United States Patent

[11] 3,618,530

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[21] Appl. No. **888,696**
[22] Filed **Dec. 29, 1969**
[45] Patented **Nov. 9, 1971**
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[54] SWITCH ACTUATING APPARATUS FOR TOW TRUCKS

8 Claims, 6 Drawing Figs.

[52] **U.S. Cl.** ..... **104/88,** 104/130, 104/172 BT

[51] **Int. Cl.** **B61l 13/02,** B65g 17/12

[50] **Field of Search** ..... 104/88, 172 BT, 170, 178; 198/38; 104/96–105, 130–132

[56] **References Cited**

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ABSTRACT: A switch actuating apparatus for use in a tow truck system includes two vertically slotted and horizontally notched probe mounting members disposed on either side of the tow pin of a conveyor truck to uniquely guide and position the probes. The probes cooperate with said slots and notches so as to swing forwardly when contacted from the rear, and are connected to a probe lifting device which is vertically movable between a raised inoperative position and a lowered operative position. The handle for the probe lifting device is located adjacent the tow pin handle and both are mounted in a handle housing whereby when the tow pin is raised the probes are necessarily raised, and when the probes are lowered the tow pin must also be lowered.

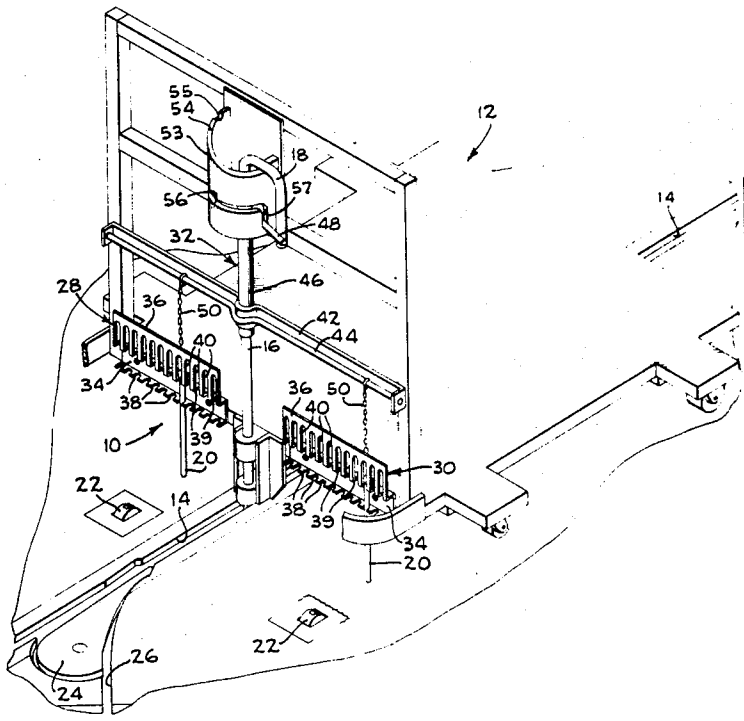
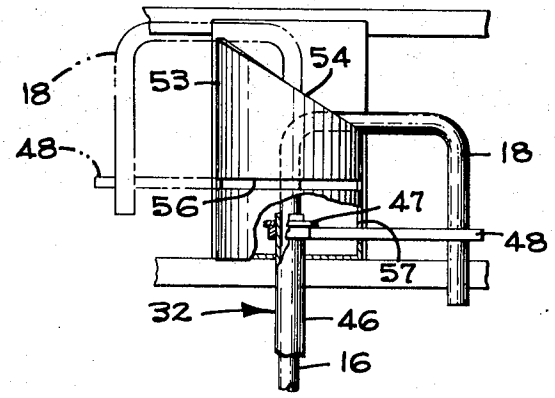


FIG_1A



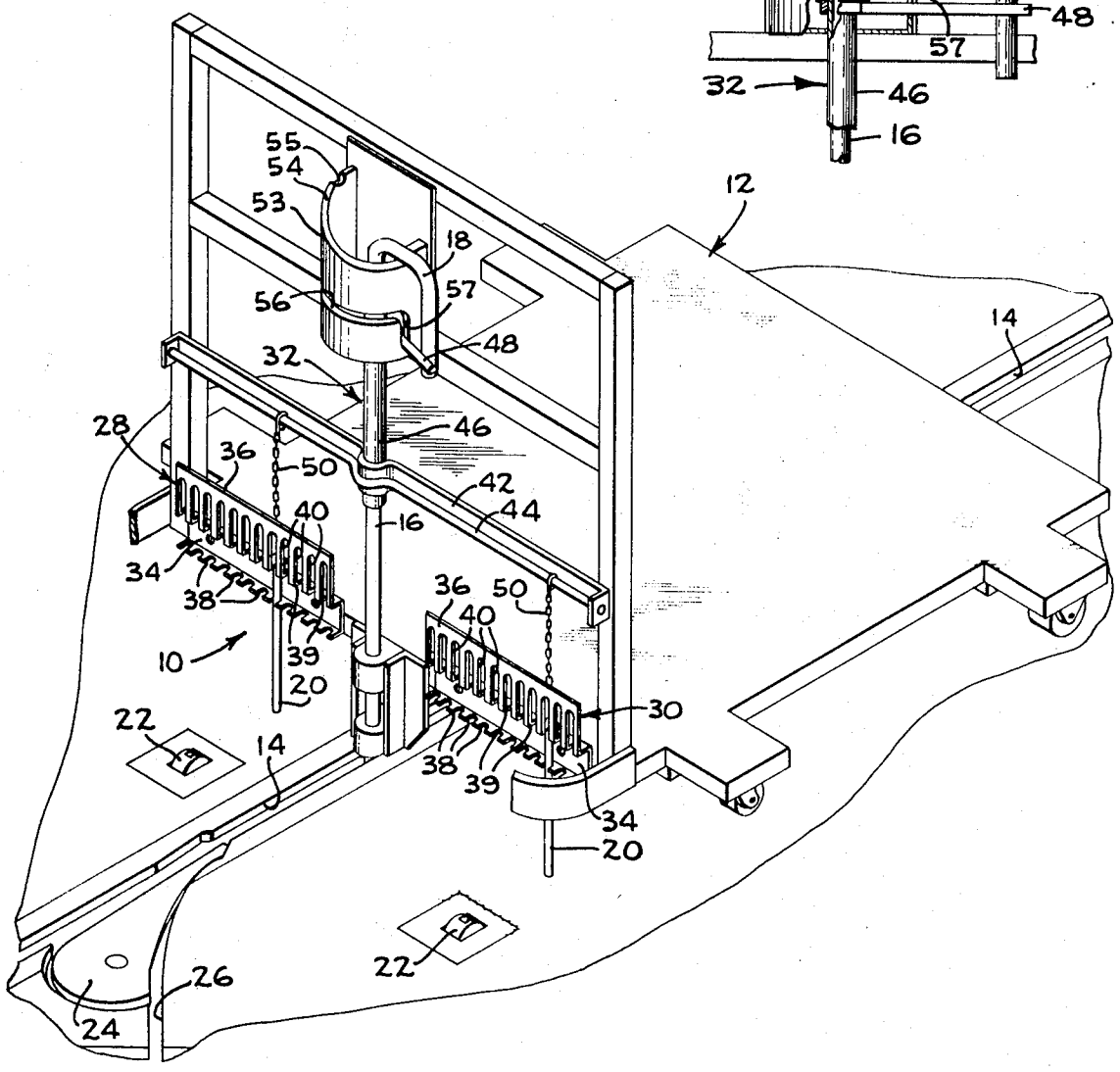


FIG_1

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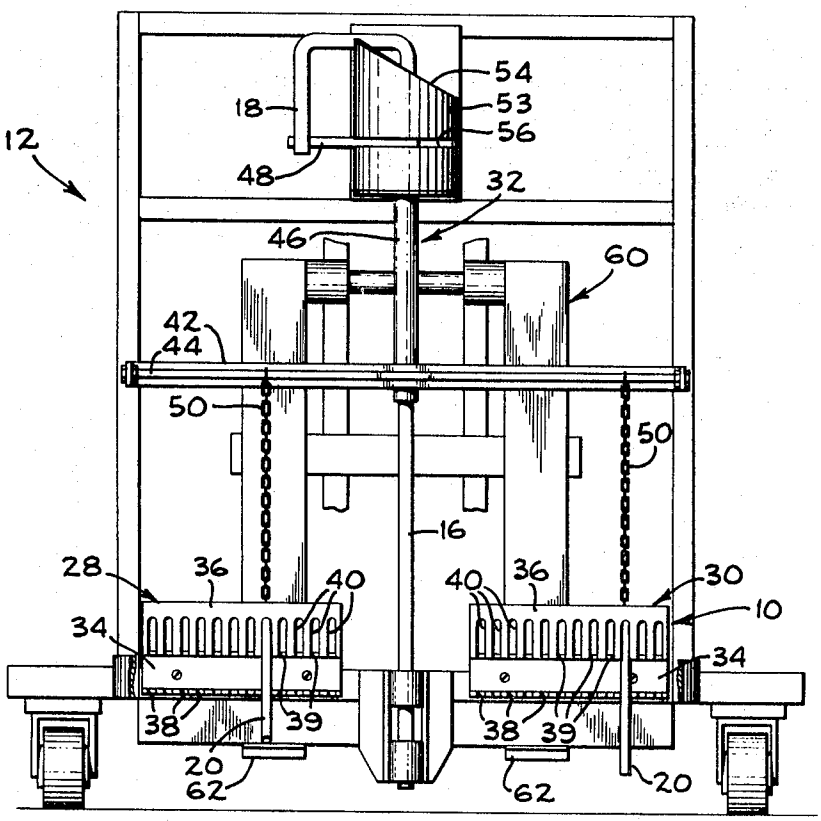

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FIG_2

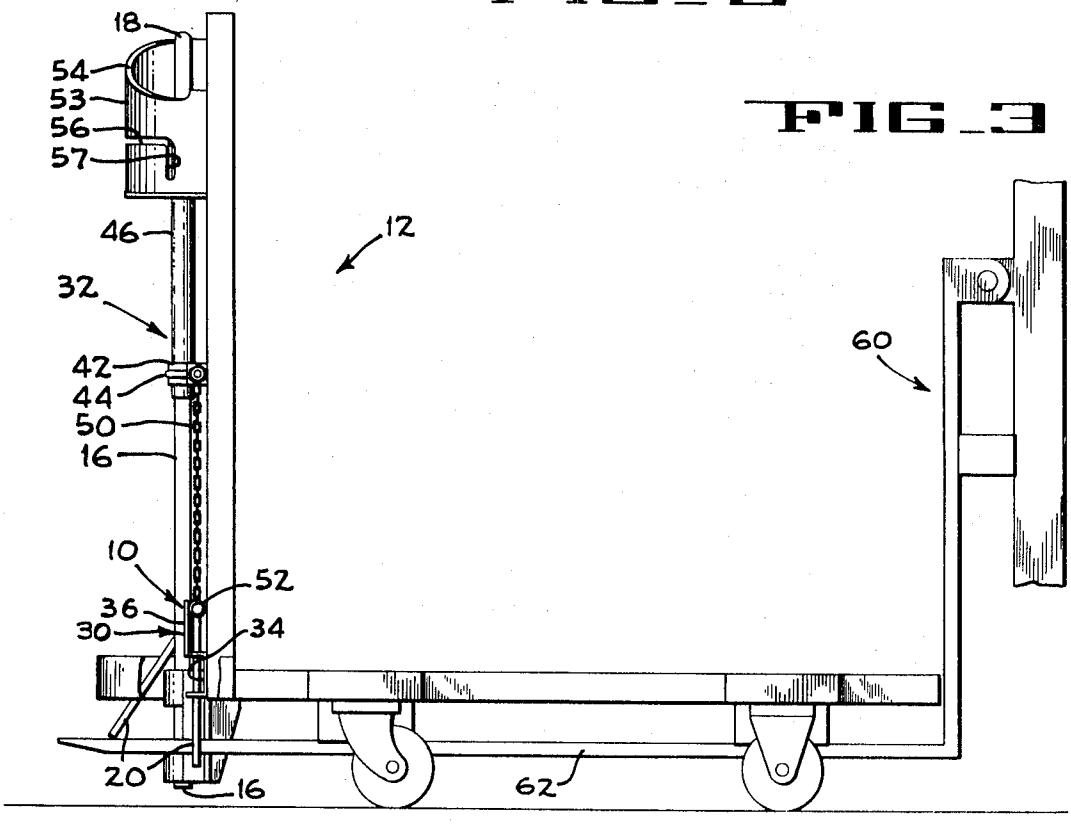

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FIG_3

FIG_4

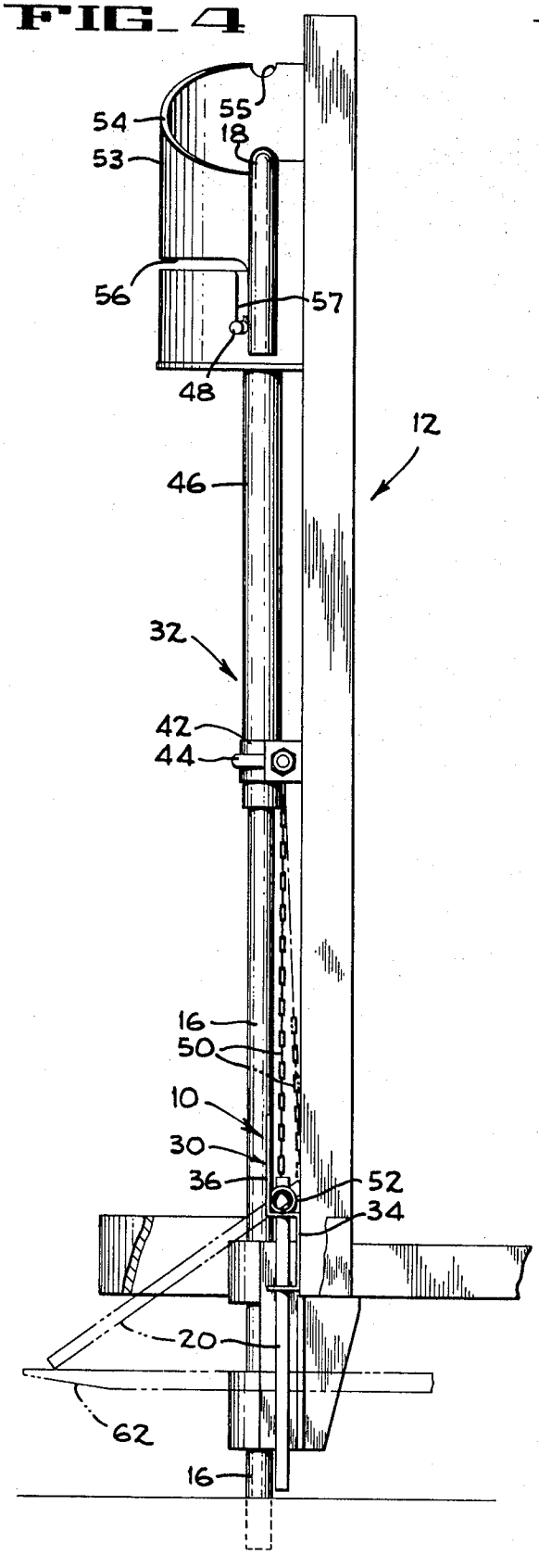
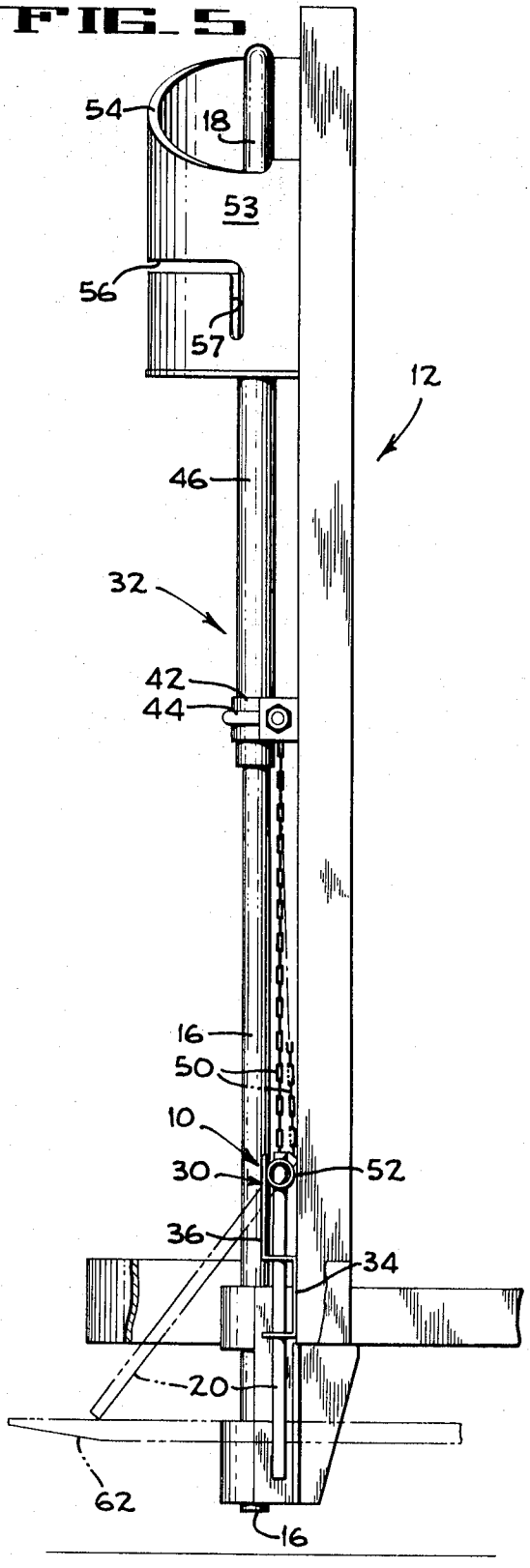

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FIG_5


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SWITCH ACTUATING APPARATUS FOR TOW TRUCKS

BACKGROUND OF THE INVENTION

The present invention relates generally to automated tow truck systems wherein conveyor trucks or dollies are towed by a driven linked chain that travels along an endless slot in a reference surface such as the floor of a warehouse. Switches disposed at preselected intervals along the main slot serve to divert the conveyor trucks into adjacent shunt slots when activated by a probe or probes depending from the truck. The switches can be of the mechanically actuatable type or of the electrically actuatable type. The present invention is primarily concerned with the former wherein probes mounted on the conveyor truck serve to physically trip properly coded reader heads disposed in the floor to open a switch plate in the floor and thus divert the truck into the adjacent shunt slot.

In many warehouses wherein the tow truck systems are utilized, conveyor trucks, along with the loads supported thereon, are picked up by fork lift trucks after entering a shunt slot and are temporarily stored in a warehouse rack. The fork lift truck approaches the conveyor truck from the rear so that the forwardly extending prongs of the fork lift truck extend longitudinally beneath the conveyor truck. Generally, the prongs are so long that they extend beyond the front end of the conveyor truck where the switch actuating probes hang below the conveyor truck. Depending on the lateral displacement of the probes from the longitudinal centerline of the conveyor truck, frequently the prongs of the fork lift truck will contact and damage the probes as the prongs are inserted beneath the conveyor truck. The switch actuating apparatus of the present invention is designed to alleviate such damage.

The probes of the switch actuating apparatus and the tow pin on the conveyor truck have operable and inoperable positions in which either can be placed. It is important to the quick, efficient, and damage-free operation of the system that the probes and the tow pin be disposed for quick and easy independent manipulation. The switch actuating apparatus of the present invention is mounted on the conveyor truck so that the probes of the apparatus can easily be manipulated between their operable and inoperable positions from a location that is convenient to the operator and is also adjacent the location where the tow pin is manipulated.

SUMMARY OF THE INVENTION

The switch actuating apparatus of the present invention is adapted for use on the front end of a conveyor truck used in a tow truck system. The apparatus includes two identical mounting brackets, one on either side of the tow pin of the conveyor truck, for guiding switch actuating probes. The brackets are constructed so that if a probe is contacted from the rear it will swing out forwardly avoiding damage, but when contacted from the front it acts as a rigid bar and as such is capable of tripping a coded reader head in the floor to open a switch plate and thus divert the truck into its predestined shunt slot. Frequently, the conveyor trucks are picked up by fork lift trucks and placed in a storage rack for later use and the prongs of the fork lift truck are long enough so that they will contact the probes when the prongs are inserted beneath the truck from the rear. The swing-out feature of the probes prevent them from being damaged on such an occurrence.

The mounting brackets contain a plurality of slots and notches, each being located at a preselected lateral distance from the longitudinal centerline of the conveyor truck, and each being cut to receive a probe for movement as described above. In the disclosed embodiment of the actuating apparatus there is one probe associated with each of the mounting brackets so that there is one probe on either side of the truck's tow pin. The probes are removably received in the notches so that they can be manually moved from one pair of vertically aligned slots and notches and placed in another pair to code the truck for a single one of a multitude of possible destinations or shunt slots.

Each of the probes hangs by a flexible chain from a rigid but vertically movable cross rod so that upward and downward movement of the cross rod effects a corresponding movement of the probes. The cross rod is operatively connected to a probe handle disposed at the transverse center of the conveyor truck and at a level which is convenient for manipulation by an operator.

The probe handle along with the tow pin handle, which is used to raise and lower the tow pin, are each uniquely situated in a handle housing for quick and easy manipulation. When the tow pin is raised, the probes also must be raised and conversely the probes cannot be lowered without lowering the tow pin; but, the tow pin can be lowered without lowering the probes. Thus, an operator, before placing a conveyor truck into the system, can easily lower the tow pin and the probes simultaneously sending the truck to a desired shunt slot, or he can lower only the tow pin. Once the truck has been diverted into the desired shunt slot, the operator can quickly raise both the probes and the tow pin with one easy hand movement.

Accordingly, it is an object of the present invention to provide a switch actuating apparatus wherein the probes cannot be lowered into an operative position until the tow pin is lowered or has been lowered into its operative position.

Another object is to provide a switch actuating apparatus wherein the tow pin cannot be raised into an inoperative position without also raising the probes into an inoperative position.

Another object is to provide a switch actuating apparatus wherein the probes are mounted to swing out when contacted from one direction but act as a rigid body when contacted from the opposite direction.

Still another object is to provide a switch actuating apparatus wherein the probes will swing out of the way of the prongs of a fork lift truck when the prongs are inserted beneath the conveyor truck from the rear thereof.

The manner in which these and other objects of the invention may be obtained will be apparent from the following detailed description and the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary isometric view with parts broken away of a conveyor truck showing the switch actuating apparatus of the present invention mounted thereon.

FIG. 1A is a fragmentary front elevation of the tow pin handle and the probe handle showing their pivotal interconnection.

FIG. 2 is a front elevation with parts broken away of the truck conveyor shown in FIG. 1, and also showing a portion of a fork lift truck in position to lift the conveyor truck.

FIG. 3 is a side elevation with parts broken away of the conveyor truck shown in FIG. 1, and also showing a portion of a fork lift truck in position to lift the conveyor truck.

FIG. 4 is an enlarged fragmentary side elevation with parts broken away of the front portion of the conveyor truck showing a probe in its lowered operative position in solid lines and also showing in phantom lines the prong of a fork lift truck after having deflected the probe into a swing out position.

FIG. 5 is an enlarged fragmentary side elevation with parts broken away of the front portion of the conveyor truck showing a probe in its raised inoperative position in solid lines and also showing in phantom lines the prong of a fork lift truck after having deflected the probe into a swing out position.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The switch actuating apparatus of the present invention generally designated **10** is adapted for use on a conveyor truck **12** utilized in a tow truck system wherein trucks are towed by a driven link chain that is movable along an endless main slot **14** in a reference surface such as the floor of a warehouse.

The conveyor truck **12** is equipped with a tow pin **16** that can be manually lowered or raised by a handle portion **18** into and out of engagement with the driven link chain. The switch

actuating apparatus 10 is mounted on the upstanding front end of the conveyor truck 12 and has a pair of depending probes 20 which serve in their lowered operative position to trip coded reader heads 22 disposed in the floor and thus effect an opening of a switch plate 24 so that the properly coded truck 12 will be diverted into a preselected one of a plurality of shunt slots 26 intersecting the main slot 14. It is not necessary that there be two depending probes, as the switch actuation apparatus could also be used in a system wherein only one probe was utilized to code the truck. The one-probe systems are generally used where there are not as many shunt slots 26 and thus there is no need for the multiple codings available with different position combinations of two probes. A more detailed description of one-probe and two-probe switching systems can be found in my copending U.S. application, Ser. No. 797,485 entitled "Mechanical Tow Truck Switching Apparatus."

The switch actuating apparatus 10 consists of two mounting brackets 28 and 30, one affixed to the truck 12 on either side of the tow pin 16, a vertically movable probe lifting device 32, and the probes 20.

The mounting brackets 28 and 30 are identical and each consists of a metal sheet that has been slotted, notched and bent into the desired configuration shown in the drawings. An end view of the bracket 30 (FIG. 3) shows it as having a channel 34 with an upstanding flange 36. The lower leg of the channel 34 has a plurality of notches 38 (FIG. 1). The upstanding flange 36 has a plurality of elongated slots 40 which are continuous into the upper leg of the channel 34 to define slots 39 in said upper leg which are in vertical alignment with the notches 38, the upper leg of the channel providing a resting position for the probes. The notches 38, and slots 39 and 40, are just wide enough to receive the probe 20 in a manner to be described later.

The probe lifting device 32 includes a supporting bracket 42, a supporting cross rod 44 of circular cross section supported by the bracket 42, and a sleeve 46, surrounding the tow pin 16, to which the bracket 42 is fixedly attached. Rotatably secured to the upper end of the sleeve 46 is a probe handle 48. As seen in FIG. 1A a washer 47 is welded to the upper end of sleeve 46 and prevents upward movement of handle 48 relative to the sleeve 46. The handle 48 can be rotated with respect to the sleeve 46 while the sleeve remains stationary but any upward vertical movement of the handle 48 causes a corresponding upward vertical movement of the sleeve and hence the support bracket 42 and rod 44. When handle 48 is lowered, the sleeve 46, along with bracket 42 and rod 44, falls a corresponding distance due to gravity. A pair of flexible chains 50 are slidably supported by the rod 44 one on either side of the tow pin 16, and each has a probe 20 attached to its lower end. Cylindrical rollers 52 (FIG. 3), attached to the probes 20 attached to its lower end. Cylindrical rollers 52 (FIG. 3), attached to the probes 20 near their upper ends to define heads therefor stabilize the upper ends of the probes and prevent them from passing forwardly through the slots 40 when the probes are resting in aligned slots 39 and notches 38 rearwardly of upstanding flange 36. The purpose for mounting the probes so that they can be raised into an inoperative position is that in a raised position, they are less likely to be damaged by contacting obstructions on the floor and also they are incapable of tripping a reader head 22 when it is desired that they not do so.

In addition to being movable upwardly and downwardly by handle 48, the probe can be shifted laterally in the brackets 28 and 30 by the manual lifting of the probe out of one pair of aligned slots 39 and notches 38, sliding its supporting chain 50 along rod 44 until it overlies the newly desired probe position, and dropping the probe into the vertically aligned slot and notch associated with the new position. The lateral displacement of the probes from the longitudinal centerline of the truck determines how the truck is coded and thus into which shunt slot it will be diverted. It is to be noted that due to the flexibility of the chains 50, the probes can be shifted from one aligned slot and notch to another without raising or lowering the probe handle 48.

The handles of both the tow pin and the probe lifting device are situated in a unique handle housing 53 located on the longitudinal centerline of the conveyor truck 12 and near the top of the upstanding front end thereof. The handle housing 53 resembles a cylinder that has been cut along a plane containing its geometric centerline. It has a spiralling cam surface 54 tapering downwardly from its upper edge with a retaining notch 55 near said edge. The handle 18 of the tow pin, which has an inverted U-shape, is draped over the cam surface 54 so that as the tow pin handle 18 is rotated about the longitudinal centerline of the tow pin, the surface 54 will cam the tow pin upwardly or downwardly, depending on the direction of rotation, and in so doing will lower or raise the tow pin 16 into an operative or inoperative position respectively. The housing 53 also has an inverted L-shaped slot 56 passing therethrough in which the probe handle 48 is disposed for guidance and support. The slot 56 extends horizontally substantially across the entire curved surface of the housing 53 and has a vertical portion 57 extending downwardly from the horizontal portion on the right hand side of the housing as viewed in FIG. 2. When the probe handle 48 is retained in the vertical portion 57 of the slot 56 (FIGS. 1 and 4), the probes 20 are in their lowered operative position. To raise and retain the probes in their inoperative position, the handle 48 is merely lifted in the vertical portion of the slot then rotated into the horizontal portion.

It is important to note that, when both the tow pin handle 18 and the probe handle 48 are retained in their lowered operative positions (FIGS. 1 and 4), the end of the inverted U-shaped handle 18 extends below the horizontal probe handle 48 and is disposed rearwardly of the probe handle. The probe handle 48 thus prevents the tow pin handle 18 from being raised by forward movement along cam surface 54 until handle 48 is raised and rotated along the horizontal portion of slot 56. Thus when the operator pulls the tow pin up, he necessarily must raise the probes and thereby place them in a less damage susceptible position.

When both the tow pin handle 18 and the probe handle 48 are in their raised inoperative positions (FIGS. 2, 3 and 5) with the handle 18 resting in notch 55, the end of the inverted U-shaped tow pin handle 18 still extends below the horizontal probe handle 48 with the tow pin handle 18 disposed rearwardly of the probe handle 48. Therefore, the tow pin handle 18 prevents the probe handle 48 from being lowered until the tow pin handle 18 itself is lowered. This unique relationship between the handles 18 and 48 provides for quick and easy manipulation of the handles together when it is necessary to move them together, and easy independent manipulation of the handles when it is desired to move them independently. This arrangement of the handles also assures an elevated position of the probes when the tow pin is elevated, thus decreasing the possibility of damage to the probes by obstructions on the floor.

In many warehouses wherein tow truck systems are utilized, the conveyor trucks 12 are picked up by a fork lift truck 60 (FIGS. 2 and 3), after they have been diverted into their predestined shunt slot 26. The fork lift truck will pick up the conveyor trucks, along with the load supported thereon, and place them in a warehouse storage rack, divorced from the tow truck system. The fork lift truck approaches the conveyor truck 12 from the rear so that the forwardly extending prongs 62 of the fork lift truck extend longitudinally beneath the conveyor truck. Generally the prongs are so long that they extend beyond the front end of the conveyor truck where the switch actuating probes 20 hang below the conveyor truck. Depending on which aligned pairs of slots 39 and notches 38 the probes are in, frequently the prongs 62 will contact a probe or probes. The probes of the present invention, however, will swing out forwardly, on such an occurrence, because of their construction and the manner in which they are mounted on the truck 12.

As pointed out above, the probes **20** have a cylindrical roller **52** attached to their upper ends. The roller serves as a pivot for the probe when the probe is contacted from the rear, as by a prong **62** of a fork lift truck. In such a case, the lower portion of the probe **20** will swing out of the notches **38** which open forwardly, and pivot about the longitudinal axis of the roller **52** which lies perpendicular to the longitudinal axis of the probe **20**. The roller **52**, which exceeds in length the width of the slots **40** will hold the upper portion back, only allowing it to pivot about the roller.

As can be seen in FIGS. **4** and **5**, the probes **20** are free to swing out, as described above, regardless of whether or not they are in a raised inoperative position (FIG. **5**), or a lowered operative position (FIG. **4**). The elongated slots **40** extend high enough on flange **36** so that if a probe is contacted by a prong **62** while in its raised position, it is free to swing out through a slot **40** alleviating the possibility of damage by the prong.

It is important to note that even though the probes **20** are free to swing out forwardly, they are incapable of pivoting rearwardly beyond their normal vertical disposition. Therefore, the probes are rigid in response to any rearward force and thus are capable of physically tripping a reader head **22** as seen in FIG. **1**.

The switch actuating apparatus herein disclosed is not limited, however, to a switching system as shown. There are numerous types of switching systems in which the present apparatus would be desirable and applicable. This would include electrical switching systems wherein the switches are not physically and mechanically actuated but rather are magnetically or electrically actuated.

Although the best mode contemplated for carrying out the present invention has been herein shown and described, it will be apparent that modification and variation may be made without departing from what is regarded to be the subject matter of the invention.

What I claim is:

1. A switch actuating apparatus for use on a conveyor truck having a vertically adjustable tow pin and at least one vertically adjustable probe and wherein said tow pin and probe are separately mounted on said truck for movement between a lowered operative position and a raised inoperative position, the improvement comprising first handle means operatively connected to and vertically movable with said tow pin, second handle means operatively connected to and vertically movable with said probe, a handle housing wherein each of the said handles are disposed and interrelated, and means including interengaging portions of said handles and handle-retaining means on said housing for locking said probes in a raised position when said tow pin is in a raised position.

2. A switch actuating apparatus for use on a conveyor truck having a vertically adjustable tow pin and at least one vertically adjustable probe and wherein said tow pin and probe are separately mounted on said truck for movement between a lowered operative position and a raised inoperative position, the improvement comprising first handle means operatively connected to and vertically movable with said tow pin, second handle means operatively connected to and vertically movable with said probe, a handle housing wherein each of the said handles are disposed and interrelated, and means including interengaging portions of said handles and handle-retaining means on said housing for locking said tow pin in a lowered position when said probe is in a lowered position.

3. A switch actuating apparatus for use on a conveyor truck comprising in combination, at least one mounting bracket secured to said truck, said bracket having a plurality of vertically elongated slots therein, at least one probe mounted in said bracket, said probe having a head at the upper end, a probe lifting device including a handle portion operatively connected to said probe and disposed for vertical movement to raise or lower said probe, said head cooperating with said slots to permit forwardly pivotal movement of said probe and to prevent passage of the upper end of said probe through said slots when said probe is in any position between the raised inoperative position and the lowered operative position whereby the pivotal movement of the probe will prevent accidental damage to the probe when struck from the rear of said truck.

4. A switch actuating apparatus for use on a conveyor truck comprising in combination, at least one mounting bracket secured to said truck, said bracket having a plurality of vertically elongated slots therein, at least one probe mounted in said bracket, said probe having a head at the upper end thereof, a probe lifting device including a handle portion to raise or lower the probe operatively connected to a vertically movable supporting member extending transversely of the truck, and flexible means slidably received on said supporting member for operably connecting the probe to said probe lifting device, said head cooperating with said slots to permit forwardly pivotal movement of said probe and to prevent passage of said probe through said slots when said probe is in any position between the lowered operative position and the raised inoperative position.

5. A switch actuating apparatus including a floor type reader head for use on a conveyor truck comprising in combination, at least one mounting bracket secured to said truck, said mounting bracket having a forward upstanding vertical flange with a plurality of slots, a horizontal flange extending rearwardly with a plurality of notches open to said slots, and a spaced lower horizontal flange extending forwardly with a plurality of notches in alignment with said slots at least one rigid probe mounted on said bracket and movable between a lowered operative position and a raised inoperative position, and a cylindrical member attached to the upper end of said probe, said member preventing passage of the probe forwardly through said slots but permitting forwardly pivoting of said probe without allowing rearward pivoting movement whereby the pivotal movement will prevent accidental damage to the probe when the probe is struck from the rear of said truck, while permitting normal tripping of the reader head.

6. A switch actuating apparatus for use on a conveyor truck having a vertically adjustable tow pin and at least one vertically adjustable probe and wherein said tow pin and probe are separately mounted on said truck for movement between a lowered operative position and a raised inoperative position, the improvement comprising first handle means operatively connected to and vertically movable with said tow pin, means to mount said probe for pivoting movement in a forwardly direction in a lowered operative position and a raised inoperative position, second handle means operatively connected to and vertically movable with said pivotable probe, and a handle housing having retainer means associated with each handle for retaining each handle in either a raised or lowered position, said retainer means for each handle being located in said housing relative to each other so that the pivotable probe can be moved between said raised and lowered positions while the tow pin remains in a lowered position.

7. A switch actuating apparatus for use on a conveyor truck having a vertically adjustable tow pin and at least one vertically adjustable probe and wherein said tow pin and probe are separately mounted on said truck for movement between a lowered operative position and a raised inoperative position, the improvement comprising first handle means operatively connected to and vertically movable with said tow pin, said probe being pivotable in a forwardly direction in a lowered operative position and a raised inoperative position, second handle means operatively connected to and vertically movable with said pivotable probe, and a handle housing having retainer means associated with each handle for retaining each handle in either a raised or lowered position, said retainer means for each handle being located in said housing relative to each other so that the tow pin can be moved between said raised and lowered positions while the pivotable probe remains in a raised position.

8. A switch actuating apparatus for use on a conveyor truck comprising in combination, at least one mounting bracket secured to said truck, said mounting bracket having a plurality

of vertical slots, at least one rigid probe mounted in said bracket, said probe movable between a raised inoperative position and a lowered operative position, said probe having a shank of smaller width than said slots and having a head of greater width than said slots, said shank pivotal through the slot about the head when contacted from one direction in either position of the probe, and means in the path of the shank of the probe to prevent pivotal movement thereof when contacted from the other direction.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,618,530 Dated November 9, 1971

Inventor(s) HORACE M. SWARTZ

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 3, lines 52 & 53 - delete "attached to its lower end. Cylindrical rollers 52 (Fig. 3), attached to the probes 20".

Column 5, line 50 - change "probes" to -- probe --.

Signed and sealed this 25th day of July 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents