July 2, 1935. J. J. NEUMAN 2,006,869

MATERIAL HANDLING APPARATUS

Original Filed Feb. 23, 1933

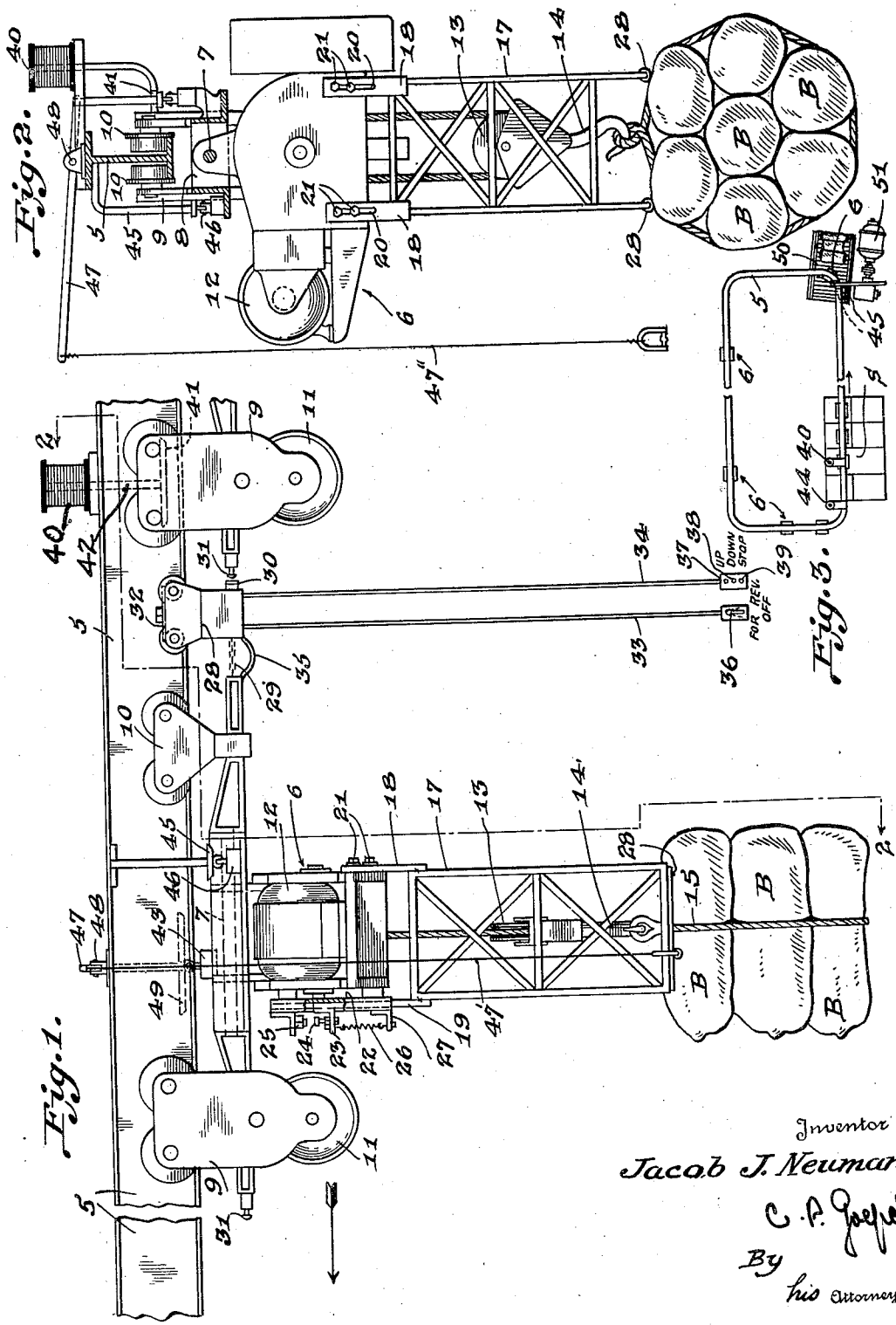


Fig. 1.

Fig. 2.

Fig. 3.

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Patented July 2, 1935 2,006,869

UNITED STATES PATENT OFFICE

2,006,869

MATERIAL HANDLING APPARATUS

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Original application February 23, 1933, Serial No. 658,069. Divided and this application February 26, 1934, Serial No. 712,993

3 Claims. (Cl. 212—132)

This invention relates to material handling apparatus of the electrically operated trolley hoist type, and more particularly to an automatic stop control for such hoist mechanism. This application for patent is a division of my copending application for patent filed February 23, 1933, Serial No. 658,069.

In general, the object of my invention is to provide a relatively simple apparatus whereby commodities, such as raw sugar, may be expeditiously handled at the dock or pier for the purpose of first weighing the same, and then transporting the weighed bags or packages to a conveyer, storage elevator or other relatively remote point so that the manual labor heretofore incident to the handling of such materials may be reduced to a minimum.

My invention has particular application to traveling trolley hoists suitably mounted on a pier or dock, each including a hoist for raising and lowering a plurality of bags of sugar or other material, and in conjunction with means for automatically controlling the travel of the trolleys. The invention provides an automatic stop control for the hoists and the individual operation thereof.

More specifically, my present invention provides in combination with a load hoist and its operating motor, a vertically movable mechanism arranged to be moved upwardly by the load so as to engage and operate a switch whereby to open the circuit of the hoist motor. The invention may be usefully employed, for example, and in the manner hereinafter explained, in connection with automatically acting means for controlling the travel of trolley hoists upon a monorail.

With the above and other objects in view, the invention consists in the improved trolley hoist control, and in the form, construction and combination of parts as will be hereinafter more fully described, illustrated in the accompanying drawing and subsequently incorporated in the subjoined claims.

In the drawing wherein I have illustrated one simple and practical embodiment of my present improvements, and in which similar reference characters designate corresponding parts throughout the several views,—

Figure 1 is a side elevational view showing a trolley hoist embodying the automatic stop control of my present invention;

Fig. 2 is a vertical section taken substantially on the line 2—2 of Fig. 1; and

Fig. 3 is a fragmentary plan view illustrating one installation embodying the invention and showing a plurality of trolley hoists arranged upon a pier or dock for handling the bags of material as they are unloaded from the hold of a vessel.

Referring in detail to the drawing, for the purpose of illustrating one application and use of my present invention, I have shown a continuous monorail track 5, preferably though not necessarily, having a cross-sectional I-beam form which is suitably supported upon the water front dock at which the cargoes of vessels are to be unloaded. A number of electrically controlled hoists generally indicated at 6 are mounted in suspended relation from the continuous monorail 5 for longitudinal traveling movement. Preferably, each hoist at the top thereof, is suspended from the rod or trunnion 7 mounted in the trolley frame 8, so that said hoist has transverse swinging movement relative to said trolley frame. The elongated frame 8 is in turn suspended from the monorail 5 by the front and rear trolleys 9 and 10, respectively, the former being power-driven by a reversible electric motor indicated at 11.

The hoist 6 is also operated by a reversible electric motor 12 movable as a unit with said hoist with respect to the trolley frame 8. The hoist includes the cable sheave 13 raised and lowered in the operation of the motor 12 and which is provided with the hook 14 to which the load-receiving sling 15 is adapted to be connected.

A vertically movable frame 17 is provided at opposite sides thereof with upwardly extending arms 18 and 19, respectively, a pair of the arms 18 at one side of said frame being slotted as at 20 to receive spaced guide bolts 21 projecting from the housing of the hoist 6.

The arm 19 at the opposite side of the frame 17 is movable in a vertically disposed guide 22 suitably attached to the hoist and is provided at its upper end with a bracket 23, on which a vertically adjustable bolt or stud 24 is mounted. This stud is adapted to actuate a switch 25 and break the hoisting circuit of the motor 12 to automatically limit the upward movement of the load. A coil spring 26 attached to the bracket 23 and to a bracket 27 on the lower end of guide 22 moves the frame 17 downwardly to its normal position and thereby urges rollers 28 on the lower end of said frame under pressure against the upper bags B carried by the sling 15 to thus stabilize the load and prevent swinging or swaying motion thereof relative to the hoist.

In addition to the trolleys 9 and 10, a trailer trolley 28 is spaced a short distance rearwardly

from the frame 8 and is connected therewith by a chain or other flexible element indicated at 29. This trolley 28 at its rear side carries an arm or projection 30 with which a switch operating button 31 on the forward end of the following trolley frame 8 is adapted to engage to operate the switch and break the travel motor circuit for the latter trolley frame. Any slight forward motion of said trolley after its motor circuit is broken will result in the forward motion of the trailer trolley 28 of the advance trolley frame 8, and thus produce slack in the chain connection 29. This relative movement between frame 8 and the trolley 28 is essential, since it is not possible to bring the trolley to an instant stop upon the breaking of its motor travel circuit. Chain 29 is normally kept taut by the provision of a leaf spring member 32 having frictional bearing engagement upon the wheels of the trailer trolley 28 which results in a braking action and causes said trolley to drag behind the main trolley. Complete control of travel motor 11 and hoist motor 12 is attained through a switch unit at the lower ends of the sheathed conductors indicated at 33 and 34, depending from the trailer trolley 28, said current conductors being connected with the motors through the connection indicated at 35 extending between the main trolley frame 8 and the trailer trolley 28. The switch unit for the control of motor 11 has a manually operable arm indicated at 36 which when moved in one direction from a neutral position closes the motor circuit for forward travel, and when moved in the opposite direction, closes the motor circuit for rearward travel of the trolley. This switch arm or lever will remain set in the forward position but preferably is returned by means of a suitable spring upon release from the reverse to the neutral position.

The switch unit for the control of the hoist motor 12 includes an up-button 37 closing the motor circuit in one direction to hoist the load; a down-button 38 to close the motor circuit in the reverse direction and lower the load and a stop-button 39. However, in addition to these control switches, I provide certain automatically operating limit switches for controlling the motor circuits independently of said manually operable switches as will be presently described.

At a suitable point upon the dock beneath one side of the monorail 5, the government and merchant scales generally indicated at S upon which the bags of sugar are to be weighed, are suitably positioned. At a proper point so as to stop the traveling hoist and its load above the scales S, a solenoid 40 is mounted at one side of the monorail 5 and operates when energized to lift a shoe 41 on the lower end of the solenoid core 42. This shoe when in its normal position is adapted to actuate a normally closed switch 43 carried by the trolley frame 8 to open the circuit of motor 11 and thus stop further travel of the hoist. A similar switch actuating shoe is also mounted at a suitable point in advance of the scales S and is actuated to switch-releasing position by the solenoid indicated at 44. The circuits of these solenoids 40 and 44 may be closed by the operation of a common push-button or other type of switch arranged at the office or house of the scale attendant.

There is also fixed to one side of the monorail 5, a shoe 45 which operates a normally open switch 46 on the trolley frame 8 to close the lowering circuit of the hoist motor 12, when the hoist arrives at the unloading position. In suitably spaced relation from the shoe 45, a lever 47 is fulcrumed in spaced relation to one of its ends as at 48 at the top of monorail 5, and has suspended from said end thereof a shoe 49 which engages the movable element of switch 43 and opens said switch to break the circuit of motor 11, thus bringing the trolley to a stop.

When the trolley is automatically stopped above the weighing scales by the operation of switch 43 by the shoe 41, the button 38 of the manually controlled switch unit for motor 12 is then pressed so as to operate said motor and lower the load carried in sling 15 to the scale platform. The lowering movement is stopped by breaking the motor circuit by actuation of push-button 39 or an automatically acting limit switch may be provided in the motor circuit for this purpose. After weighing, the button 37 is pressed so as to again raise the load into contact with frame 17 whereby switch 25 is operated in the manner above explained to automatically break the motor circuit. The scale attendant then presses the button to energize the solenoids 40 and 44, thus lifting the shoes 41 and permitting switches 43 to return to normally closed positions so that the travel motors 11 are energized. Thus the hoist with the weighed sugar bags progresses towards the unloading station and the succeeding hoist takes its place above the scale platform.

As herein shown, there is arranged below one end of the rectangular track or monorail 5, the end of a load-receiving endless conveyer 50 driven by the motor 51. When the hoists arrive above the end of the conveyer 50, switches 43 and 46 are actuated in the manner above explained so as to stop the travel of the hoist trolley and close the lowering circuit of hoist motor 12, thereby lowering the load of sugar bags upon the end of conveyer 50, where an operator is stationed to release said bags from the sling 15. Upon lifting the shoe 49 by means of operating element 47'' connected to lever 47, the switch 43 will return to closed position to close the circuit of motor 11 and continue the travel of the hoist. The sugar bags may thus be deposited upon the conveyer 50.

From the foregoing description considered in connection with the accompanying drawing, it is believed that the construction, manner of operation and several advantages of my invention as herein disclosed will be clearly and fully understood. It will be seen that I have provided a simple and reliably operating apparatus whereby such heavy bags of sugar or other material may be expeditiously handled, weighed and deposited upon an endless conveyer or the like for transport to a suitable predetermined destination. The automatic control means herein referred to enables the several operations to be carried out with absolute safety, both to the apparatus and to the necessary attendants in charge thereof, and enables the manual labor which has heretofore been incident to the handling of such materials to be reduced to a minimum. Since the means which I provide for preventing swinging movement of the load during the travel of the hoist is highly effective for this purpose, the weighing and conveyance of the load is greatly facilitated and the apparatus relieved of excessive strains, while possible accidental release of the load from the hoist is obviated.

In the foregoing description of the accompanying drawing, I have disclosed one embodiment of the essential features of my present invention, which I believe to be entirely practical for the

purpose in view. It is nevertheless to be understood that my invention is capable of embodiment in many different environments and may also be incorporated in various other alternative structural forms, and I accordingly reserve the privilege of resorting to all such legitimate changes in the form, construction and relative arrangement of the several parts as may be fairly embodied within the spirit and scope of the invention as claimed.

I claim:—

1. In a material handling apparatus which includes a trolley mounted to travel on an overhead monorail or the like, a hoist frame suspended from the trolley comprising upper and lower sections of box-like skeleton form in cross section and the interiors of which provide a through work passage, the upper section being pivotally united at its upper end with the trolley and the lower section being connected with the upper section for movement upwardly relative thereto toward an upper terminal, an electric hoisting motor and its hoisting gear, the former being mounted on the upper section and having an operating circuit, the latter being disposed for operation in said work passage and adapted to lift and sustain a load against the lower end of the lower section so that both sections and the load may swing as a unit on the pivotal connection of the upper section, the load when lifted against the lower section by means of the motor and tackle, lifting the lower section toward its upper terminal, and means arranged to be actuated by the lifting movement of the lower section at a predetermined point for breaking the motor circuit.

2. A trolley hoist of the overhead type having a wheeled body traveling on an overhead rail, a hoist frame suspended from the body by a pivot for lateral swaying movement and having a work passage, said frame comprising upper and lower sections, the latter being connected for relative vertical movement with respect to the former, from a lower terminal toward an upper terminal, an electric hoisting motor carried by the upper section and having an operating circuit, hoisting gear arranged in the work passage and controlled by the motor and adapted, when lifted, to lift a load against the lower end of the lower section and cause the load to lift the lower section from its lower terminal toward its upper terminal, means for opening the motor circuit actuated and rendered effective for such purpose by the upward movement of the lower section and at a predetermined point between the lower and upper terminals thereof, said means being thus effective irrespective of the lateral swaying movement of the suspended hoist frame.

3. In a trolley hoist of the type in which a trolley body travels on an overhead track rail, a sectional hoist frame pivotally suspended for swaying movement from the trolley body and having a box-like cross sectional form with a hollow vertical work passage, the bottom section being connected and normally disposed for upward movement toward the section above it, hoisting tackle arranged to operate in the work passage and adapted, when lifted, to lift a load in firm abutment against the lower end of the bottom section to make the load sway as a unit with the hoist frame and at the same time to cause the load to lift the bottom section, operative mechanism on the hoist frame for lifting the tackle, and means under the control of the lifting movement of the bottom section for causing the lifting mechanism to cease its lifting operation.

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