W. LAMB.

HOIST.

APPLICATION FILED DEC. 20, 1917.

1,282,438.

Patented Oct. 22, 1918.

5 SHEETS—SHEET 1.

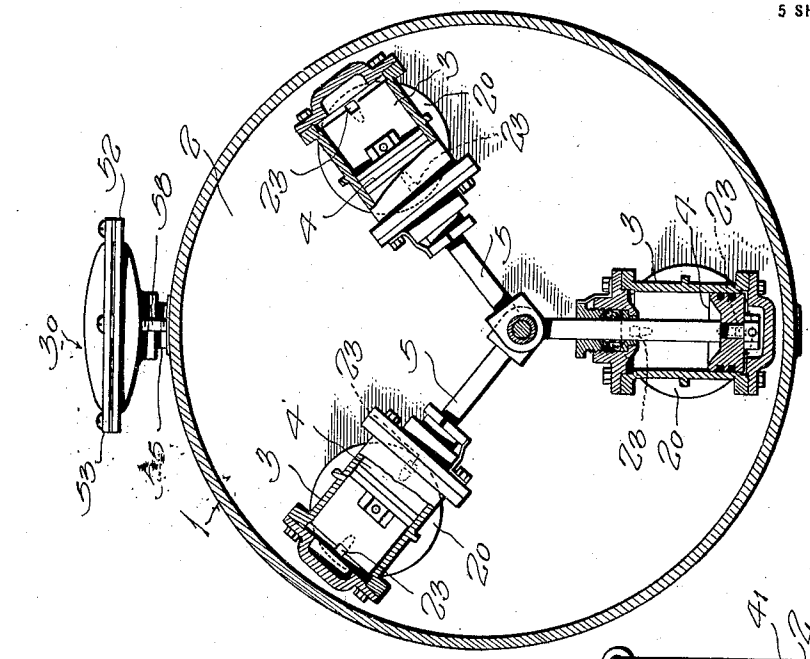


FIG. 5.

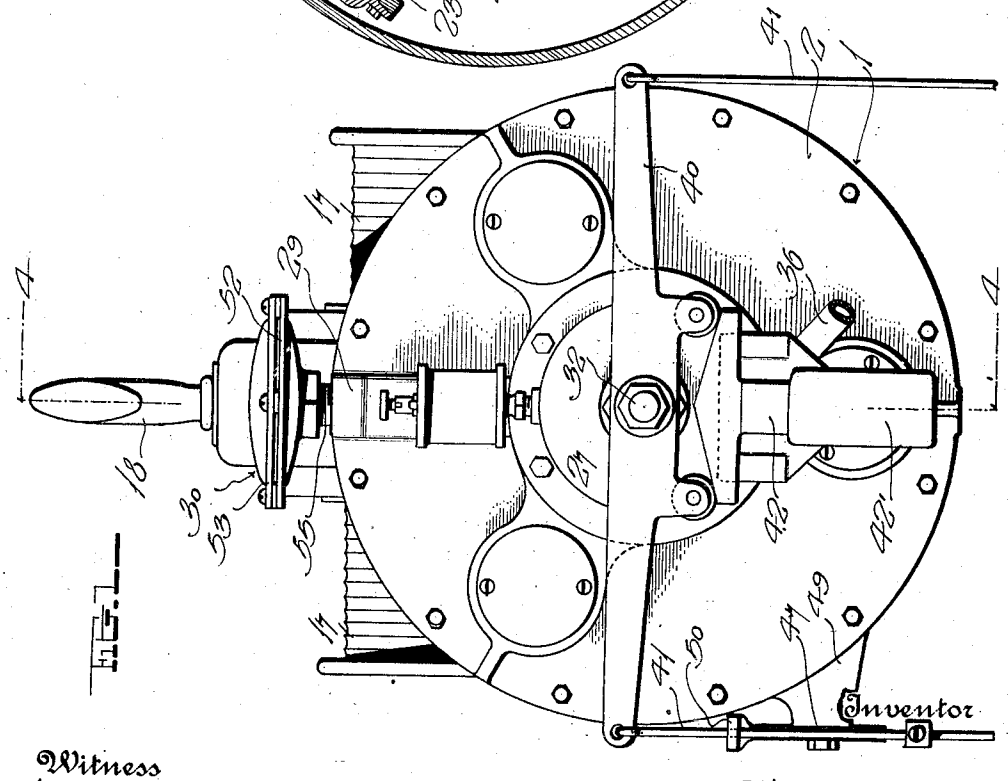


FIG. 1.

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5 SHEETS—SHEET 2.

Fig. 2.

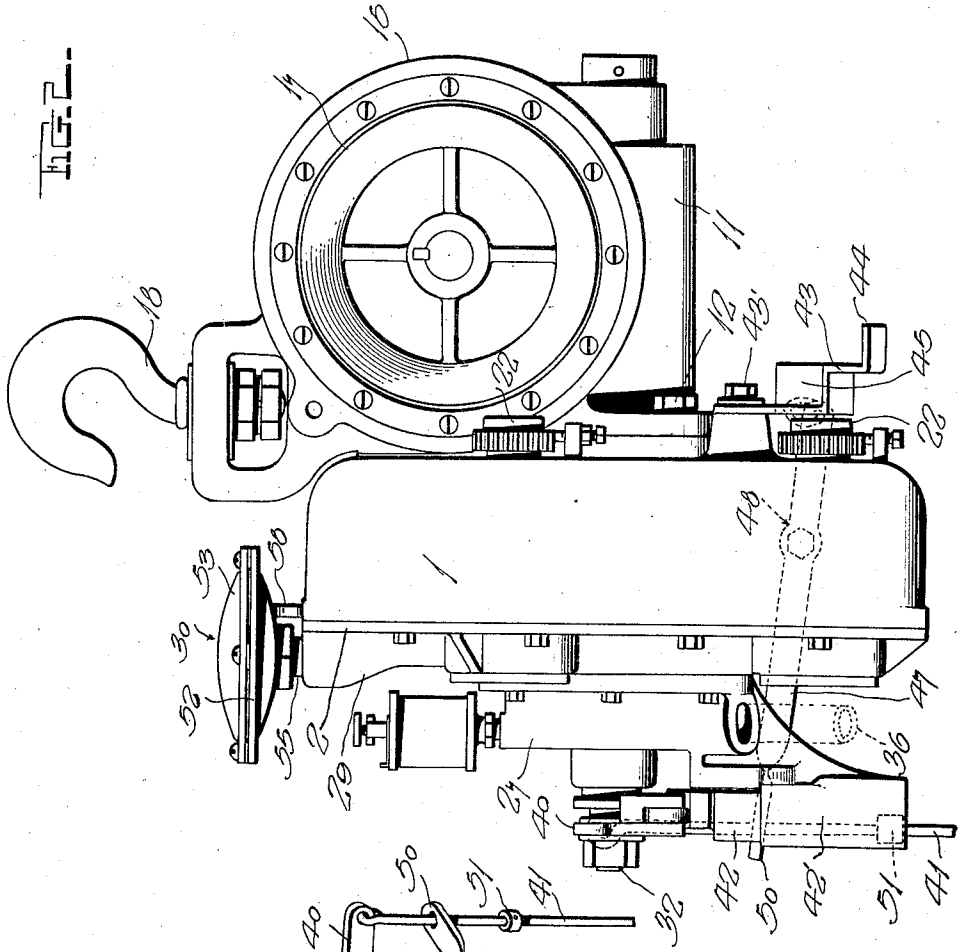
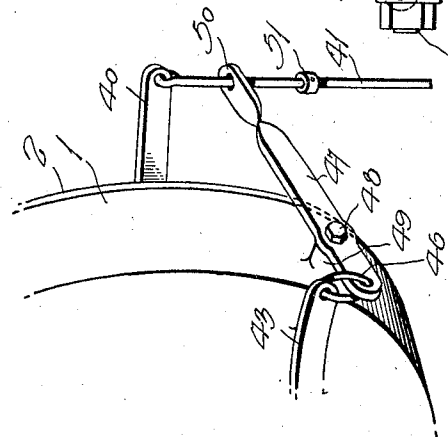


Fig. 3.



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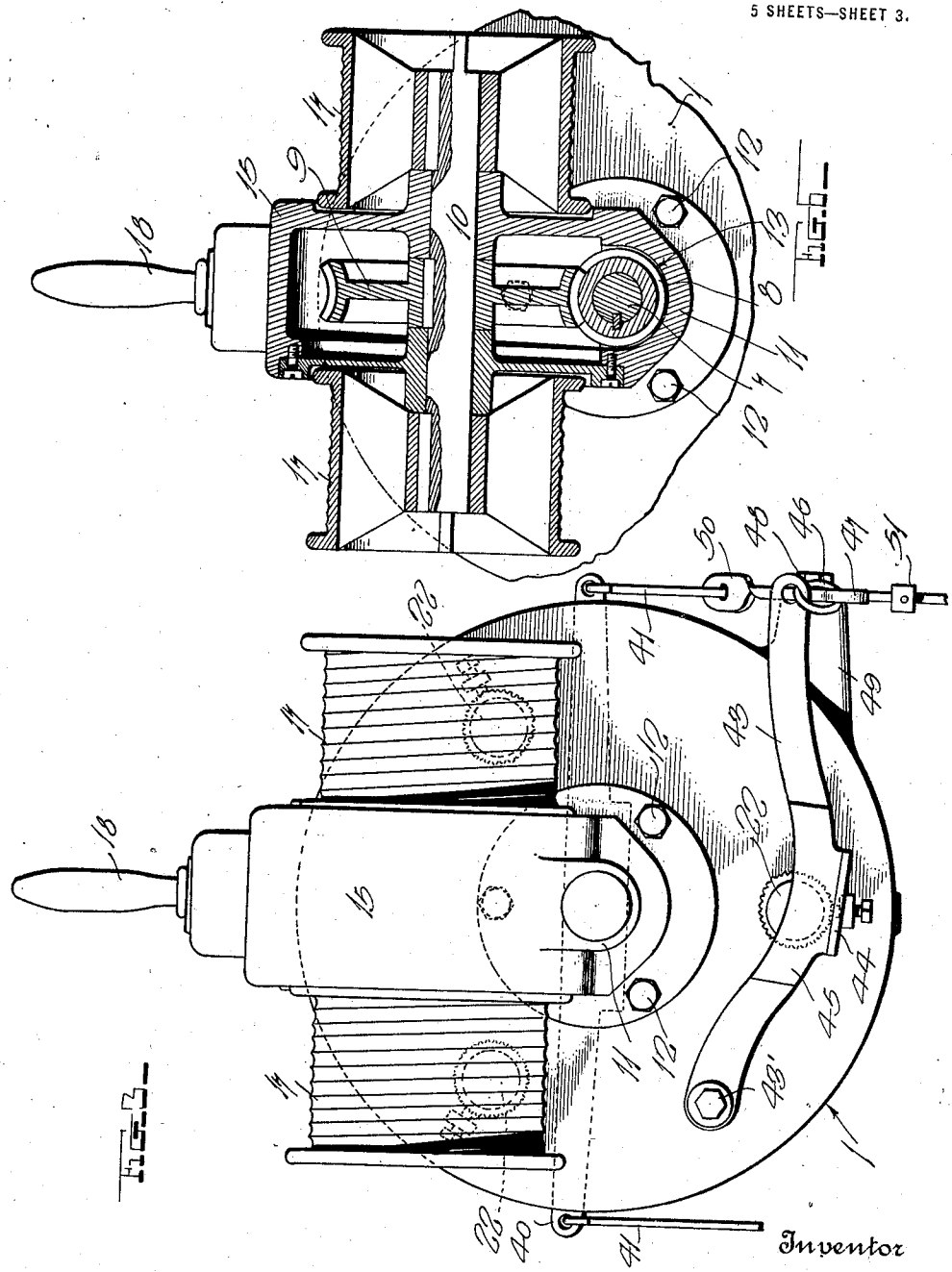
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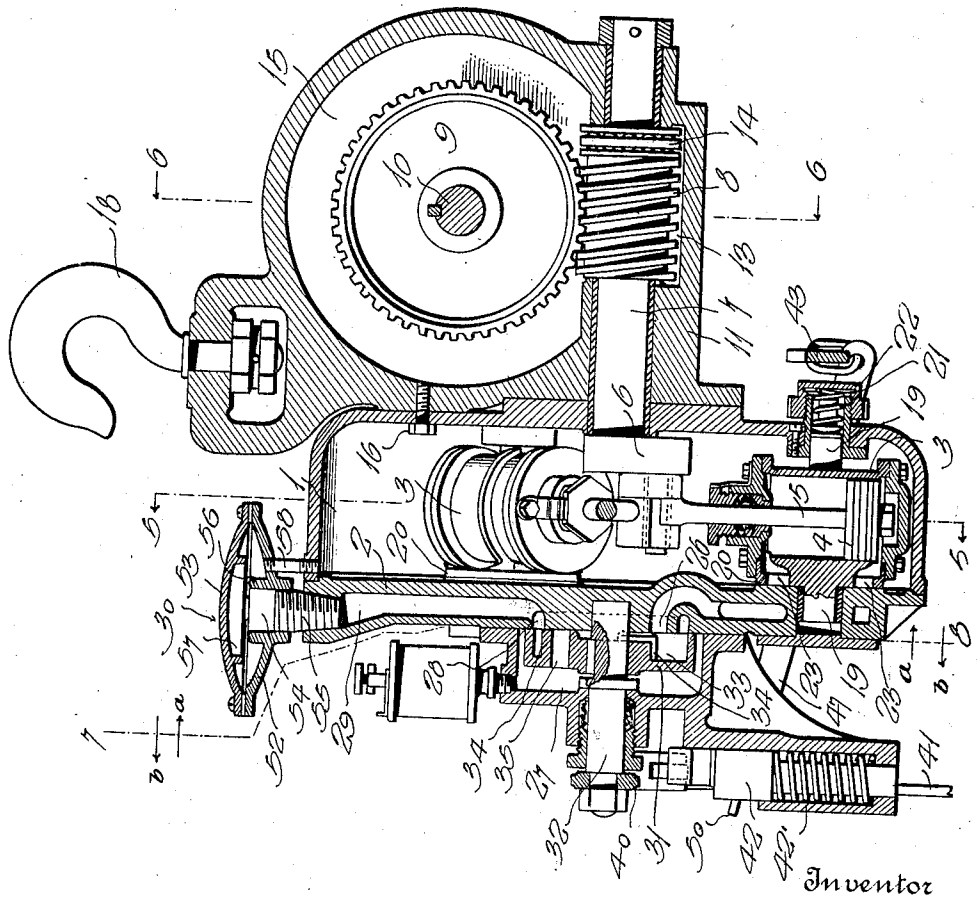
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5 SHEETS—SHEET 4.

FIG. 4.



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5 SHEETS—SHEET 5.

FIG. 12.

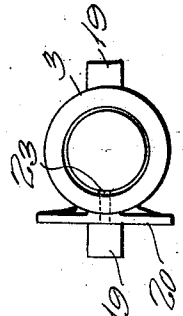


FIG. 7.

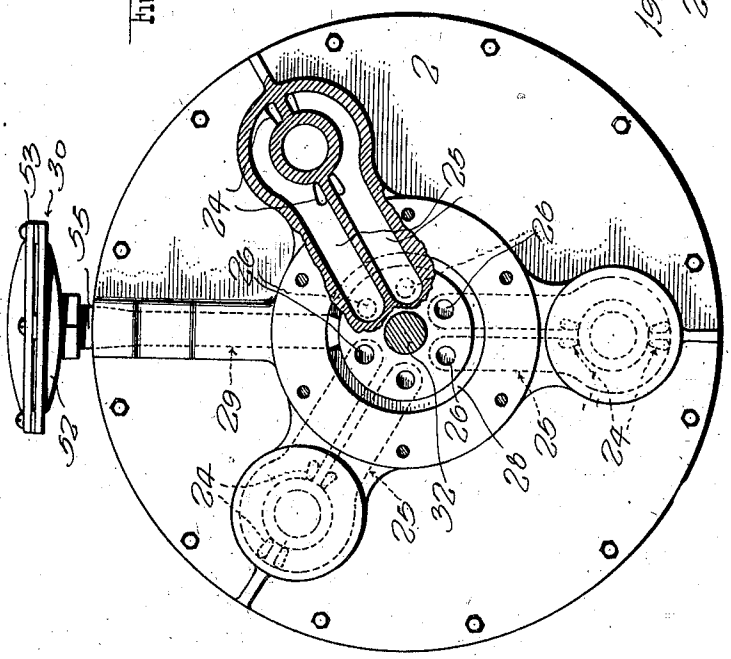
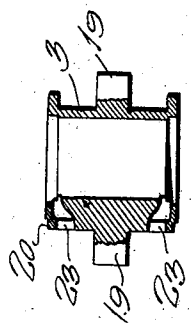


FIG. 11.



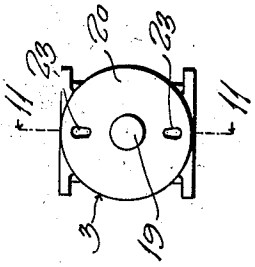
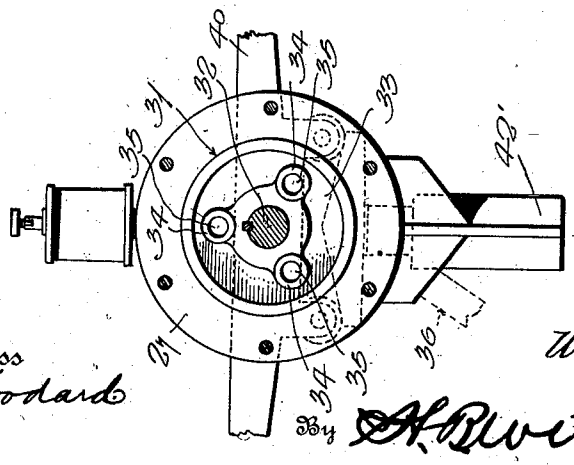


FIG. 10.

FIG. 8.



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UNITED STATES PATENT OFFICE.

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1,282,438. Specification of Letters Patent. Patented Oct. 22, 1918.

Application filed December 20, 1917. Serial No. 208,097.

BEST AVAILABLE COPY

To all whom it may concern:

Be it known that I, WILLIAM LAMB, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Hoists; and I do declare the following to a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

One object of the present invention is to so improve upon the general construction and arrangement of steam and compressed air hoists, as to provide a device which will be extremely simple and compact, yet highly efficient and durable.

A further object is to provide an automatic shut-off for the hoist engines when the load has been raised to a predetermined extent.

Yet another object is to provide a novel type of control valve for the several fluid pressure cylinders.

A still further object is to provide novel means for returning any oil to the engine which may possibly be blown therefrom with the exhaust steam or other fluid pressure used.

With the foregoing general objects in view, the invention resides in the novel features of construction and unique combinations of parts to be hereinafter fully described and claimed, the descriptive matter being supplemented by the accompanying drawings which form a part of this specification and in which:—

Figure 1 is a front elevation of the improved hoist;

Fig. 2 is a side elevation thereof;

Fig. 3 is a rear elevation;

Fig. 4 is a central vertical section on the plane indicated by the line 4—4 of Fig. 1;

Figs. 5 and 6 are vertical transverse sections on the planes designated by the lines 5—5 and 6—6 respectively of Fig. 4;

Fig. 7 is a transverse section on the plane indicated by the line 7—8 of Fig. 4, looking in the direction of the arrows *a*;

Fig. 8 is a sectional view on the line 7—8 of Fig. 4, looking in the direction indicated by the arrows *b*;

Fig. 9 is a detail perspective view illustrating a portion of the automatic cut-out;

Fig. 10 is a side elevation of one of the engine cylinders with its heads removed;

Fig. 11 is a section of Fig. 10 on the plane of the line 11—11 thereof; and

Fig. 12 is an end elevation of one of the cylinders.

In the drawings above briefly described, the numeral 1 designates a comparatively flat vertically disposed casing which is preferably of circular formation, the front side 2 of the casing being removable as shown. A plurality of oscillating cylinders (preferably three) are positioned in the casing 1 and the pistons 4 of said cylinders are provided with piston rods 5 connected to a crank 6 on the inner end of a horizontal shaft 7 which extends at its front end into the casing 1, through the rear side of this casing. Between its ends, the shaft 7 is provided with a worm 8 which meshes with a vertically disposed worm gear 9 on a horizontal shaft 10 mounted above and extending at right angles to the shaft 7. A horizontally elongated bearing 11 is bolted at 12 to the rear side of casing 1, said bearing rotatably supporting the shaft 7 and having in its upper side a recess 13 which receives the worm 8, said recess also receiving a thrust bearing 14 which prevents the action of the worm 8 upon the gear 9 from shifting shaft 7 longitudinally.

The horizontal bearing 11 is formed integrally with and constitutes the bottom of a second vertically disposed casing 15 in which the worm gear 9 is positioned, said casing being secured to the rear side of casing 1 by screws or the like 16. It will be observed that casing 15 is disposed in a vertical plane at right angles to the plane in which the casing 1 is located and that said casing 15 is positioned on the vertical center line of said casing 1. The opposite ends of the shaft 10 extend beyond the opposite sides of casing 15 as shown clearly in Fig. 6 and a pair of winding drums 17 are secured on said shaft, said drums being located in the angles between the vertical casings 1 and 15. By this arrangement, the device is rendered extremely compact and since the weight of the load is placed upon two cables wound upon the drums 17, the strain upon the supporting hook or the like 18 is substantially balanced so that little tilting of the hoists will occur.

Each of the cylinders 3 is provided with a pair of trunnions 19 which are rotatably mounted in appropriate bearings formed in

the front and rear sides of the casing 1, and the sides of said cylinders adjacent the front side 2 of said casing, are formed with integral disks 20 which contact with said side. Springs 21 and adjusting caps 22 therefor are provided for forcing the cylinders tightly toward the plate 2, in order that said disks 20 may be held in tight contact therewith. Each cylinder is formed with a pair of ports 23, one being positioned at each end thereof and both ports opening through the disks 20 for registration with other ports 24 which are formed in the front plate 2 of the casing 1, the registration of these ports being controlled by the oscillation of the cylinders 3 in a well known manner.

A plurality of pairs of radial ports 25 lead inwardly from the ports 24 and at 26, said ports 25 open through the outer side of the front plate 2. A preferably circular valve chest 27 is secured to the plate 2 on the exterior of the latter and surrounds the several inner ends 26 of the ports 25 as will be clear from Figs. 4, 7 and 8, and said plate 2 is formed with an annular exhaust 28 positioned within said chest 27. An exhaust passage 29 leads from the channel 28 as shown most clearly in Fig. 4, the upper end of said passage discharging into a muffler 30 whose construction will be hereinafter described.

Positioned in the valve chest 27 is a valve disk 31 which is mounted rigidly on the inner end of a short horizontal rock shaft 32, the inner face of said disk being disposed in contact with the outer face of plate 2 and being formed with an annular recess 33 with which the annular channel 28 registers. Disk 31 is also provided with a plurality of lugs 34 extending into the recess 33, and ports 35 are formed through said disk and through the lugs for registration with the inner ends 26 of the passages or ports 25. There are half as many ports 35 as 25 and the former are equal in number to the cylinders 3. Fluid under pressure is admitted to the chest 27 by a suitable pipe 36 and when the valve disk 31 is properly set, this pressure will pass through the ports above described to drive the engine in a manner to be hereinafter fully described.

Normally the valve disk 31 is so positioned that its ports 35 are midway between the ports 26, so that the engine remains at a standstill. When, however, the rock shaft 32 is turned in one direction, the ports 35 will conduct the fluid under pressure from the chest 27 to certain of the passages 25 from which it will enter the proper end of the cylinders 3, through the ports 24 which happen to register with the ports 23 of said cylinders. The pistons 4 are thus operated to turn the shaft 7 and the oscillation of the cylinders controls the admission and exhaust of the fluid as is well known. When pressure is being supplied to the cylinders through one of their ports 25 the other of such ports acts as the exhaust passage and discharges into the recess 33. From this recess, the exhaust pressure enters the annular channel 28 and is conducted from the latter to the muffler 30, by means of the exhaust passage 29.

For operating shaft 32, a horizontal lever 40 is rigidly secured at its center to said shaft, the ends of said lever extending preferably beyond the edges of the casing 1 and being provided with depending pull rods or cables 41, whereby the lever may be rocked in either direction to control the direction of rotation of the shaft 7. For holding lever 40 in neutral position, a well known type of spring pressed keeper 42 is employed, said keeper being mounted on a guide 42′ which is preferably though not necessarily formed integrally with the valve chest 27 as will be clear from Figs. 1 and 4. In case the operator should fail to cut off the fluid supply to the engine, when the load has been raised to the maximum amount, it becomes highly expedient to provide an automatic cut-out, and although I am aware that similar devices have heretofore been devised, I have provided the following novel construction for attaining this end.

A horizontal trip lever 43 is fulcrumed at one end of the rear side of the casing 1 as indicated at 43′, said lever extending beneath the winding drums 17 and having between its ends a shoe 44 adapted to be struck by the block to which the cables are attached, whereby said lever will be rocked upwardly from the lowered position of Fig. 3. The central portion of lever 43 is preferably bowed outwardly as shown at 45, to clear one of the adjusting caps 22 and also to position the shoe 44 for better engagement with the block or other part with which it is adapted to coöperate. The end of lever 43 opposite its fulcrum 43′, is pivotally connected by a link or the like 46 to a transmitting lever 47 fulcrumed between its ends at 48 to a lug or the like 49 formed on the edge of the casing 1. The front end of lever 47 is given a quarter turn to form an eye 50 through which one of the cables or the like 41 passes as shown clearly in Figs. 1, 3 and 9. This part 41 is equipped with a stop 51 and when the lever 43 is operated in the manner above set forth, it will transmit movement to the lever 47, with the result that the eye 50 of the latter will strike the stop 51, so that the rod or the like 41 upon which the stop is carried, will pull downwardly upon the lever 40, thus so rocking this lever as to set the valve 31 in a position to cut off the

supply of fluid to the cylinders, thus bringing the engine to a standstill without injury to any parts, which might otherwise occur.

Although any preferred type of muffler 30 could be employed in connection with the machine above described, this muffler is preferably constructed as shown in Fig. 4, that is of a lower bowl-shaped section 52 and an upper dome-shaped section 53, the two sections being suitably secured together in spaced relation. The center of the section 52 is provided with an inlet 54 communicating with the passage 29 through a suitable nipple 55 and an upstanding wall 56 is formed around said inlet 54. The upper section 53 is provided with an annular depending flange 57 of greater diameter than the wall 52 and it will be obvious that the provision of these two parts will check the outrush of exhaust steam or compressed air. The result is that any oil which would otherwise escape with the exhaust, will drop onto the bottom of the section 52, such oil being returned to the casing 1 by a suitable vertical tube or the like 58, whereby the oil which would otherwise be wasted, is utilized for further lubrication of the interior parts.

From the foregoing, taken in connection with the accompanying drawings, it will be obvious that although my invention is of extremely simple and compact nature, it will be highly efficient and durable. Since probably the best results are obtained from the several specific details shown and described, these details are preferably employed, but I wish it understood that within the scope of the invention as claimed, numerous minor changes may well be made.

I claim:

1. In a hoist, the combination of a casing, a winding drum in rear thereof, means in said casing for driving said drum, a lever fulcrumed at the front of said casing for controlling said driving means, one end of said lever extending beyond said casing, a trip lever fulcrumed at one end to the rear side of said casing, the other end of said trip lever extending beyond said casing, and a transmitting lever extending transversely of the other levers and fulcrumed between its ends to said casing, the ends of said transmitting lever being operatively associated with the projecting ends of said control and trip levers, said trip lever being disposed beneath the drum for actuation when the load is raised to the maximum.

2. In a hoist, the combination of a casing, a winding drum in rear thereof, means in said casing for driving said drum, a lever fulcrumed at the front of said casing for controlling said driving means, one end of said lever extending beyond said casing, an operating member depending from said projecting end of said controlling lever, a trip lever fulcrumed at one end to the rear side of said casing and positioned beneath said drum, a transmitting lever extending transversely of the others and fulcrumed between its ends to said casing, a pivotal connection between the rear end of said transmitting lever and said trip lever, the front end of said transmitting lever having an eye through which the aforesaid operating member slides, and a stop on said operating member in the downward path of said eye, the intermediate portion of said trip lever being bowed outwardly and having a shoe adapted to be struck when the load is raised to the maximum.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WILLIAM LAMB.

Witnesses:
FRED MACDONALD,
A. G. SAEOKE.