Jan. 22, 1946. J. E. DAVENPORT 2,393,312

SAFETY APPLIANCE FOR HOISTING APPARATUS

Filed Nov. 12, 1943 2 Sheets-Sheet 1

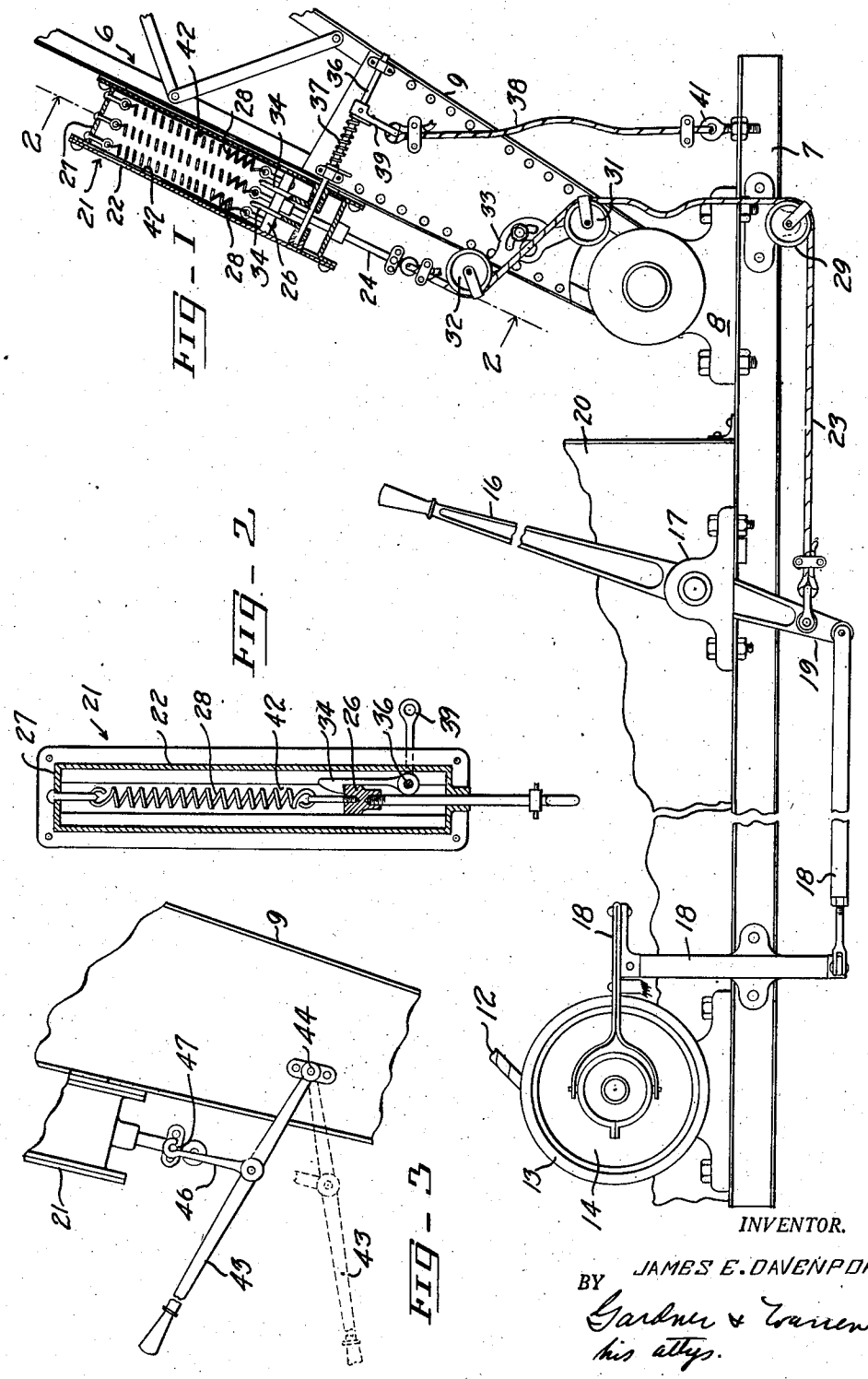


FIG - 1

FIG - 2

FIG - 3

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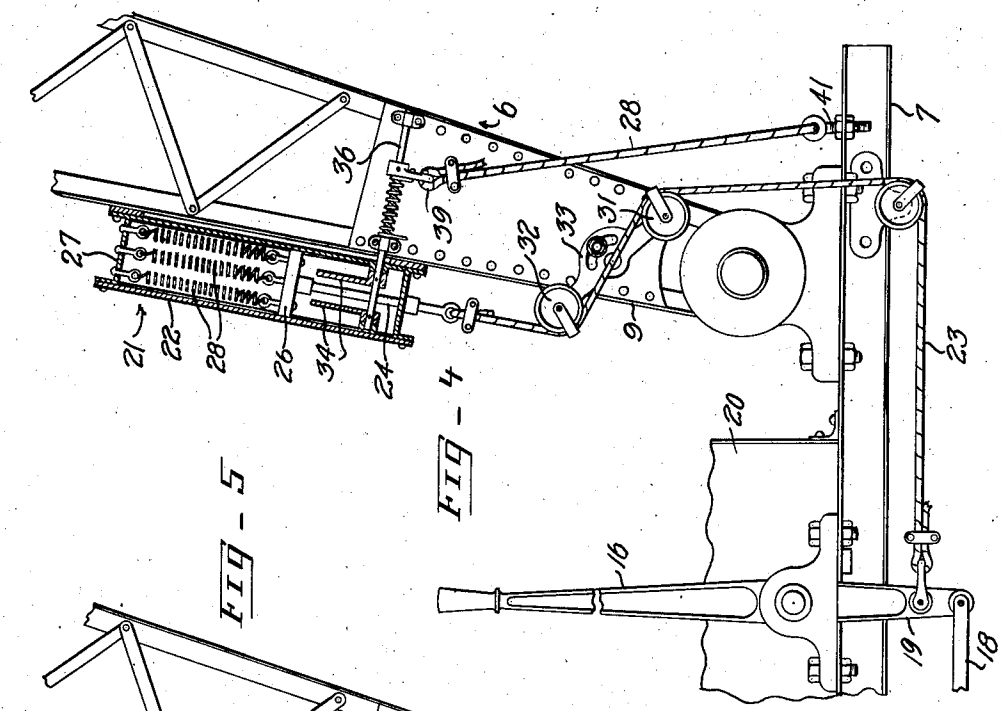
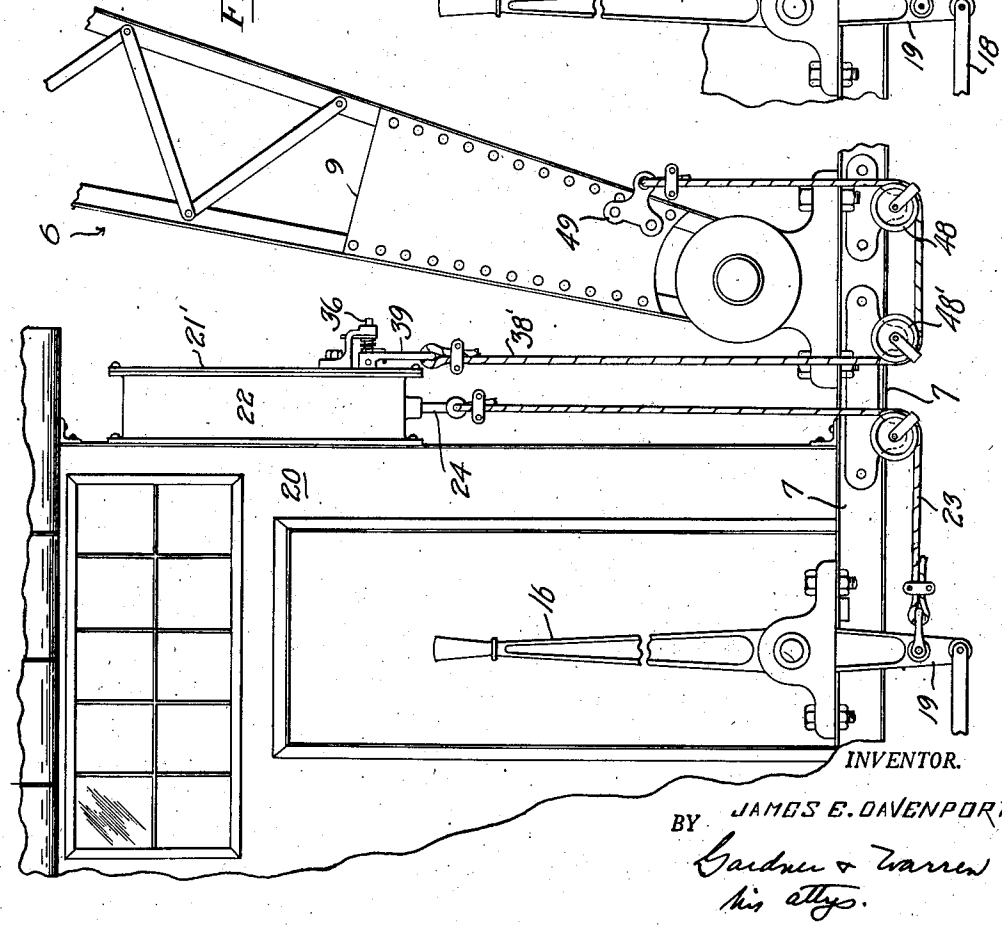


FIG - 4

FIG - 5



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Patented Jan. 22, 1946 2,393,312

UNITED STATES PATENT OFFICE

2,393,312

SAFETY APPLIANCE FOR HOISTING APPARATUS

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Application November 12, 1943, Serial No. 509,989

3 Claims. (Cl. 212—39)

The invention relates to an appliance arranged for use on a hoisting apparatus such as a crane hoist, and designed to automatically disconnect the power for operating the hoist when the hoist boom is elevated to a critical position beyond which the boom may strike the cab, and thus possibly injure the operator and damage the cab and hoist mechanism. This type of hoisting mechanism, utilizes a clutch which is operatively interposed between the power unit and the winding drum which controls the raising and lowering of the boom about its pivotal axis, and it is this clutch which is arranged to be released by the safety device when the boom reaches the critical position aforesaid. The devices heretofore designed for effecting said release of the clutch, have in practically all instances employed more or less intricate electrical or pneumatically operated mechanism, or mechanical means which operate in a manner causing destructive wear of the clutch when the boom moves slowly in reaching the critical position.

In accordance with the present invention, the safety device is positive acting, and provides for instantaneous operation of the clutch regardless of the speed of movement of the boom.

Another object of the invention is to provide a safety device of the character described which may be quickly and easily reset to operative position after actuation.

A further object or feature of the invention, is to provide a safety means of the character described which will be relatively simple in operation, can be manufactured at low cost, and readily applied to different parts of the hoist apparatus.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth in the following description of the preferred forms of the invention which is illustrated in the drawings accompanying and forming part of the specification. It is to be understood, however, that variations in the showing may be adopted within the scope of the invention as set forth in the claims.

Referring to said drawings:

Figure 1 is a side view of a portion of a crane hoist equipped with the safety appliance of my invention, parts being removed and shown in section in order to disclose the otherwise hidden portions. The appliance is shown in set position as during the normal positioning of the boom.

Figure 2 is an enlarged longitudinal sectional view taken through the safety appliance, as indicated by the line 2—2 in Figure 1.

Figure 3 is a fragmentary side view of the apparatus showing a means of resetting the safety appliance after it has been actuated.

Figure 4 is a view corresponding to Figure 1, but showing the parts with the safety appliance in actuated position.

Figure 5 is a view similar to Figure 1, but showing a modified construction and arrangement of the safety appliance.

The safety appliance of my invention is here illustrated in association with a hoisting apparatus 6 including a base 7 and a bearing block 8 in which the lower end of a boom 9 is pivotally mounted for swinging upwardly or downwardly as may be required. The boom may be moved in a conventional manner, such as by means of a cable 12 attached to the boom and operatively mounted on a suitable drum 13 arranged to be connected through a clutch 14 to an appropriate power unit (not shown). The clutch may be moved to an engaged or disengaged position, that is in position connecting or disconnecting the drum for movement with the power unit, by means of a lever 16 which is fulcrumed on a bearing block 17 secured to the frame or base 7, the lever being here shown connected to the movable member of the clutch 14 by means of a system of levers 18 connected to the lower arm 19 of lever 16. The power unit and the control mechanism including the lever 16 is usually enclosed in a suitable cab 20 supported on the base and formed large enough to accommodate the operator, and as will be clear from the drawings, such mechanism and cab are positioned to the immediate rear of the bearing block 8 of the boom so that there is no danger of the cab and mechanism or the operator being endangered unless the boom is elevated to a vertical position adjacent or against the cab.

Briefly my invention comprises a device mounted on but powered independently of the hoisting apparatus and operatively connected to the clutch so as to move and hold the same in disengaged position, the device being held against interfering with the clutch during the normal positioning and operation of the boom, so that under its own power it will effect instantaneous disengagement of the clutch as soon as the boom reaches the critical position.

In the form of the invention illustrated in Figures 1 to 4 inclusive, the means comprising an independently powered device for effecting the movement of the clutch and a latching mechanism for holding said device in operation during the normal functioning of the boom is in the form of a unit 21 mounted directly on the boom adjacent but spaced appreciably from the pivotal axis thereof. The unit includes a fixed member here shown in the form of a housing 22 and connecting means is provided between the housing and the clutch which in one position will hold the clutch in vertical relation and thus deprive the drum of the power to effect movement of the boom.

The connecting means aforesaid is in the form of a cable 23 attached at one end to the arm 19

of lever 16 and at the other end to a rod 24 extending into the housing. Within the housing, the rod 24 is secured to a bar 26 which is connected to the far end 27 of the housing by one or more springs 28. The cable 23 is threaded over a series of idler pulleys 29, 31, and 32, the pulley 29 being mounted on the base 7 whereas the pulleys 31 and 32 are carried on an adjustable support 33 mounted on the boom. As will be understood, the cable is of such length that under the pull exerted by the springs, the lever 16 will be moved to the vertical position shown in Figure 4 so as to thus place the clutch in vertical or disengaged relation. In order to permit the clutch 14 to be moved to engaged as well as disengaged position without interference from the clutch releasing device, such as is required for the normal operation of the hoisting apparatus, means are provided for holding the bar 26 in an advanced position against the resistance of the springs 28. As here shown such means is in the form of a pair of latching dogs 34 which are fixedly held on a shaft 36 mounted in the housing 22. The shaft is urged by means of a spring 37 to keep the dogs 34 engaged with the bar however, as will be evident, by rotating the shaft 36 against the resistance of spring 37, the bar 26 will be released whereby under the pull of springs 28 the cable 12 will be drawn to place the clutch in vertical position. Means are provided for causing the shaft 36 to be thus rotated to release the bar 26, when the boom is raised to a predetermined upright position, such means as here shown being in the simple form of a cable 38 which is connected to a crank 39 on the shaft 36 and affixed such as by an eyebolt 41 to the base 7. As will now be clear, when the boom is raised high enough, such as indicated in Figure 4, the cable 38 which is otherwise left in a slackened condition, becomes taut and causes the shaft 36 to rotate and release the bar. In this manner the clutch will be instantly disengaged and the further movement of the boom toward the cab will be halted. It may be explained in this connection that most hoisting apparatus of the type to which my invention is applied, have a means generally associated with the drum for checking the movement of the boom whenever the power unit is disconnected. It will thus be clear that when the clutch is placed in neutral position, movement of the boom is stopped. Should it become necessary to immediately move the boom after the clutch is released, the clutch may be replaced in engaged position by operating the lever 16 against the resistance of the springs 28.

Preferably the eyebolt 41 is adjustably secured to the base so that the length of the cable 28 may be varied and thus the point at which the safety device will be operated may be regulated.

By appropriate adjustment of the pulley supporting bracket 33, the cable 12 may be maintained in slackened condition without undue looseness during movement of the boom, and at the same time a straight pull may be assured between the rod 24 and cable and between the portions of the cable between the various pulleys and the lever.

The bar 26 is preferably mounted in guides 42 which assist in holding the bar in the extended position and during movement in the housing, and means are provided for retracting the bar against the resistance of the springs 28 so that the locking dogs may re-engage the bar and thus reset the device, after the latter has been tripped. As here shown such means includes a lever 43 which may be either permanently or removably pivoted to the boom such as indicated at 44. Pivoted to the lever is hook 46 which may be attached to a pin 47 at the outer end of the rod 24, and by swinging downward on the lever when the hook is engaged with the pin, the bar may be retracted until the dogs automatically catch the bar. After the device has thus been reset, the lever may be removed or placed in an unobtrusive position of the boom.

As previously stated, the safety device of my invention, may be positioned with little change in design, on portions of the hoisting apparatus other than the boom. In Figure 5 I have shown the unit 21' mounted on the cab instead of on the boom. In this arrangement, the cable 38' instead of being simply attached to the base of the apparatus, is guided over pulleys 48 on the base and connected to a bracket 49 on the boom.

I claim:

1. An automatic power cut-off appliance for a hoisting apparatus having a boom and power operated means for elevating same including a power disengaging member comprising a support carried by and movable with said boom, a flexible connection operatively interposed between said member and support and having a resilient portion therein, said connection operating to hold said member in power disengaging relation, a latch on said support for releasably holding said connection in inoperative position relative to said member, and a device for tripping said latch when said boom is in predetermined elevated position, comprising a connective member secured to a relatively stationary part of said apparatus and operatively to said latch.

2. An automatic power cut-off appliance for a hoisting apparatus having a boom and power operated means for elevating same including a power disengaging member, comprising a support mounted on a relatively stationary part of said apparatus, a flexible connection means operatively connected between said member and said boom and having a yielding extensible portion therein, said connection means operating to hold said member in power disengaging relation, a latch on said support for releasably holding said connection means in inoperative position relative to said member, and a device for tripping said latch when said boom is in predetermined elevated relation, comprising a connective member operatively secured to said latch and to said boom.

3. An automatic power cut-off appliance for a hoisting apparatus having a boom and power operated means for elevating same including a power disengaging member, comprising a casing arranged to be affixed to the apparatus, an extensible spring anchored at one end therein, a slide reciprocatively mounted in said casing and secured to at another end to said slide, a cable connected to said slide and operatively to said member, said spring and cable arranged and positioned to hold said member in power disengaged relation when the spring is relatively contracted and the boom is in other than a predetermined elevated position, a latch carried by said casing and including a dog arranged therein and engageable with said slide to retain said spring in an extended position, and means having a part operatively connected with the boom for tripping said latch to release said slide when the boom reaches said predetermined position.

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