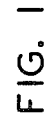


C. H. T. WOODWARD ETAL

MOVEABLE PLATFORM WITH LIFT AND TURNOVER MECHANISM

6 Sheets-Sheet 1



Cyril Horace Woodward
Robert N. DeFloria

3,027,031

6 Sheets-Sheet 2

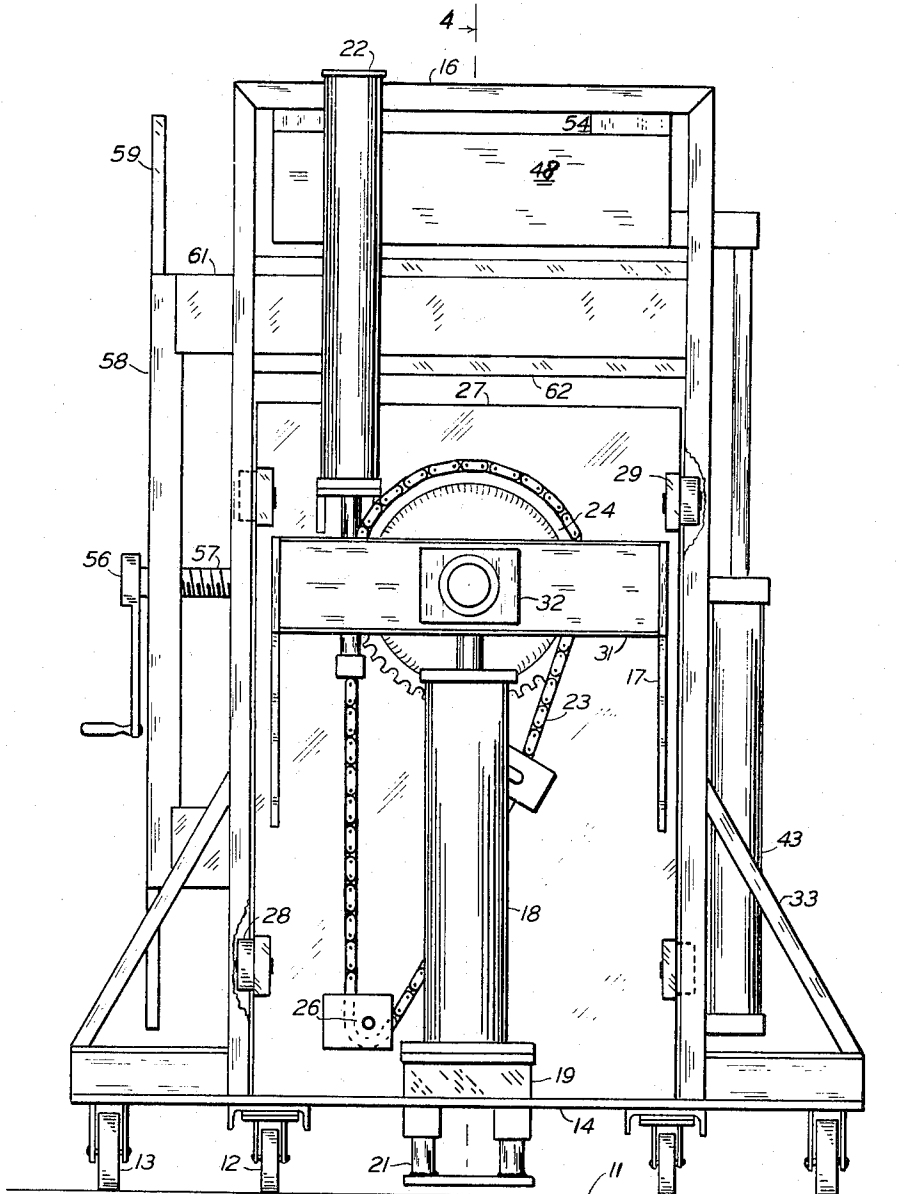


FIG. 2

Cypressus racemosa Woodward
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MOVEABLE PLATFORM WITH LIFT AND TURNOVER MECHANISM

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6 Sheets-Sheet 3

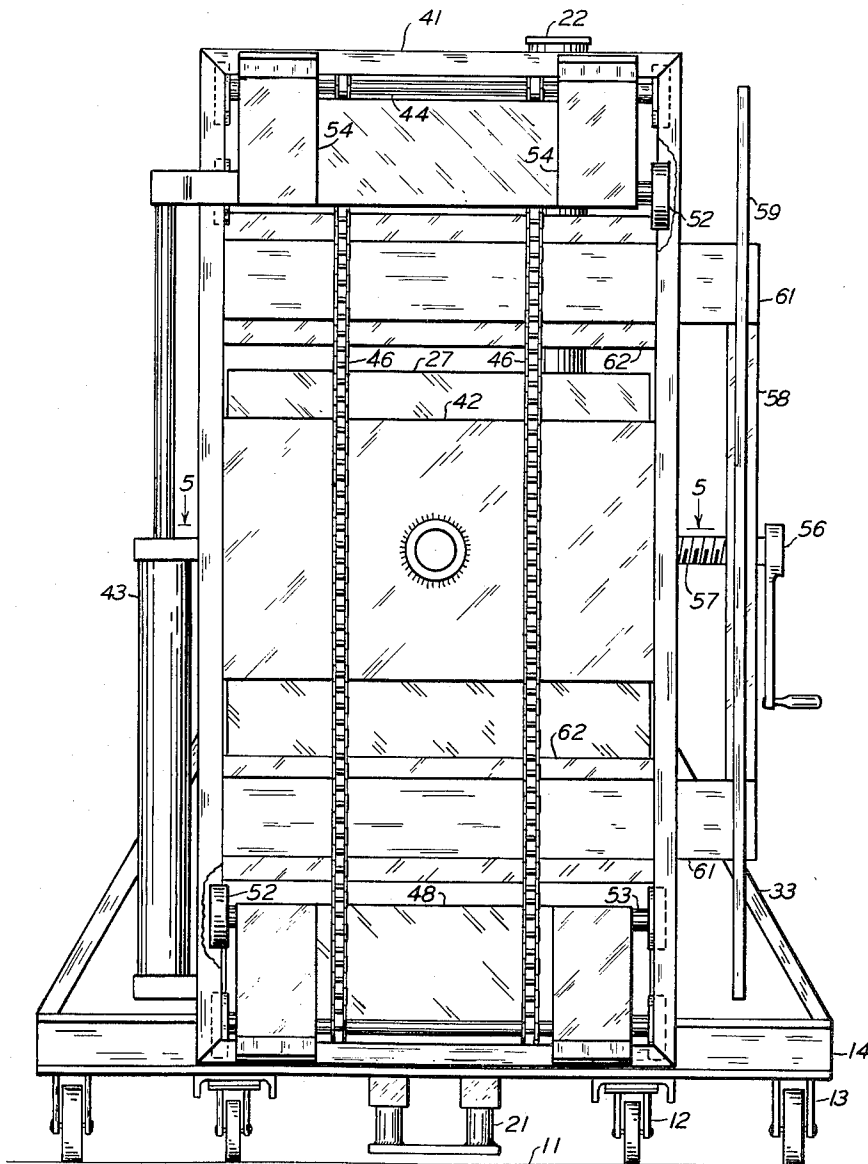


FIG. 3

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MOVEABLE PLATFORM WITH LIFT AND TURNOVER MECHANISM

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6 Sheets-Sheet 4

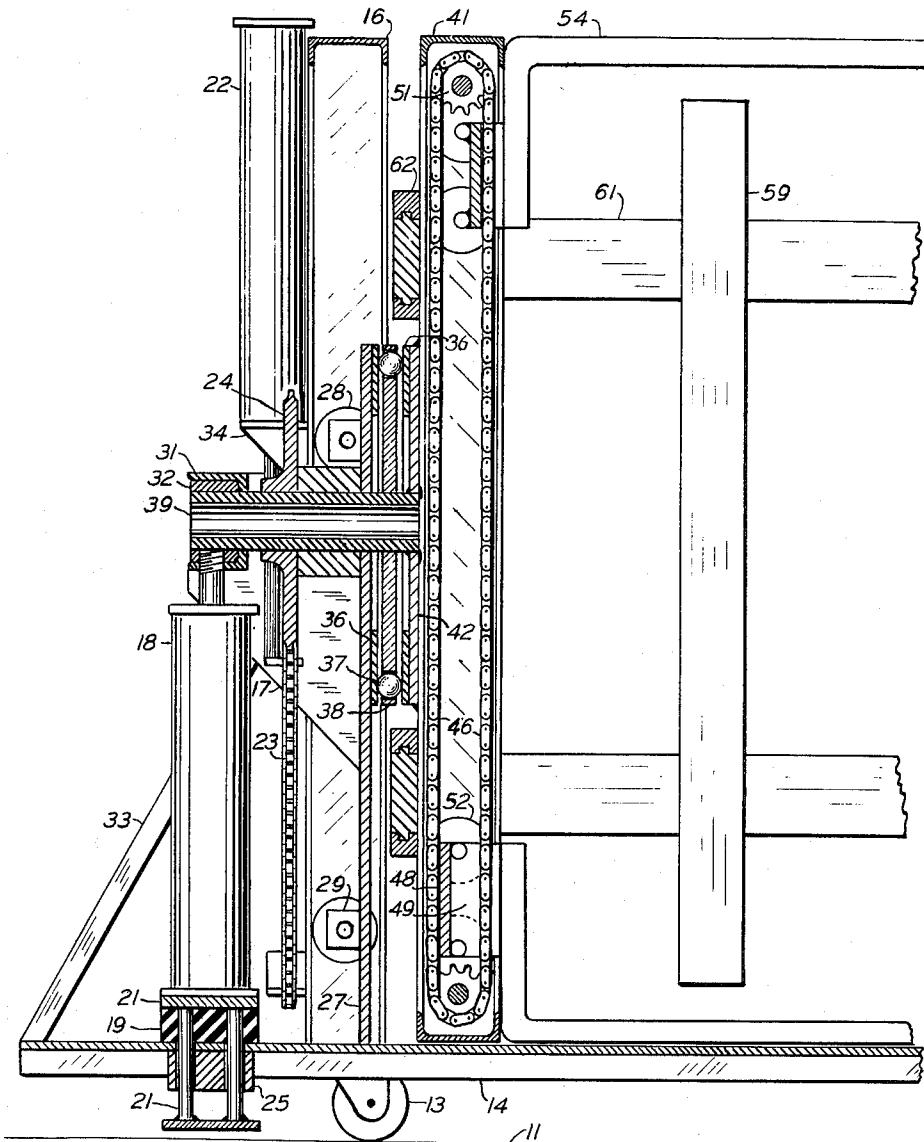


FIG. 4

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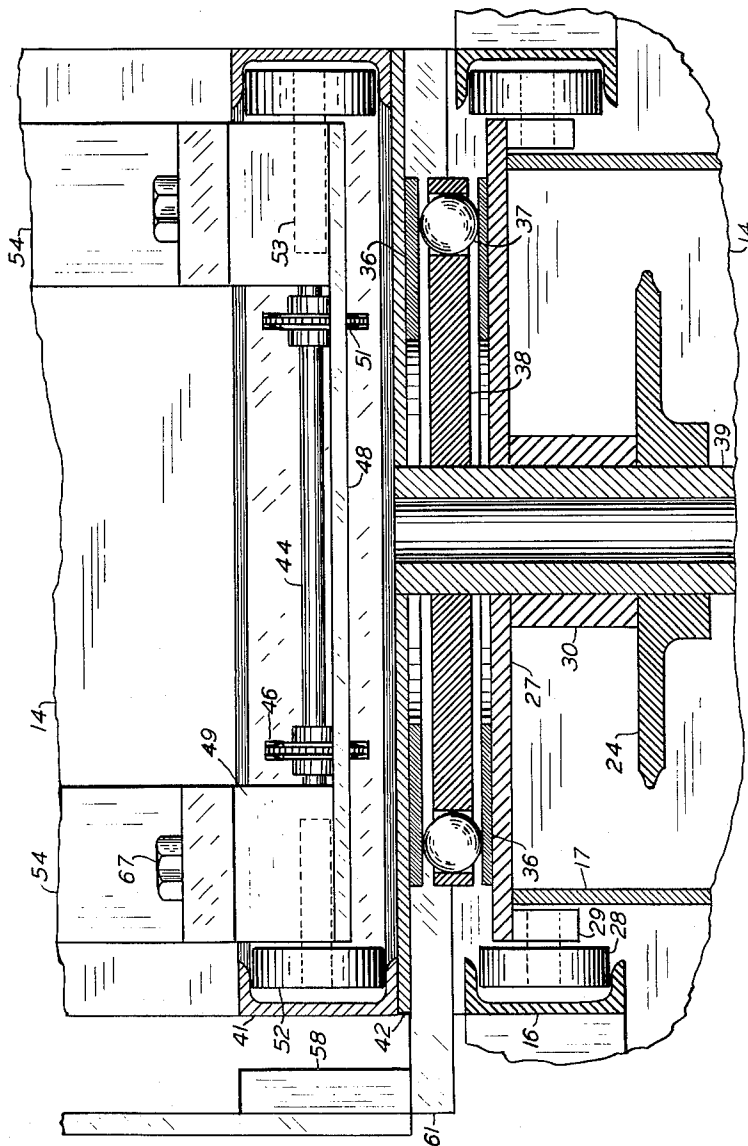
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MOVEABLE PLATFORM WITH LIFT AND TURNOVER MECHANISM

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6 Sheets-Sheet 5



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MOVEABLE PLATFORM WITH LIFT AND TURNOVER MECHANISM

Filed July 31, 1958

6 Sheets-Sheet 6

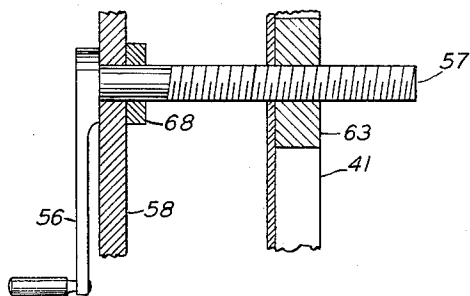


FIG. 6

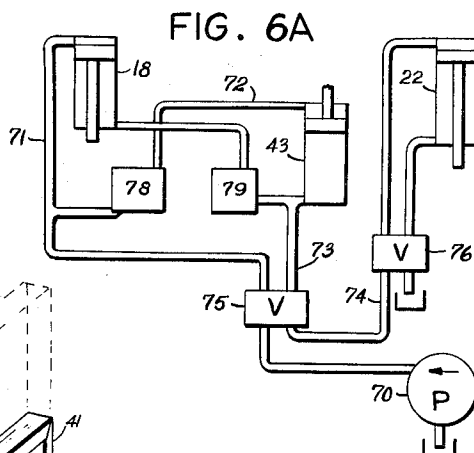


FIG. 6A

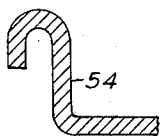


FIG. 7

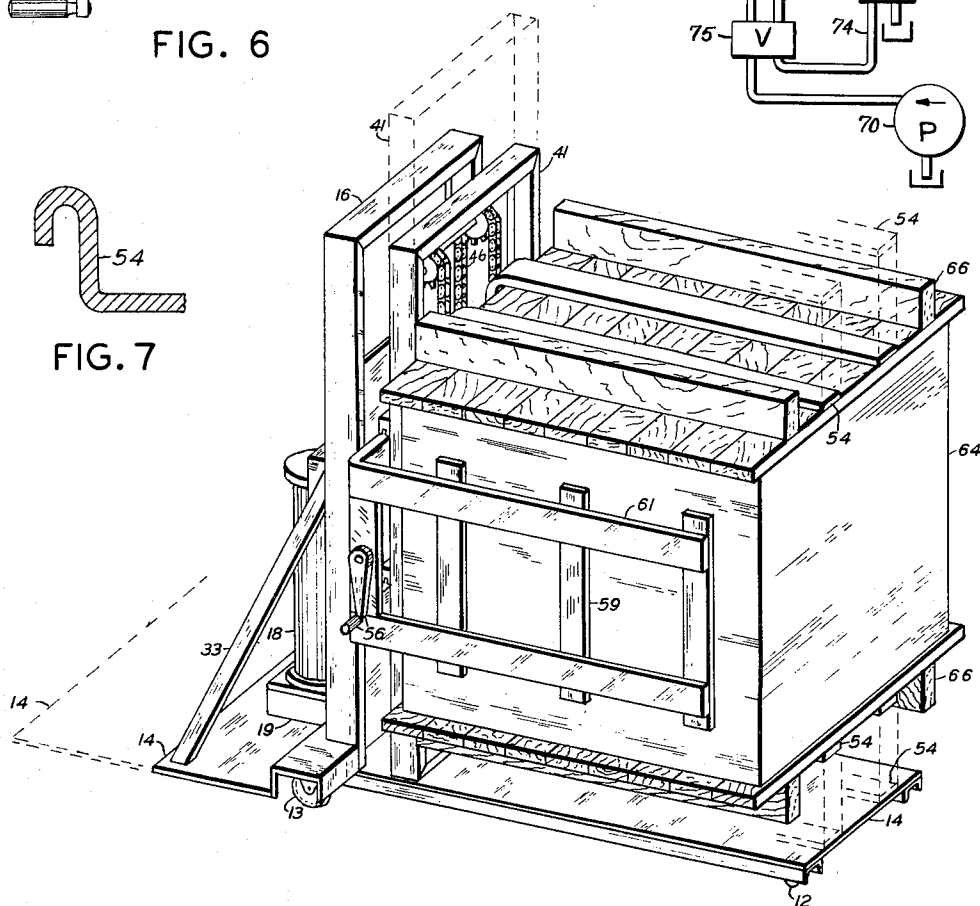


FIG. 8

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MOVEABLE PLATFORM WITH LIFT AND TURNOVER MECHANISM

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Filed July 31, 1958, Ser. No. 752,242

9 Claims. (Cl. 214—652)

The present invention relates generally to a lift and turnover mechanism, and it has particular relation to a movable platform provided with a lift and turnover mechanism of the type suitable for use in the lifting and turning over of skids containing stacks of paper and the like.

In the operation of automatic sheet feeding machines, especially in the printing industry, the sheets of paper coming off a printing press are arranged in a pile or stack on a skid with their printed sides facing upwardly. Before the unprinted sides of such sheets can be printed, the pile or stack of sheets must be reversed or inverted, and, in many instances, the reversing or inverting operation is a very laborious job. It may be done by hand, or, in the larger plants, there is a skid lifting and inverting mechanism that is mounted fixedly to the floor. With such fixed mechanism, it is necessary to truck the loaded skids to its position for lifting and inverting, and then it is necessary to retruck the reversed skids back to the printing press for the printing of the opposite sides of said sheets.

The present invention obviates the aforesaid disadvantages and provides a machine that can be moved from press to press for the lifting and inverting of loaded skids, and requires no fixed mounting or supporting base on the floor of the plant.

An object of the present invention is to provide a simple, inexpensive and efficient movable platform having hydraulic jack means for not only lifting and clamping, but also for reversing skids containing stacked sheets of paper or the like.

Another object of the invention is the provision of a movable platform having means for transferring a portion of the weight of its load to the floor over which it is movable.

A further object of the invention is to provide a movable platform with means suitable for engaging the load between suitable clamping members for preventing the same from shifting during the inverting operation.

Another object of the invention is the provision of suitable means adjustable to the width of the load for supporting the same during the inverting operation.

A further object of the invention is to provide a movable platform with means that will permit its use as an elevator for supporting a skid load of paper sheets at varying heights for facilitating the feeding of the top-most sheet into a printing press.

Other and further objects and advantages of the invention reside in the detailed construction of the several parts, which result in simplicity, efficiency and economy, and which will be apparent from the following description, wherein a preferred embodiment of the invention is shown, reference being had to the accompanying drawings, forming a part hereof, wherein like numerals indicate like parts, in which:

FIGURE 1 is a side elevational view of a platform embodying the principles of the invention;

FIGURE 2 is a rear elevational view of the platform shown in FIGURE 1;

FIGURE 3 is a front elevational view of the platform shown in FIGURE 1;

FIGURE 4 is a sectional view of the platform shown in FIGURE 2, the same having been taken substantially

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along the line 4—4 thereof, looking in the direction of the arrows;

FIGURE 5 is a fragmentary top plan view, on an enlarged scale, of the platform shown in FIGURE 3, the same having been taken substantially along the line 5—5 thereof, looking in the direction of the arrows;

FIG. 6 is a fragmentary, enlarged sectional view of the actuating mechanism for the laterally adjustable load support means of the invention;

FIG. 6A is a diagrammatic representation of the hydraulic system of the invention;

FIG. 7 is a fragmentary, sectional view of one of the forks for clamping the load; and

FIG. 8 is a perspective view of the device of the invention, showing by dotted lines the various movements of the parts.

Referring now to the drawings, and especially to FIGURE 1, there is shown a platform 14 suitably equipped with conventional spaced supporting casters or wheels 12 and 13, which provide means by which the same may be moved from one place to another over a floor 11 or other supporting structure. On this platform are mounted all the other parts, fixed or movable, that make up the invention.

A vertically extending carriage guideway 16, comprising two vertical tracks and a top cross member, is rigidly fixed to the platform, and braced to it by means of braces 33.

A movable carriage 27, FIGURE 2, is supported in the vertical tracks of carriage guideway 16 by means of rollers 23 which are bearing-mounted to ears 29 that form part of the carriage. This carriage serves to raise the load off the floor sufficiently to be inverted. The carriage is caused to travel vertically between the tracks of carriage guideway 16 by means of vertical lift jack 18, which in turn is attached to the base plate. Extending downwardly from vertical lift jack 18 through platform 14 and ways is a weight transfer foot 21. This foot serves to transfer the load directly to the floor 11 during the lifting operation to relieve wheels 13 and to act as an automatic brake to prevent rolling of the platform 14 during the time the heavy load is supported thereby. The load transfer to the floor is automatically accomplished by compression of the resilient spacer 19 when the load is lifted. All remaining parts that make up the invention are mounted, fixed or movable, on this carriage.

An inverting trackway 41, comprising two tracks and two cross members, is mounted on reinforcing plate 42 which in turn is mounted rigidly to shaft 39, FIGURES 4 and 5. The shaft 39, trackway 41 and attaching parts serve to invert the load after it has been raised clear of the floor. The shaft 39 is rotatably supported on carriage 27 by means of sleeve bearing 30, by means of a bearing comprising inverting ball bearing race 36, balls 37 and retainer 38, and by means of frame 31 and support 32, which in turn are supported on carriage 27 by means of gusset 17. Rigidly attached to shaft 39 is inverting sprocket 24 which is driven in rotation by chain 23 which, in turn is driven through a 180-degree rotation of shaft 39 by means of inverting jack 22. Jack 22 is supported on carriage 27 by means of gussets 34. Chain 23 is supported by idler sprocket 26. The provision of a jack for inverting the skid avoids the time delay of such mechanisms as worm gears. Rapid inversion is possible in our invention, without disturbing the integrity of the stack, because of the laterally adjustable load support means described hereinafter. All remaining parts that make up the invention are mounted, fixed or movable, on this inverting trackway 41.

Two pairs of forks 54 are mounted on fork mountings 49 which are free to travel in the inverting guideway 41 by means of rollers 52 and pins 53. These forks serve

to support and clamp the load during the inverting operation.

Each fork is shaped as shown in FIGURE 7 and is attached to the fork mounting 49 by means of a single bolt 67, FIGURE 5, to facilitate removal of the upper forks when the invention is used as a lift table. The opposite pairs of forks 54 are driven toward and away from each other by means of clamping jack 43, FIGURES 1 and 3. In order to maintain the center of gravity of the clamped load aligned with inverting shaft 39, the two pairs of fork mountings are caused to move toward or away from the shaft center by means of chains 46, to which one pair is attached at the back by a cross member 48, while the other pair is attached at the front by a similar cross member 48. The chains 46 are supported in the inverting trackway 41 by means of sprockets 51 which are mounted on shafts 44 which are in turn fixed to the sides of trackway 41, near top and bottom.

Laterally adjustable load support means, including the side bars 61 and spacers 59, FIGURE 1, are slideably mounted in guides 62 which are in turn mounted on inverting trackway 41. The side bars 61 and spacers serve to support the load laterally during the inverting operation, and to adjust to any load width to maintain the load center of gravity in line laterally with inverting shaft 39. The adjustment is set by means of crank 56 which rotates screw 57 which is mounted in retainer 68 and engages nut 63 fixed to inverting trackway 41. Rotation of the crank 56 moves frame 58, and with it side bars 61 and spacers 59, toward or away from the center of rotation of the inverting mechanism.

The complete operation of the invention can be seen in FIGURE 8. The device has been rolled forward under a load of paper 64 mounted on an ordinary skid 66, and an additional skid 66 has been placed on top of the load. With connection to suitable electrical outlet made, a common hydraulic compressor 70 (FIG. 6A) is caused to generate hydraulic pressure in the lines 71, 72, 73 and 74 (FIG. 6A) to the three jacks described. Side bars 61 and spacers 59 have been adjusted by means of crank 56 so that they extend laterally exactly half the load width from the center of the inverting shaft. When the device is properly placed adjacent to the load, these forks and spacers are snug against the side of the load. Manipulation of one hydraulic valve 75 (FIG. 6A) causes lift jack 18 to raise the load off the floor and at the same time to extend the load transfer foot down to the floor, FIGURE 4. With the device thus securely braked and the vertical lift operation completed, hydraulic power is automatically transferred to clamping jack 43, by a suitable sequence valve 78, causing the upper and lower pairs of forks 54 to move together and clamp the load securely between them as shown in FIGURE 8. When a preset pressure has been applied to the load through the clamping jack 43, this second jack becomes inoperative automatically and, at the operator's discretion, a second valve 76 (FIG. 6A) is manipulated, causing inverting jack 22 to rotate the load through 180 degrees about the inverting axis. At the completion of the inverting cycle, the first valve 75 is set in the opposite direction, and the unclamping and lowering operations are accomplished automatically, by a suitable sequence valve 79, replacing the inverted load on the floor. At the completion of this automatic operation, the invention is backed away from the load and is ready to repeat the operation on another load.

Although we have only shown and described in detail one embodiment of the invention, it will be readily apparent to those skilled in the art that many modifications may be made therein without departing from the spirit thereof or from the scope of the appended claims.

What we claim is:

1. In apparatus of the character described, a movable platform; a carriage guideway upstanding vertically from

said platform; a carriage mounted movably on said guideway; lift mechanism, including a first fluid operated jack on said platform, for moving said carriage on said guideway; an inverting trackway rotatably mounted on said carriage to turn on a horizontal axis; turnover mechanism including a second fluid operated jack on said guideway and inversion means operable by said second jack for inverting said trackway; spaced upper and lower forks movably mounted on said inverting trackway; clamping mechanism, including a third fluid operated jack on said trackway and actuating means operable by said third jack for simultaneously moving both of said forks toward and away from each other and valves operably connected to said jacks for controlling the supply of fluid pressure thereto.

2. Apparatus as specified in claim 1 wherein said lift mechanism includes a weight transfer foot vertically slidable in said platform and a resilient, compressible member normally supporting said foot and said first jack, said foot being automatically moved downwardly when said jack lifts a load.

3. Apparatus as specified in claim 1 wherein said inversion means of said turnover mechanism includes a sprocket rotatable co-axially with said trackway and an endless chain trained around said sprocket, said chain having a straight stretch extending along the path of, and connected to, the piston of said second jack whereby said sprocket is turned by the reciprocation of said piston.

4. Apparatus as specified in claim 1 wherein said actuating means of said clamping mechanism includes endless chain means on said trackway, actuated by said third jack, said upper forks being fixed to one stretch and said lower forks being fixed to the other stretch of said chain for simultaneously moving said forks toward and away from each other.

5. Apparatus as specified in claim 4 plus bolt means securing said upper forks to said endless chain means, said upper forks being removable to convert said apparatus to a lift table.

6. Apparatus as specified in claim 1 plus laterally adjustable load support means on said inverting trackway, said means including side bars and spacers adapted to support a load during inversion thereof and a manually operable thrust screw for moving said bars and spacers toward and away from the axis of said trackway.

7. In apparatus of the character described, a platform movable over a supporting surface; a carriage guideway mounted vertically on said platform; a carriage mounted movably on said guideway, said carriage having a rotatable inverting trackway; spaced upper and lower, load-engaging forks mounted movably on said inverting trackway, clamping mechanism on said trackway for simultaneously moving said upper and lower forks toward and away from each other; lift mechanism on said platform for raising said carriage on its guideway, said mechanism including a weight transfer foot and a resilient compressible member for automatically transferring a portion of the weight of a lifted load from said platform to said supporting surface and turnover mechanism on said guideway for rotating said trackway to invert said load.

8. In apparatus of the character described, a platform movable over a supporting surface, a carriage guideway mounted vertically on said platform; a carriage mounted movably on said guideway, said carriage having a rotatable inverting trackway; spaced upper and lower load-engaging forks mounted movably on said inverting trackway; clamping mechanism on said trackway for simultaneously moving said upper and lower forks toward and away from each other; lift mechanism on said platform for raising said carriage on its guideway, said mechanism including a resiliently mounted load transfer foot for automatically transferring a portion of the load lifted from said platform to said supporting surface, turnover

mechanism on said guideway for rotating said trackway to invert said load and laterally movable load support means on said trackway, adjustable to the width of said load for supporting the load during inversion.

9. Apparatus as specified in claim 1 wherein said valves 5 comprise a first valve for controlling the supply of fluid pressure to said first and third jacks and a second valve, for controlling the supply of fluid pressure to said second jack.

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