TRAY TYPE SCISSORS LIFT


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4 Claims. (Cl. 254—122)

This invention relates to what has herein been designated as a "tray type scissors lifter," as designed for use in paper finishing processes for the stacking, moving and unstacking of paper sheets; the device being characterized by the embodiment therein of a lift table, or tray, that by reason of the present improvements, lowers to approximately three-fourths of an inch above floor surface level without necessitating the recession of any of its parts or mechanisms into the supporting floor surface.

It is the primary object of this invention to provide a scissors lift table or tray of the above stated character wherefore it to explain that normally and pivotedly joined lifters of the scissors lift mechanisms are powered by hydraulic cylinders, which are joined therewithin the meicro of unique rocker levers whereby the hydraulic pressure usually required to start the lifting of a full load will be materially lessened, and which lever systems further makes it possible to obtain the required lifting height and to adequately accommodate the full scissors action of the lifters with a shortened overall length of tray or lift.

It is a further object of the present invention to provide a novel lifting lever system that reduces the usually required forces on the pivot and joints throughout the lifting mechanisms.

Further objects and advantages of the invention reside in the details of construction and combination of parts and in their relationship and mode of operation, as will hereinafter be described.

In accomplishing the above mentioned and other objects of the invention, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings wherein:

FIG. 1 is a top plan view of the tray type scissors lift embodying the improvements of the present invention therein; portions of the tray being broken away to better disclose parts otherwise obscured.

FIG. 2 is a vertical section, taken on line 2--2 in FIG. 1, and showing, in dash lines, successive positions of the tray and scissors lift levers during a tray lifting operation.

FIG. 3 is a perspective view of the present lift in raised position; parts of the tray being broken away, for explanatory purposes.

FIG. 4 is a vertical section taken on line 4--4 in FIG. 1, with the lift collapsed, or fully lowered.

FIG. 5 is a vertical section taken on line 5--5 in FIG. 1.

FIG. 6 is a cross-section taken on line 6--6 in FIG. 5.

Before describing the present lifting device in detail, it is desirable to explain that normally a table device of this character capable of lifting large paper stacks will have a minimum collapsed height of seven to ten inches. If the normal working height of a paper finishing machine, such as the trimmer, is forty inches, only thirty to thirty-three inches of workable height can be utilized until a lifting device was retracted into the floor. In many instances such recessing is objectionable, especially in a second or higher floor installation.

In the present instance the lift has a platform or tray that lowers to within three-fourths of an inch from the floor surface and is supported on three sides, thus utilizing its full travel as workable height. Paper is usually stacked and transported on skids or pallets and these can be conveniently loaded onto the lift by using a jack lift or other similar types of transport equipment.

Other characterizing features of the present invention reside in the unique rocker lever system whereby lifting leverage is most advantageously employed, and which makes possible the obtaining of required lifting height with a shortened overall length of table.

Referring more in detail to the drawings:

It is to be observed best by reference to FIG. 3, that the present lift comprises a flat base structure, designated in its entirety by reference numeral 10, and a tray or lift table designated in its entirety by reference numeral 12. In order to give a better understanding of the dimensions of the present structure, it will here be mentioned that the base of a lift presently being employed is approximately five feet in length from front to back, and has an overall width of about four feet. When fully lowered, with the tray or table resting flatly upon the base structure as in FIG. 2, the lift has an overall height of about nine inches and when the lift is fully raised or extended, it has a height of approximately four feet.

It has been shown best in FIGS. 1, 2 and 3 that the base structure 10 comprises laterally spaced opposite side housings, 10a and 10b that are rigidly joined in predetermined parallel spacing by a housing 11 that rigidly joins them across their forward ends; this being the right hand end as seen in FIG. 1. It will be best understood, also, by reference to these figures that the housings 10a, 10b and 11 are in the nature of open topped boxes and it is in these boxes that the paired scissors lift levers, the lift powering hydraulic cylinders and the levers and linkage associated therewith is contained, as will presently be fully explained.

The laterally spaced relationship of the base housings 10a and 10b provides an intermediate open space, designated at 13 in FIG. 3 into which the tray forming portion of the lift table is received when the tray is lowered to receive a load. When fully lowered, the tray bottom structure, designated by numeral 12 in FIG. 4, will rest flatly on the floor surface between the two housings.

The table structure herein designated in its entirety by reference numeral 12, preferably comprises an integral or unitary casting that is formed at opposite sides with parallel housings 12a and 12b, that are open at their undersides and closed at their top sides as noted in FIG. 3. These two, laterally spaced housings are of the same dimensions as the housings 10a and 10b and are joined by a connecting housing 15 across their forward ends in such spacing that they will exactly register with the lower housings, and may be rested firmly and flatly thereon, when the parts 10 and 12 are closed together, as in FIGS. 2 or 5.

In the present structure, the upwardly opening housings 10a and 10b and the downwardly opening housings 12a and 12b are designed to house the hydraulic cylinders, and the scissors lift mechanisms between them. The housings 11 and 15, likewise cause to confine therein the scissors lift connecting shaft that coordinates or equalizes the movements of these levers.

Located lengthwise of and within each of the housings 10a and 10b, is a pair of crossed lift levers 30 and 39', that are pivotally joined through their medial crossing areas, by pivot bolts 31 as has been shown in FIG. 6. At what has been designated their forward ends the levers 30 are pivotally secured respectively, in the top forward ends of the corresponding housings 12a or 12b by pivot bolts 32 for vertical swinging as has been indicated in dash lines in FIG. 2.

At their swinging ends, at the left in FIG. 5, the levers 30 mount horizontal rollers 33 thereon for rolling travel in horizontal trackways 34 formed on the sidewalks of the base housing 10b, of base 10.
The levers 30 are of the single piece flat formation, best shown at the near side of FIG. 3 but the complementary levers 30' are of box-beam construction in that each comprises a pair of laterally spaced opposed side portions, as at 30x and 30y in FIG. 1, and these are joined in spaced relationship at their forward ends by a top and end closure plate 32 and at their swinging ends are joined by a cover plate 30f. This top plate arrangement is such as to leave an intervening open space between them as at 35 in FIG. 2.

It has further been shown in FIGS. 1 and 3 that the levers 30' are pivotally mounted at their forward ends on the bottoms of the forward end portions of housings 10a and 10b, as at 40 in FIG. 2, and at their rearward or swinging ends mount rollers 41 which engage in rolling contact with the under surfaces of the top walls of housings 12a and 12b of the top structure as best seen in FIG. 2.

Directly associated with each of the levers 30' is a hydraulic cylinder 50, so disposed as to be received lengthwise of and between the laterally spaced side plates of the box type lever, as has best been shown in FIGS. 1 and 2, when the levers 30—30' are closed together.

The cylinders 50 have ends pivotally mounted, as at 51, in the rearward ends of the base housings 10a and 10b and their piston rods 50' are each pivoted attached at their forward ends, as at 52 to one end of a rocker lever 53 that is contained within the forward end portion of the lever 30 as will best be understood by reference to FIG. 2. Each rocker lever 53 is pivoted between its ends, between the spaced side members of lever 30' on a horizontal bolt 54 and it is to be observed that the lower edge portion of each rocker lever 53 rests along its medial portion upon the bottom of the corresponding housing 10a or 10b and then curves upwardly and forwardly therefrom and equipped therealong with a succession of rollers, as at 55, 56, 57 that are caused, in a lifting operation, to be successively brought into rolling contact with the floor of the housing in which the rocker lever is contained.

It has been shown in FIGS. 1 and 4 that the rod 40 by which the levers 30—30' are pivotally mounted at opposite sides of the lift, is contained axially within a rigid tube 59 that is welded at its ends to the levers so that they will swing equally in unison during any lifting or lowering operation.

Hydraulic pressure medium is admitted to and from the hydraulic cylinders 50 through conduits 60 that enter them at their pivot ends as indicated in FIG. 1. This may conveniently be under valve control, not herein shown to extend the piston for lifting or to permit it to retract for lowering.

Assuming that the lift is constructed as described, it will be understood that when the table and tray portion is in fully lowered position it assumes the position shown in full line in FIG. 2, and when being lifted, will move upwardly successively through the several positions in which it has been shown in dash lines in FIG. 2. The tray portion 12 will be received flatly against the floor surface between the housings 10a, 10b and 11 when fully lowered and will afford easy loading or unloading therefrom.

A characterizing feature of this lift resides in the fact that, at the start of a lifting operation where the greatest lifting force is required, this will be applied by the hydraulic cylinders through rocker lever 53 and the relatively short lever arm portions that are between the pivot point 54 and near roller 55. This condition of leverage exists until the table reaches the level of line a—a in FIG. 2. Then, as lifting continues, and the lifting force required is somewhat lessened, the rollers 56 and 57 are successively brought into contact with the floor of the housing 10a as the table successively passes through levels b—b and c—c. When that end portion of the rocker lever to which the piston rod is connected engages against the rear edge of top plate 32, the force of the hydraulic cylinder is then directly applied to the lever 30 in swining it upwardly on pivot 40 to this top position of FIG. 2.

Thus, it will be understood that the leverage provided through the use of rocker levers 53—55 is such that at the start of a lifting operation the lifting force is materially greater than the shortened lever arms and is decreased as the requirement for force is lessened.

It is further understood that by rotating the base structure 10 to receive the tray portion of the table thereinto, the advantage of getting the tray to a very low level is obtained without resorting into the floor. Furthermore, the power advantage and height decrease is obtained with the decrease in overall length of the table.

What I claim as new is:

1. A scissor lift table of the character described comprising a pair of laterally spaced base housings interconnected at one end, a pair of laterally spaced table housings interconnected at the same end as the base housings and overlying said base housings, a pair of crossed and pivotally joined lever positions in and between each of said opposed base and table housings, each of said levers being movably connected at corresponding ends, respectively, with the base and table housings, a power cylinder for effecting the opening and closing of each of said pair of lift levers, each of said power cylinders being pivotally connected to a respective base housing at one end thereof, said power cylinders each including a piston rod extending from the free end thereof, a generally arcuately shaped rocker lever pivotally joined intermediate its ends to one lever of each pair of said lift levers, the pivotal joining of said rocker lever to said lift lever being intermediate the pivotal joining of said pair of lift levers and the connection of said lift lever with said base housing, one end of said rocker lever being pivotally connected to said piston rod, the arcuate portion of said rocker lever, at the end thereof opposite the connection to said piston rod, being positioned to progressively engage with the base housing as the piston rod is extended from the cylinder.

2. A scissor lift table as in claim 1 wherein one end of each crossed lifting lever is joined respectively to the base housing and table housing by a sliding connection.

3. A scissor lift table according to claim 1 wherein full retraction of the piston rods causes the paired, lift levers and the hydraulic cylinder to swing into close parallel relationship and complete enclosure within the corresponding housings of the base and table.

4. A scissor lift table according to claim 1 wherein the lift lever to which said rocker lever is pivotally attached is formed with a stop against which the rocker lever engages to limit the pivotal movement relative thereto after the fulcrum point that is farthest from the pivotal mounting of the rocker lever has been brought into contact with the base housing thus to cause the lifting power to be applied directly to the lift lever.

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