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ATTACHABLE SWEEPER

Filed June 9, 1969

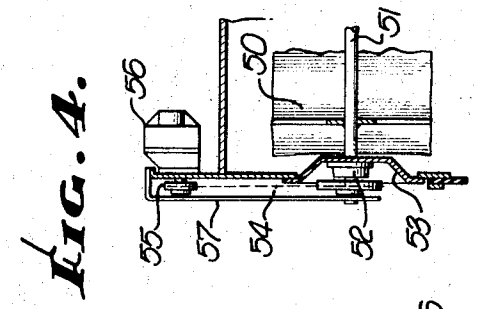


FIG. 4.

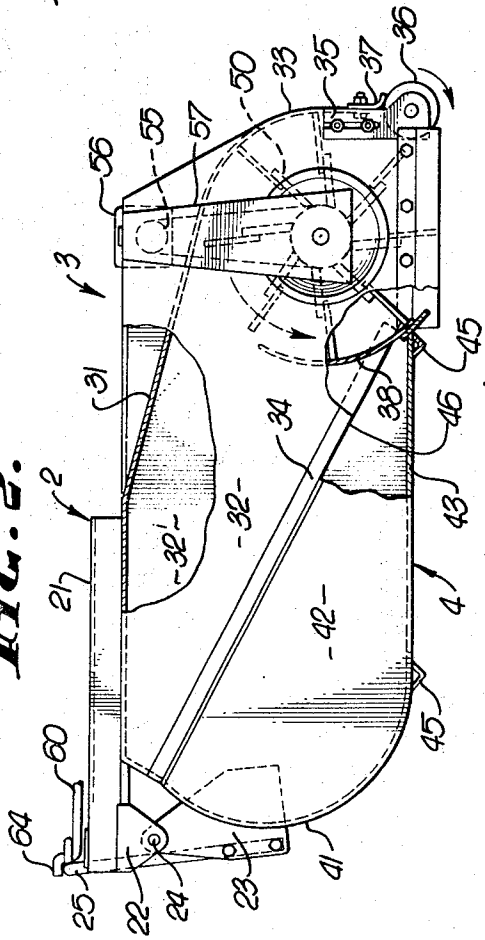


FIG. 2.

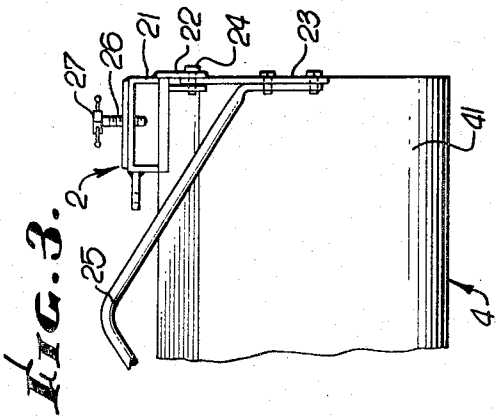


FIG. 3.

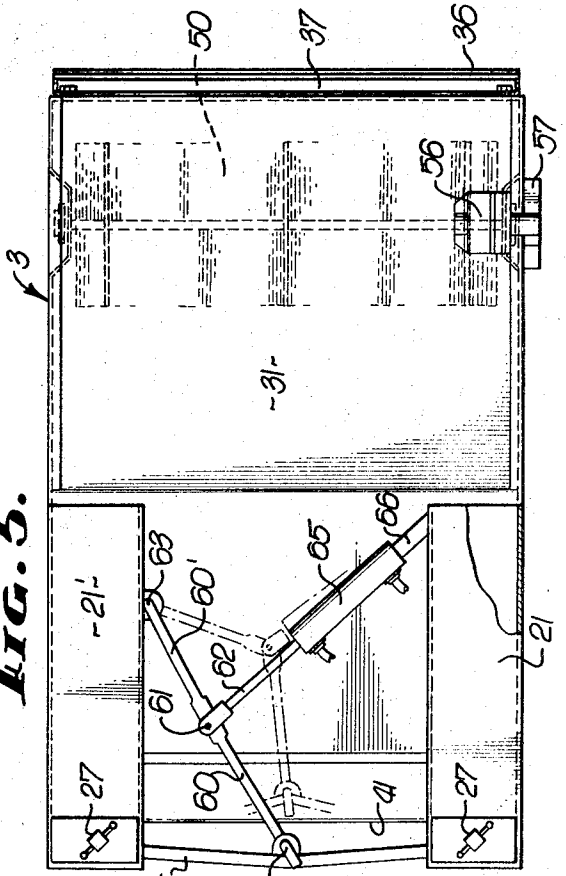


FIG. 5.

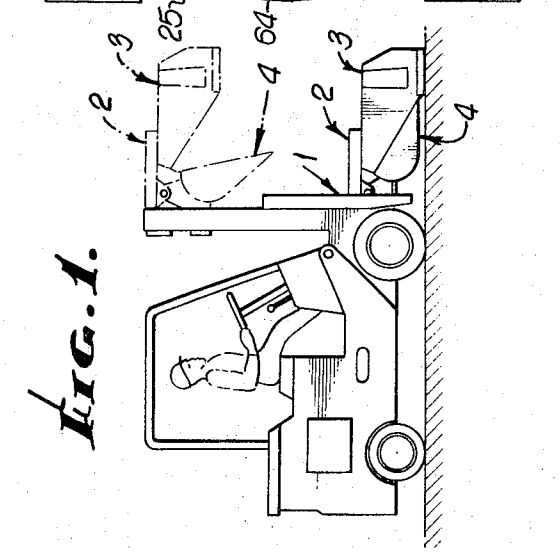


FIG. 1.

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ATTACHABLE SWEEPER

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ABSTRACT OF THE DISCLOSURE

A bottom dump sweeper for removable attachment to fork lift trucks in which the vertical height of the attachable sweeper is minimized, thereby permitting the operator to see the road ahead, the sweeper including improved means for moving a debris pan from a closed position to an open position including means whereby the debris pan is automatically held in the desired position even though the actuating means is fluid powered.

It has been recognized in the past that utilization of capital investment in equipment such as fork lifts could be increased by the use of attachable devices such as sweepers, rotary brush attachments and the like, thereby permitting the fork lift to be used in connection with the attachment in the maintenance of grounds when the fork lift is not being used in its normal manner for the movement of pallets, etc. This general idea was approached by U.S. Patent 2,709,269 but prior devices heretofore constructed for this general purpose have had many failings. Many of them were extremely complicated in the manner that they were attached to the forks of a lift, thereby introducing a time consuming and troublesome factor. Other forms of devices were very large and bulky and of such vertical height as to interfere with the vision of the operator. Another problem lay in the fact that the pressure fluid systems employed on a fork lift truck were normally incapable of holding a receptacle either in closed or in open position, this being partially due to the fact that in these pressure systems, accumulators are employed and pressure changes take place. As a result, a pan or receptacle loaded with debris could not be held in a given state of closure but would slowly open and dribble the debris where it was not wanted.

The present invention is directed to a bottom dump sweeper capable of being readily and easily attached to a fork lift truck and quickly coupled to the customary fluid pressure actuating system of the lift. The vertical height of the attachable sweeper is minimized so that the operator can activate all of the controls from the driver's seat and have an unimpeded view of the direction and perhaps obstacles in the path of movement of the sweeper. Moreover, the debris pan dumps from an aloft position and in a direction directed away from the operator. Positive means are provided for raising and lowering the sweeper attachment so as to conform to ground level, provision is provided whereby the bottom pan will not drag along the ground and be worn, and means are provided whereby the hinged pan can be maintained in either closed or open position without fail.

An object of the present invention therefore is to provide a rugged, simply constructed, economical bottom dump sweeper for removable attachment to fork lift trucks.

A further object is to provide a sweeper attachment of the character stated in which the vertical height is minimized.

Another object is to provide an arrangement of debris pan, rotatable sweeper brush and a sealing and pickup roller whereby the sweeper brush most effectively and positively picks up debris of various types and deposits it in a debris pan.

These and various other objects and advantages of the present invention will become apparent from the following description of an exemplary form of the sweeper attachment. In order to facilitate understanding, reference will be had to the appended drawings wherein:

FIG. 1 is a somewhat diagrammatic representation of the sweeper in association with a fork lift, the sweeper being shown in ground level sweeping position and also in raised dump position (shown in dotted lines),

FIG. 2 is a more detailed side elevation of the attachable sweeper itself;

FIG. 3 is a rear elevation of only about one-half of the sweeper;

FIG. 4 is a section and elevation of approximately one-half of the front end of the sweeper; and

FIG. 5 is a top or plan view of the sweeper.

Fork lift or mast-type lift trucks and vehicles are well known: all of them are characterized by having at least one pair of forwardly extending forks **1** connected to a carriage which can be controllably raised, lowered and tilted by the operator who rides the vehicle, substantially as shown in FIG. 1. The vehicle generally includes hydraulic pressure fluid means to raise and lower the load carried by the forks. The removably attachable sweeper of this invention includes a fork receiving means **2** carried by the upper housing portion **3**, a pivotally mounted bottom dump debris pan **4** and drive brush means in the forward end of the sweeper. In addition, the sweeper includes means for permitting movement of the debris pan from a closed sweeping position to an aloft position in which the pan can be opened to dump debris into a large receptacle, dump truck, etc., the debris moving away from the operator during such dumping. In FIG. 1, the position of the housing and debris pan while sweeping is shown in full lines; the position of the sweeper and debris pan in dumping position is indicated in dash lines.

As best shown in FIGS. 2, 3 and 4, the upper housing portion **3** of the sweeper attachment may include a top **31**, sides **32** and **32'**, and a front **33**. Each of the sides **32** is provided with an inclined lower margin **34** which extends from a zone spaced from the front upwardly and rearwardly toward the top of the sweeper at its rear. In each of the sides of this upper housing portion is provided a vertically adjustable bracket **35** attached to the side at the front thereof. Vertical adjustability may be attained in different ways, the illustrated example showing the use of bolts having shanks extending through a vertical slot in each of the brackets. The two brackets are employed for rotatably mounting a sealing and pickup roller **36** which during operation of the sweeper, is in rolling contact with the ground and feeds debris to the main sweeper brush **50**. A strip of flexible composition **37** may be carried by the front **33**, such strip cooperating with and contacting the roller **36**. The strip **37** is attached to the front by a metal pressure plate and suitable bolts.

The fork receiving means **2** may comprise a pair of inverted channels or open ended box sections **21** and **21'** welded to the top **31**. These channels should be parallel and spaced a distance capable of readily receiving the forks of the fork lift. Means are provided for locking each fork in its fork receiving means or fork shoe; although various means can be employed for this purpose, the drawings illustrate a cap screw, collar screw, locking set screw or the like **26** extending through an internally threaded reinforced portion of the fork receiving means, each of such locking means being preferably provided with a handle such as **27** to facilitate the locking of a fork within its shoe.

The work receiving means **2** and each of them, extend rearwardly beyond the upper housing portion **3**. Attached to the rear protruding end of each channel **21** is a down-

wardly extending bracket 22 which makes a pivotal connection as at 24 with a pivot plate 23 connected or welded to the rear 41 of the debris pan 4 or to the side 42 of such debris pan. A bail or lever 25 connects both pivot plates 23 or the lower ends of such bail are attached to the back 41 of the debris pan 4, the central portion of such bail or lever 25 extending slightly above the level of the top 31 of the upper portion of the sweeper, such bail 25 constituting means by which the entire debris pan 4 can be pivoted about pivot point 24.

The debris pan 4 is also provided with a bottom 43 which terminates as previously indicated at a zone spaced from the forwardly positioned pickup roller 36. Moreover, the bottom 43 of the debris pan normally extends in a horizontal plane which is slightly above the level of the ground. The bottom 43 may have attached to its forward edge and to a rear portion, one or more stiffeners or buffers or wear strips such as 45. Each side 42 of the debris pan is provided with an upwardly and rearwardly inclined marginal edge portion 46 which, in closed position, should meet with the downwardly extending marginal edge 34 of the upper housing portion. The roller 36 may be made of any resilient elastomer or elastomer composition or may be a relatively densely bristled brush.

A sweeper brush 50 is mounted in the fore part of the upper housing for rotation about a transverse horizontal axis. Any desired construction for installing the brush can be used but the example shows the brush shaft 51 supported by bearings 52 carried by removable dished plates 53 attached to marginal areas of large ports formed in sides 32 of the upper housing portion. One end of shaft 51 may carry a sprocket connected by chain 54 to a drive sprocket 55 mounted upon the shaft of a fluid pressure motor 56 which, in turn, is carried on an upward extension of side 32. A chain guard 57 covers the chain and sprocket.

The construction illustrated, using inwardly dished mounting plates 53, results in a thin walled construction which permits effective operation of brush 50 in adjacent relation and proximity to a wall of a building, fence or the like. The fluid pressure motor is preferably provided with hose or pipe connections and quick disconnect couplings which permit the motor to be quickly connected to the hydraulic system of a fork lift.

It may be noted at this time that the bristles of the sweeper brush 50 should extend downwardly through the space between the pickup and sealing roller 36 and the forward end of the debris pan adjacent the member 45 and effectively contact the ground therebetween. Moreover, the direction of rotation of the brush is toward the front as indicated by the arrow in FIG. 2 and opposed to the direction of rotation of the pickup roller 36. It has been found desirable to impart a curvature to the lower front portion 33 so as to somewhat conform to the diameter or radius of the brush 50 and then let the top part 31 follow a tangential direction with respect to the brush, thereby effectively directing all debris picked up by the sweeper brush into the rear compartment of the sweeper. Moreover, attention should be called to the fact that the rear portion 41 of the debris pan is also curved on an appreciably larger radius however, and causes an even distribution of debris along the bottom 43 of the pan. The lower rear portion of brush 50 is separated from the debris collection zone of the pan by curved, transversely extending partition 38 carried by the upper housing portion 3; the upper edge of partition 38 is spaced from the top 31 to permit brush 50 to throw debris over such partition into the pan. The lower margin of partition 38 may carry an elastomeric bumper against which the front edge of pan 4 may abut when the pan is in closed position.

Applicant has provided fluid pressure actuating means for pivoting the debris pan and holding it in open and dump positions. The means for accomplishing this purpose include a pair of toggle links 60 and 60' (see FIG. 5) having a common pivotal connection with each other and

the actuating means 62 at 61. One end of one of the links, 60', is pivotally attached at 63 to a fixed part of the sweeper such as the fork receiving shoe 21' whereas the free end of the other link 60 is connected to the bail or lever 25 as indicated at 64. The actuating means 62 may constitute the piston rod of a hydraulically operated cylinder 65 whose opposite end is pivotally connected to the fork receiving shoe 21 as indicated at 66.

The actuating means and toggle arrangement described hereinabove is so arranged that fluid pressure actuated means will move the toggle links 60 and 60' to beyond aligned position at the end of a pan closing stroke thereby firmly maintaining the mating edges of the debris pan with the downwardly extending edges of the upper housing portion during sweeping operations, thereby maintaining a dustproof receptacle for all debris picked up by the brush 50. Similarly, when the fluid pressure cylinder and piston 65 are actuated in order to open the pan, the links 60, 60' will again be beyond aligned position (indicated in dash lines) when the pan is fully opened for dumping. A tight and dependable closure of the pan against the upper housing is of paramount importance however in that it prevents leakage, maintains the interior of the receptacle tight and does not permit the debris pan to partly open and thereby drag upon the ground with perhaps disastrous results.

I claim:

1. A bottom dump sweeper for removable attachment to fork lift trucks and the like, comprising:
- an upper housing portion having a top, front and sides, each of the sides being provided with an upwardly and rearwardly inclined lower margin;
- a pair of parallel fork receiving elements carried by the top and extending rearwardly;
- a debris pan pivotally connected to the rearwardly extending fork receiving elements for movement from a closed position wherein said pan cooperates with inclined lower mragins of the upper housing portion to provide a debris receiving receptacle to an open position wherein the contents of the pan may be dumped by gravity;
- fluid pressure activating means for pivoting said debris pan and holding it in open and closed positions; and
- sweeping means position in said housing for sweeping debris into said pan.

2. An attachable sweeper as stated in claim 1 wherein the means for pivoting the pan include a pair of toggle links having a common pivotal connection with each other and the activating means, one end of one link being pivotally connected to the upper housing portion and the free end of the other link being connected to a lever attached to the rear portion of the debris pan;
- said actuating means being arranged to move said links to beyond aligned position at the end of a pan closing stroke.

3. An attachable sweeper as stated in claim 1, wherein said sweeping means comprises;
- inwardly dished brush mounting plates carried by the sides of the upper housing portion adjacent the front thereof, a brush shaft bearing carried by each dished plate and a shaft rotatably jonrnaled in said bearings, said shaft being provided with a sweeper brush.

4. An attachable sweeper as stated in claim 3 including:
- fluid pressure motor means for driving said shaft and sweeper brush and
- a small diameter sealing and feeder roller mounted on said upper housing portion for rotation forwardly about an axis parallel to the axis of the sweeper brush and forwardly of the sweeper brush.

5. An attachable sweeper as stated in claim 2, wherein said sweeping means comprises:
- inwardly dished brush mounting plates carried by the sides of the upper housing portion adjacent the front thereof, a brush shaft bearing carried by each dished

plate and a shaft rotatably journaled in said bearings, said shaft being provided with a sweeper brush.

6. An attachoble sweeper as stated in claim 1 wherein the front of said upper housing portion is rearwardly curved to merge with the top of said housing portion and the debris pan is provided with a bottom which, in closed position, is virtually parallel to the plane of the fork receiving elements;

the frontal edge portion of said pan bottom being horizontally spaced from the front of the upper housing portion, when said pan is in closed position and at a higher level than ground contact level of the sweeper and pickup brushes.

7. An attachable sweeper as stated in claim 1, wherein said sweeping means comprises:

a rotatable sweeper brush mounted in the forward portion of said upper housing portion for rotation about a transverse horizontal axis; and

a small diameter sealing and feeder pickup roller mounted for rotation about an axis parallel to the axis of the sweeper brush and forwardly of the sweeper brush.

8. An attachable sweeper as stated in claim 7 wherein said pan has a bottom whose frontal edge is spaced from the front of the upper housing portion when said pan is in closed position and said bottom is at a higher level than ground contact level of the sweeper brush and pickup roller.

9. An attachable sweeper as stated in claim 7, including fluid pressure means for driving said sweeper brush in a direction opposed to direction of rotation of pickup and feeder roller by reason of rolling contact with ground.

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