 54 is pivotally connected to the oscillating plate 47 by means of a stud 55 upstanding from the oscillating plate about which is secured the conventional coupling 56 on the end of the piston rod. Conduits 57 and 58 deliver and withdraw hydraulic fluid from opposite ends of the cylinder 52 on opposite sides of the piston 59 and thus reciprocate the piston and cause the plate 47 to oscillate.

Slidably extending into each leg 41 is a telescoping leg 60 which is operated by the piston rod 61 of a vertical expansion ram 62. The piston rod is provided with four pairs of lugs 63 to and between each pair of which is pivotally secured by means of a pin 64 the inner end of a link 65. The outer end of each link 65 is pivotally secured to a pair of lugs 66, by means of a pin 67. It will be apparent that as the piston rod moves downwardly out of the cylinder 68, the telescoping legs are first moved downwardly and then outwardly, the legs 41 pivoting about the pins 42 as required.

Hydraulic fluid is admitted and expelled from the cylinder 68 from opposite sides of the piston 79 by means of conduits 80 and 81. The cylinder 68 is connected at its upper end to the underside of the suspension plate by bolts 82 which extend upwardly through suitable holes in a flange 83 of the cylinder 68 into threaded bores in the suspension plate. The suspension plate is provided with a central aperture 84 through which passes a section of the conduit 80 and an aperture 85 through which passes the conduit 81. It will be apparent that at least certain sections of the conduit are in the form of a flexible hose.

The conduits 58, 80 and 35 are connected to a conduit 86 while the conduits 57, 36 and 81 are connected to a conduit 87. The two main conduits 86 and 87 are connected to a selector valve 88 which is adjustable to connect either of the main conduits to the pressure tank 89 through the conduit 90 and at the same time connect the other of the main conduits to a reservoir tank 91 through a conduit 92. A pump 93 driven by the truck lift motor is employed to move hydraulic fluid from the reservoir tank into the pressure tank.

It will be apparent that hydraulic fluid under pressure is admitted simultaneously into all three cylinders 30b, 52 and 68 when the valve 88 is adjusted to permit hydraulic fluid to flow from the pressure tank 89 into either of the main conduits. The dimensions of the various cylinders and pistons and the loads imposed on the rams are such, however, that the vertical expansion ram 62 will first operate, then the horizontal expansion ram 52 and finally the horizontal extension ram 30.

The various elements of the attachment are in the positions shown in Figure 2 when in inoperate positions with the suspension plate 25 remote from the vertical supporting members 16 and 17. If it is desired now to lift a stack of tires, the vertically slidable bracket 14 of the lift truck is raised until the telescoping legs 60 clear the topmost tire and then the lift truck is maneuvered until the suspension plate 25 is directly over the stack of tires. The bracket 14 is then lowered so the legs 41 enter into the central opening of the stack of tires with the suspension plate abutting the uppermost tire unless the stack is not very high. The selector valve is then adjusted to connect the main conduit 86 to the pressure tank 89 and the main conduit 87 to the reservoir tank 91. The hydraulic fluid will first cause the piston 68 of the vertical expansion ram 62 to move downwardly since due to its dimensions and the size of the load impressed upon it, the piston 68 is movable by a smaller hydraulic pressure than either of the other pistons.

The piston rod 61 of the piston 68 slides downwardly until the telescoping legs 60 are fully extended from the legs 41. Further downward movement of the piston rod then expands the legs 41 and 60, the links 65 pivoting at either end. The legs 60 expand until they contact the inner surfaces or central walls of the tires. When these legs 60 bear with proper force against the central walls of the tires, the pressure in the conduit 86 reaches a value great enough to cause the piston rod 53 to slide into its cylinder 52. This causes the oscillating plate 47 to rotate clockwise, Figure 3, and thus causes the mounting blocks 40 to slide outwardly on the suspension plate. The upper ends of the legs 40 are thus moved outwardly or expanded until they too contact the central walls of the tires and bear against them with proper force.

The pressure in the main conduit 86 will now increase, if the selector valve is not readjusted, to a value which will cause the piston rod 32 to slide into the cylinder 30b. This will move the suspension plate, and therefore the stack of tires closer to the vertical supporting members 16 and 17 and to the lift truck. It is desirable to have the tires close to the lift truck to prevent any tendency of the truck to tilt forward under heavy load and also to allow the truck to maneuver more easily in confined areas than would be possible if the stack of tires were held far away from the truck. It is not necessary, of course, to bring the stack of tires close to the truck. The selector valve may be adjusted to prevent fluid from entering or leaving either main conduit after the upper ends of the legs 41 are expanded.

The bracket 14 may now be lifted to raise the

attachment and the stack of tires held thereby. The truck can then move from one place to another to carry the tires wherever desired. The tires are held on the legs 41 and 60 by the friction between the legs 41 and 60 and the central walls of the tires. It will be apparent that no hooks, spikes or blades or other implements having relatively sharp points or edges contact the tires.

When the tires are transported to a desired location, the bracket 14 is lowered until the lowermost tire contacts the surface on which it will thereafter rest. The selector valve 88 is adjusted to connect main conduit 87 to the pressure tank 89 and the main conduit 86 to the reservoir tank 91. The three rams will now operate in the reverse order. The piston rod 61 will move upwardly to contact the telescoped legs and then to telescope them fully into the legs 41. Then the piston rod 53 will slide out to rotate the oscillating plate 47 in a counter-clockwise direction, Figure 3, to contact the upper ends of the legs 41. Finally, the piston rod 32 may be made to slide out, if desired to move the suspension plate 25 away from the lift truck. This may be done either before or after the bracket 41 is raised to lift the legs 41 and 60 from within the stack of tires.

It will be apparent now that an attachment for lift trucks has been provided which is controllable by a single valve 88 which may be located on the truck within easy reach of the operator thereof. It will also be apparent that the legs 41 and 60 hold and lift tires by frictionally engaging each tire of a stack of tires and that no sharp points or edges ever bear against the tires or are likely to do so. Moreover, it will be seen that the attachment is of relatively simple structure and easily operable to lift, stack and transport tires or the like.

Manifestly, the construction as shown and described is capable of some modification and such modification as may be construed to fall within the scope and meaning of the appended claims is also considered to be within the spirit and intent of the invention.

What is claimed is:

1. An automobile tire lifting and hauling attachment for a power lift truck having a vertically movable member, said attachment comprising a pair of vertical supporting members rigidly secured to said vertically movable member adjacent the lower ends thereof; a substantially horizontal suspension plate connected to the upper ends of said vertical supporting members and having radial slots therein, a mounting block having a lug slidable in each of said slots, a depending leg pivotally suspended from each of said lugs, each of said dependent legs having a telescopically related extensible section, means supported on said suspension plate for moving said blocks to radially actuate said legs and means mounted on said suspension plate and connected to said extensible sections for displacing said sections downwardly and then outwardly.

2. An automobile tire lifting and transporting attachment for a power lift truck having a vertically movable member, said attachment comprising a pair of vertical supporting members rigidly secured to said vertically movable member adjacent the lower ends thereof horizontal extensible members joined at their inner ends to the upper ends of said vertical supporting members; a substantially horizontal and radially slotted suspension plate carried by the outer ends of said

horizontal extensible members, a mounting block having a lug slidable in each of the slots of said suspension plate; a plurality of spaced legs pivotally suspended from said lugs, each of said dependent legs having a downwardly extensible section; means mounted on said suspension plate and connected to said extensible sections for extending said sections downwardly and then outwardly; and means on said suspension plate for actuating said blocks to move said legs outwardly on said suspension plate.

3. The device of claim 1, said suspension plate being mounted on said supporting members for reciprocal horizontal movement toward and away from said supporting members; and means mounted on said supporting members and connected to said suspension plate for moving said suspension plate toward and away from said supporting members.

4. The device of claim 2, said suspension plate being mounted on said horizontal extensible members for reciprocal horizontal movement toward and away from said supporting members; and means mounted on said supporting members and connected to said suspension plate for moving said suspension plate toward and away from said supporting members.

5. An automobile tire lifting and transporting attachment for a power lift truck having a vertically movable member, said attachment comprising vertical supporting members rigidly mounted on said vertically movable members, horizontally extendable members mounted on the upper ends of said vertical supporting members a horizontal radially slotted suspension plate mounted on said horizontally extendable members; mounting blocks movable in the slots of said plate, a plurality of dependent legs having upper ends pivotally connected to said blocks for inward and outward movement away from and toward the periphery of said suspension plate; means selectively moving said blocks, each of said legs having a downwardly extensible section; means mounted on said suspension plate and connected to said extensible leg sections for moving said sections downwardly and then outwardly whereby said legs and sections may contact inner surfaces of annular articles to hold said annular articles by frictional engagement therewith.

6. An attachment for a power lift truck having a vertically movable member for use in lifting stacks of annular articles, said attachment comprising a suspension member mounted on said vertically movable member; and having radial slots therein, a block having a lug depending through each of said slots, a plurality of dependent legs pivotally connected at their upper ends to said lugs, means supported on said suspension member for moving said blocks in said slots to actuate said legs inwardly and outwardly relative to the outer edges of said suspension member, a longitudinally movable extension telescopically arranged in each of said legs; means mounted on said suspension member and connected to said extensions for moving said extensions downwardly and then outwardly whereby said legs and sections may be disposed in a stack of annular articles and then expanded in coordination with said block moving means to contact in parallelism the inner surfaces of said annular articles to hold said articles by frictional engagement therewith.

7. An attachment for a power lift truck having a vertically movable member for use in lifting stacks of annular articles comprising a horizontal

suspension member mounted on said vertically movable member; a plurality of mounting members arranged for radial movement toward and away from the edges of said suspension member a leg pivotally connected at its upper end to each of said mounting members, each of said legs having a longitudinally movable extension; a hydraulic ram mounted on said suspension member and having a vertically reciprocable member depending downwardly and between said legs; a plurality of radially extending links having inner ends pivotally connected to said reciprocable member, the outer ends of said links being pivotally connected to said extensions, said extensions being moved downwardly and then outwardly when said reciprocable member is moved downwardly, said extensions being moved inwardly and then upwardly when said reciprocable member is moved upwardly.

8. The device of claim 6, said suspension member being mounted for reciprocable horizontal movement on said vertically movable member; and hydraulic means for reciprocating said suspension member.

9. The device of claim 7, said suspension member being mounted for reciprocable horizontal movement on said vertically movable member; and hydraulic means for reciprocating said suspension member.

10. A device for lifting stacks of automobile tires comprising a supporting member; a suspension member carried by said supporting member, a plurality of mounting blocks carried by said suspension member for radial movement in relation to the center of said suspension member, means for actuating said blocks; a plurality of dependent spaced legs each being pivotally suspended at its upper end from one of said blocks, each of said legs having a longitudinally movable extension; a cylinder depending from the center of said suspension member having a plunger, a series of radial links pivoted at their inner ends to said plunger and at their outer ends to said extensions for moving said extensions downwardly and then outwardly in coordination with said block actuating means, whereby said legs and sections may be disposed in a stack of annular articles and then expanded at their upper and lower ends to contact the inner surfaces of said automobile tires in parallelism to hold said tires by frictional engagement therewith.

11. A device for lifting stacks of annular articles comprising a supporting member; a plurality of mounting blocks carried by said supporting member, arranged for radial displacement thereon, means for actuating said blocks, a leg pivotally suspended from each of said blocks, each of said legs having a longitudinally movable extension; a hydraulic ram mounted on said supporting member and having a vertically reciprocable member depending downwardly and between said legs; a plurality of radially extending links having inner ends pivotally connected to said reciprocable member, the outer ends of said links being pivotally connected to said extensions, said extensions being moved downwardly and then outwardly by said links when said reciprocable member is moved downwardly, said extensions being moved inwardly and then upwardly when said reciprocable member is moved upwardly, said legs and extensions being insertable in a stack of annular articles and moved in an outwardly direction at their upper and lower ends by said block actuating means and said reciprocable member respectively to hold said articles by parallel frictional engagement with the inner walls thereof.

12. A device for lifting stacks of annular articles comprising a suspension plate; a plurality of legs having upper ends pivotally and slidably connected to said suspension plate for inward and outward movement away from and toward the periphery of said suspension plate; a first hydraulic means for moving said upper ends toward and away from the periphery of said suspension plate, each of said legs having a downwardly extensible section; a second hydraulic means mounted on said suspension plate and having a vertically reciprocable member connected to said extensions, said extensions being moved downwardly and then outwardly when said reciprocable member is moved downwardly, said extensions being moved inwardly and then upwardly when said reciprocable member is moved upwardly, said legs and extensions being insertable in a stack of annular articles to hold said articles by frictional engagement therewith, and means for applying hydraulic fluid to said first and second hydraulic means, said second hydraulic means being actuated before said first hydraulic means is actuated.

13. A device for lifting stacks of annular articles comprising a suspension plate; a plurality of legs having upper ends pivotally and slidably connected to said suspension plate for inward and outward movement away from and toward the periphery of said suspension plate; a first hydraulic means for moving said upper ends toward and away from the periphery of said suspension plate, each of said legs having a downwardly extensible section; a second hydraulic means mounted on said suspension plate and having a vertically reciprocable member connected to said extensions, said extensions being moved downwardly and then outwardly when said reciprocable member is moved downwardly, said extensions being moved inwardly and then upwardly when said reciprocable member is moved upwardly, said legs and extensions being insertable in a stack of annular articles to hold said articles by frictional engagement therewith, said suspension plate being movably mounted on a support for horizontal reciprocable movement; a third hydraulic means for reciprocably moving said suspension plate, and means for supplying hydraulic fluid to said first, second and third hydraulic means, said second hydraulic means always being actuated before said first hydraulic means is actuated, said first hydraulic means always being actuated before said third hydraulic means is actuated, said support being attachable to a vertically movable member of a power lift truck.

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