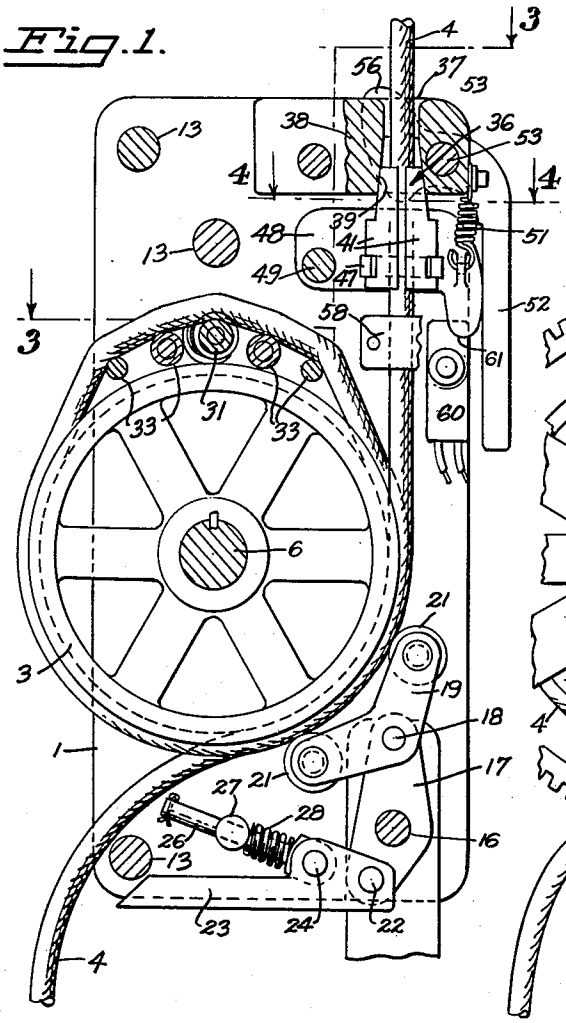
Jan. 26, 1960 H. B. SIMMONS 2,922,623

HOISTS

Filed Nov. 14, 1955 2 Sheets-Sheet 1

Fig. 1.



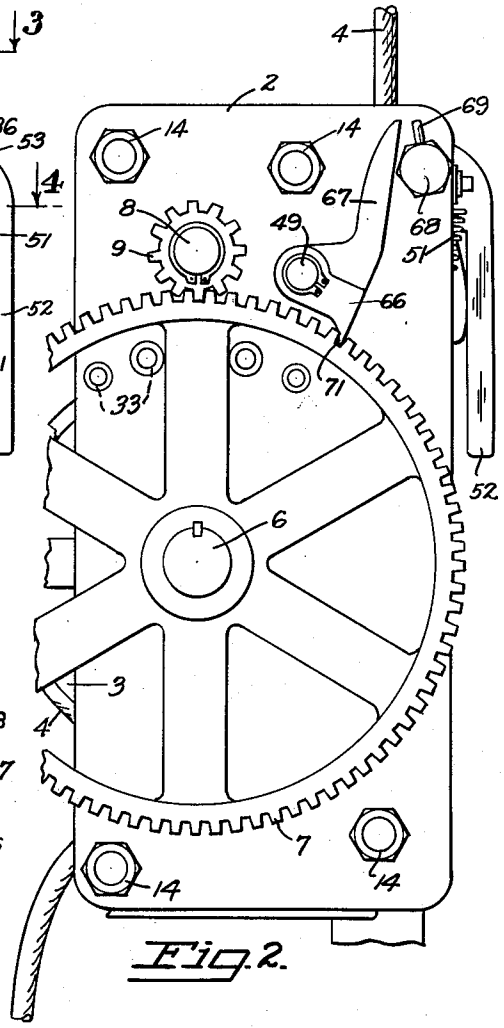


Fig. 2.

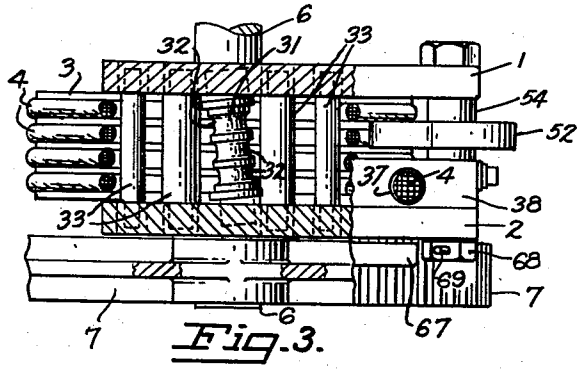
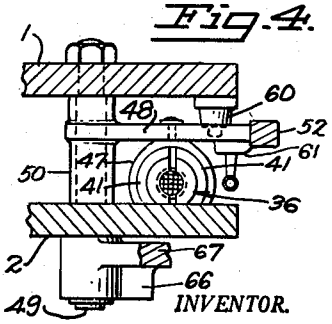


Fig. 3.

Fig. 4.



INVENTOR.
HORACE B. SIMMONS
BY George B. White
ATTORNEY

Jan. 26, 1960 H. B. SIMMONS 2,922,623

HOISTS

Filed Nov. 14, 1955 2 Sheets-Sheet 2

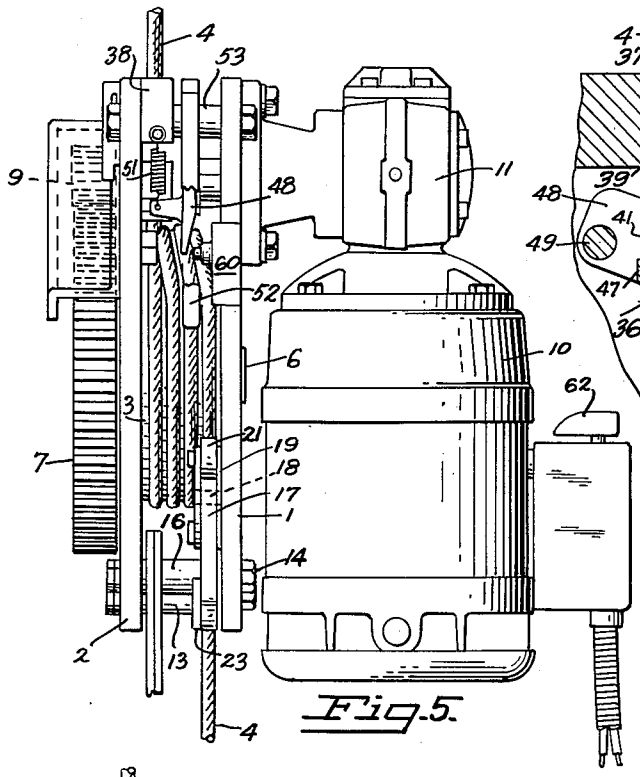


Fig. 5.

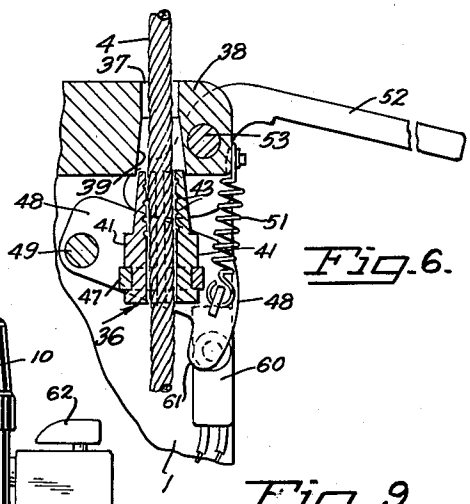
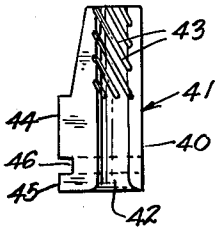


Fig. 6.

Fig. 9.



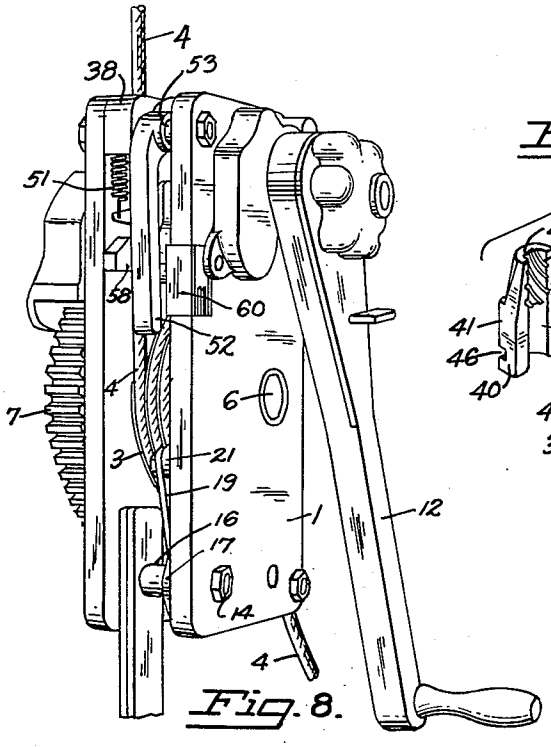
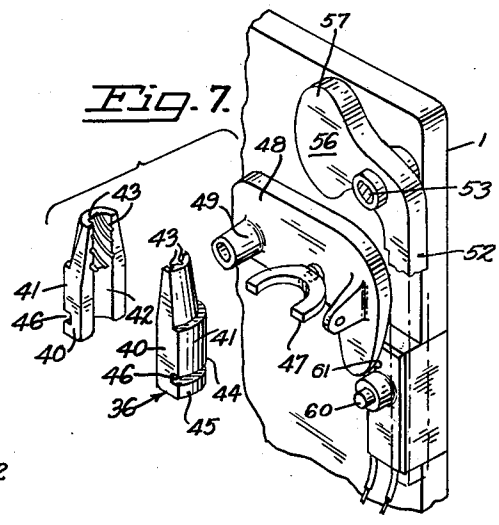


Fig. 8.

Fig. 7.



INVENTOR.
HORACE B. SIMMONS
BY George B. White
ATTORNEY

United States Patent Office 2,922,623 Patented Jan. 26, 1960

2,922,623

HOISTS

Horace B. Simmons, San Francisco, Calif.

Application November 14, 1955, Serial No. 546,316

3 Claims. (Cl. 254—156)

This invention relates to a hoist.

The primary object of the invention is to provide a so-called traction hoist which has constant torque and which is compact, light weight and rugged, and in which the operation is always safe, both when it is hand operated and when motor operated.

Particularly, the invention pertains to the type of traction hoist which may be used to carry and lift platforms or scaffolding or the like, used on structures as buildings, bridges, towers, tanks, mines, refinery and the like, or to lift such scaffolding or platform for various operations, such as painting, cleaning, plastering, erection of structures and the like.

The particular advantages of the hoist herein described include the means whereby the torque is held constant for any given load regardless of the height to which the load is lifted; the cranking of the handle in the manual units or the torque on the motor in the motorized unit being about the same at any height and assures the same rate of climb from bottom to top of the cable or traction line; other advantages are that the wire or cable is always wound at one point of a grooved drum and always leaves at the same place at another point of the drum. This eliminates cross-over wires, the building up slack or the crushing of the cable; it leaves the wire or cable open to inspection and as the end of the cable is not secured to the drum, the device allows all turns that accumulate in wrap on the drum type of hoist to run out at the bitter end of the cable, thus the load is always hung perpendicularly to the line of suspension eliminating any tendency of the unit being unbalanced; the device can be used equally well in horizontal position as a traveling or stationary winch; it provides for positive gripping of the cable and also automatic release and connection for the turning of the drum or operation; and in the motorized units it provides an automatic safety connection whereby the operation of the motor is positively prevented when the cable is gripped and is allowed to work only when the cable is released.

I am aware that some changes may be made in the general arrangements and combinations of the several devices and parts, as well as in the details of the construction thereof without departing from the scope of the present invention as set forth in the following specification, and as defined in the following claims; hence I do not limit my invention to the exact arrangements and combinations of the said device and parts as described in the said specification, nor do I confine myself to the exact details of the construction of the said parts as illustrated in the accompanying drawings.

With the foregoing and other objects in view, which will be made manifest in the following detailed description, reference is had to the accompanying drawings for the illiustrative embodiment of the invention, wherein

Fig. 1 is a partly sectional side view of my device.

Fig. 2 is a fragmental side view of my device.

Fig. 3 is a sectional fragmental view, the section being taken on lines 3—3 of Fig. 1.

Fig. 4 is a fragmental sectional view of the mechanism and switch control, the section being taken on lines 4—4 of Fig. 1.

Fig. 5 is an edge view of my device with motor drive.

Fig. 6 is a sectional fragmental detail view of the cable gripping and switch control device in its cable releasing position.

Fig. 7 is a perspective developed view of the cable gripping and switch control device.

Fig. 8 is a perspective view of the device with manual control handle thereon.

Fig. 9 is a perspective view of one-half sleeve showing the spiral serration therein.

Between a pair of side plates 1 and 2 is located a grooved drum 3 over which is played a wire or cable 4 in the usual manner. The drum 3 is keyed or mounted on a shaft 6 which in turn is journalled in the opposite plates 1 and 2. An end of the shaft 6 extends through the adjacent plate 2 and on the projecting portion thereof is mounted a spur gear 7. Spaced above the spur gear and the drum there is journalled in the plates 1 and 2 a pinion gear shaft 8 on which latter is mounted a pinion gear 9 in mesh with the teeth of the spur gear 7 so that as rotation is imparted to the pinion gear shaft 8, it rotates the gear pinion 9 and this in turn rotates the spur gear 7 and the main shaft 6 and the drum 3 thereon for the purpose of winding the cable 4 upon the drum 3 in a manner to be hereinafter described.

Rotation may be imparted to the pinion gear shaft 8 by means of an electric motor 10 and suitable reduction gearing 11 suitably controlled, or by means of a ratchet handle 12 of the type generally shown in Fig. 8 for manual operation.

The side plates 1 and 2 are clamped together by suitable spacers 13 and bolt 14 as herein indicated. Below the drum 3 and at one corner of the plate there is provided a tensioning device. There are several suitable types of tensioning devices available to maintain the end of the cable under tension on the drum, and the herein is merely illustrative. This tensioning device includes a pivot shaft 16 on which is mounted between the plates 1 and 2 a lever 17.

On the end of the lever 17 near the drum is a pivot 18 on which is supported a rocking arm 19 with tension rollers 21 in the opposite ends thereof bearing against the cable 4 in the last adjacent groove of the drum 3. The other or lower end of the rocking arm 19 has a pivot 22 therein to which is pivoted a lock arm 23. To the hub 24 of the lock arm 23 is also pivoted a toggle pin 26 which latter slidably extends through a rotatable transverse pin 27 so that the toggle pin 26 is slidable through and also rotatable with the pin 27. A coil spring 28 between the pin 27 and the hub 24 of the lock arm 23 maintains the toggle pin 26 under tension as the lock arm 23 is pulled outwardly from the respective plates, then it turns around the pivot 22 and thereby pulls the toggle pin 26 outwardly from the pin 27 and correspondingly pulls the adjacent end of the lever 17 toward the pin 27 so as to pull the lock arm 19 and the tension rollers 21 away from the drum 3. When the lock arm 23 is pushed back to its position, it moves the toggle pin 26 inwardly and against the action of the coil spring 28 between the pin 27 and the hub 24, and it pushes the hub and the lower end of the lever 17 outwardly so as to hold the upper end of the lever 17 and the rocking arm 19 and the tension rollers 21 inwardly in tensioning position. It is to be understood that several different types of tensioning devices may be employed which have a similar release and are suitably held in contact with the cable on the drum at the lower portion of the hoist.

The devices as heretofore described, are more or less conventional. The herein invention is directed to the

mechanisms and devices for controlling and guiding the cable with respect to the drum.

The cable 4 enters between the side plates 1 and 2 from the top of the device, and leaves always at the bottom of the device, as shown. As the cable 4 extends from the top, it is played around the first adjacent groove on the drum 3, namely around the groove next to the side plate 2. Then as the cable is wound on the drum, it is directed back into the next groove of the drum, over a grooved guide roller 31. This guide roller 31 is arranged at an angle other than at right angles to the planes of the side plates, or to the diametrical plane of the drum 3. As particularly shown in Fig. 3, the grooved guide roller slants transversely and is not parallel with the axis of the drum shaft 6. The vertical plane through the axis of the guide roller intersects the vertical axial plane of the drum at an acute inclined angle. The grooves 32 on the guide roller 31 are formed generally at right angles to the axis of the guide roller 31 so that by reason of the angular position of the guide roller 31 the grooves are transversely slanted substantially so as to lead from one drum groove to the next from one end of the drum to the other in sequence. There are three grooves 32 on the guide roller 31 when it is used in connection with the four groove drum 3 shown on which the cable is played for about four turns. This positively guides the cable from one groove into the other of the drum without allowing any damage or jamming or distortion of the wire cable.

The grooves 32 which are transversely inclined with respect to the grooves of the drum 3 positively and gently guide the cable from one groove to another on the subsequent turns or winding of the cable 4 on the drum 3. This materially prolongs the life of the cable.

The cable is also guided either by grooved or smooth guide rollers 33 to the grooved roller 31 from the opposite sides thereof. The rollers 33 are of graduated diameter, the smallest being the farthest away from the central grooved guide roller 31. As the cable is played over the drum, it is gradually raised or guided up to the grooves 32 of the guide roller 31 as particularly indicated in Fig. 1, and then gradually descends to meet the grooves of the drum.

The upper branch of the cable 4 extends upwardly between the plates 1 and 2 through a cable lock device 36 and through a hole 37 through a spacer block 38. The hole 37 is counterbored so as to form a generally frusto-conical socket 39 into which extends the cable lock device 36. A pair of complemental half jaws or sleeves 41 when put together form a generally frusto-conical exterior entering into the socket 39 so that when the half sleeves 41 are pulled up into the socket 39, they are squeezed together and when pulled out of the socket 39, are allowed to move apart. Each half sleeve 41 has a semi-cylindrical jaw face 42 over one-half of the cable 4. Each jaw face 42 is provided with serrations 43 slanted spirally so as to generally correspond to the spiral exterior of the usual cable 4, and thereby more firmly lock unto said cable 4 when the half sleeves 41 are pushed together. This forms a split cable lock, each half of which has on its interior spiral grooves for the purpose of engaging the cable and which is frusto-conical on the outside so that the split-halves are clamped together on the cable when drawn into the socket 39 and move apart when pulled out of said socket 39. The sleeves 41 have flat faces 40 adjacent and along the plate 2.

On the lower portion or base of the half sleeves 41 are spaced cylindrical collars 44 and 45 defining therebetween a groove 46 into which loosely extends a yoke 47 for the purpose of shifting the split sleeves. This yoke 47 extends from the side of a release arm 48 supported on a pivot 49 between the plates 1 and 2 and offset to one side of the cable 4. A coil spring 51 is anchored at one end thereof to the spacer block 38 and at its other end to the release arm 48 so as to normally pull the release arm 48 upwardly into position for pushing the split sleeve locking device into the socket 39. The hub 50 of the release arm 48 extends from one plate to the other so as to space and locate the release arm 48 in position.

A cable lock lever 52 is pivoted on a pivot bolt 53 extending transversely through the side plates and through said spacer block 38. The hub 54 of the cable lock lever 52 extends from the spacer block 38 to the other plate 1. Thus the cable lock lever 52 is located in registry with the release arm 48. On the pivoted head 56 of the cable lock lever 52 is provided a cam 57 which bears against the top of the release arm 48 so that as the cable lock lever 52 is pulled outwardly and upwardly it turns the head 56 downwardly and the cam 57 against the top of the release arm 48 and pushes the release arm 48 down and thereby pulls the split half sleeves 41 out of the socket 49 and releases the cable 4. When the cable lock lever 52 is turned back to the initial position as shown in Fig. 1, it permits the coil spring 51 to pull the release arm 48 back to its initial position and thereby to return the conical half sleeves 41 into the socket 39 for locking the cable 4. A stop 58 between the plates 1 and 2 below the base of the half sleeves 41 limits the downward movement of the half sleeves 41.

In the case of the motorized hoist the electric circuit of the electric motor 10 is controlled by a suitable so-called micro switch 39 which is mounted between the plates 1 and 2 generally extending in registry with a tapering cam edge 61 on the release arm 48 so that as the release arm 48 is lowered into the position shown in Fig. 6 for releasing the cable 4, its cam edge presses against the micro switch button 60 and closes the electric circuit to the motor 10, whereupon the motor might be operated in the usual manner through a usual rheostat or switch 62, or the like. Whenever the release arm 42 is in the upward position wherein the cable lock device 36 is locked upon the cable 4, the micro switch 59 is open and the electric supply lines to the electric motor 10 are broken and the electric motor 10 cannot be operated. In this manner the operation of the motor against the cable lock is positively prevented.

A pawl 66 is pivoted on the pivot bolt 49 of the release arm 48 so as to be swingable thereon into and out of engagement with the spur gear 7. The pawl 66 has an ear 67 extended opposite the adjacent end of the pivot bolt 53 of the cable lock lever 52. On the end of the pivot bolt 53 is a head 68 from which extends a finger 69 which bears against the ear 67 of the pawl 66. The relationship between the finger 69 and the ear 67 is such that when the cable lock lever 52 is in locking position, then the pawl 66 is allowed to drop into engagement with the spur gear 7 and lock the spur gear, and when the cable lock lever 52 is in releasing position as shown in Fig. 6, then the finger 69 pushes against the ear 67 and pulls the pawl 66 around its pivot so as to withdraw the tooth 71 of the pawl 66 from the spur gear 7 and thereby release the spur gear 7 simultaneously with the release of the cable lock 36.

In operation, for instance, when the hoist is used for raising and lowering usual scaffolds or platforms, for vertical movement, the cable is extended and wound on the drum as shown, and normally it is locked in position by the cable lock device 36 as well as by the pawl 66 and by the spur gear 7. In order to raise or lower the hoist on the cable 7, the cable lock lever 52 is pulled out and releases the cable lock device from the cable 4 and the pawl 66 from the spur gear 7 in the manner heretofore described. Then by rotating the ratchet hand wheel as shown in Fig. 8, or by operating the electric motor 10 in either direction, the cable is wound upon the drum as guided by the grooved guide roller 31 to hoist into the desired position. After the hoist has reached the desired position, the operation of the motor is automatically stopped by closing the cable lock lever 52 in the position shown in Fig. 1, and thereby the cable 4 as well as the spur gear 7 are locked, and the micro-switch is kept open, in the manner heretofore described.

I claim:

1. In combination with a hoist of the character described, in which a cable drum is supported between a pair of opposite frame members so as to rotate therebetween, and in which means are provided for rotating said drum, and in which a cable wound several turns around said drum extends through opposite ends of the hoist between said frame members; a fixed element between said frame members spaced from said drum, said fixed element having a passage therethrough and having a conical socket formed on the ends of said passage inwardly of said hoist, said cable slidably extending through said socket, a conical cable grip adapted to be squeezed into said socket, said cable grip including a pair of complemental jaw sections forming a generally conical exterior adapted to be squeezed into said socket to be pushed thereby together, a release arm pivoted between said frame members and connected to said cable grip for pulling said cable grip out of said socket thereby to allow the jaw sections thereof to move apart and release the cable, resiliently yieldable means to normally urge said release arm toward said socket to move said cable grip into cable gripping position, an actuating lever pivoted between said frame members, and a cam on said actuating lever aligned with said release arm for engaging and pushing the same when said lever is manipulated, an operating mechanism to rotate said drum, a control device yieldably held in position to render said operating mechanism inoperative, said control device being between said frame members in alignment with said release arm, the cam face on said release arm adjacent said control device being so formed as to engage said control device and move it into position for rendering said operating mechanism operative when said release arm is pushed by said lever into cable releasing position thereby to permit operation of said operating mechanism when said cable is released.

2. In combination with a hoist of the character described, in which a cable drum is supported between a pair of opposite frame members so as to rotate therebetween, and in which means are provided for rotating said drum, and in which a cable wound several turns around said drum extends through opposite ends of the hoist between said frame members; a fixed element between said frame members spaced from said drum, said fixed element having a passage therethrough and having a conical socket formed on the ends of said passage inwardly of said hoist, said cable slidably extending through said socket, a conical cable grip adapted to be squeezed into said socket, said cable grip including a pair of complemental jaw sections forming a generally conical exterior adapted to be squeezed into said socket to be pushed thereby together, a hub on each jaw section having an external peripheral groove, a release arm pivoted between said frame members, a yoke on said release arm, extended into said grooves of said jaw sections for pulling said cable gripping member out of said socket when said release arm is swung away from said socket thereby to allow said jaw sections to move apart and release said cable, resiliently yieldable means to normally urge said release arm and its yoke toward said socket to move said gripping member into cable gripping position, an exterior actuating lever journalled in said frame members, a journal shaft on said lever extending across the space between said frame members above said release arm, a cam on said journal shaft registering with said release arm for engaging and pushing said arm to releasing position when said lever is manipulated, means to impart rotation to said drum at will, said rotating means including a gear transmission, a pawl pivoted on said frame members and engageable with said gear transmission to lock it against rotation, a head on said journal shaft of said lever adjacent said pawl rotatable with said turning of said lever, and a projection of said head bearing against said pawl so as to release said pawl from said gear transmission when said lever is turned to push said release arm into cable releasing position.

3. In combination with a hoist of the character described, in which a cable drum is supported between a pair of opposite frame members so as to rotate therebetween and in which power means are provided for rotating said drum, and in which a cable wound several turns around said drum extends through opposite ends of the hoist between said frame members, a conical socket between the frame members through which the cable extends, a releasable cable grip adapted to be squeezed into said socket for gripping said cable, a release arm between said frame members connected to said cable grip for releasing said grip from said socket so as to release said cable, an actuating element extended from between said frame members for manipulating said release arm, a power control device normally to render said power means inoperative and being adapted to be moved into position to render said power means operative, a member on said release arm for engaging said power control device only when said cable grip is released so as to move said power control device into position to permit operation of said power means.

References Cited in the file of this patent

UNITED STATES PATENTS

42,465	Davies	Apr. 26, 1864
281,549	Nack	July 17, 1883
294,629	Jenkins	Mar. 4, 1884
523,273	Fouts	July 17, 1894
899,786	Colby	Sept. 29, 1908
1,682,083	Johnston	Aug. 28, 1928
2,410,419	Bellezza	Nov. 5, 1946
2,508,187	Niemiec	May 16, 1950
2,530,766	Halderman	Nov. 21, 1950
2,550,839	Martin	May 1, 1951
2,579,846	Moravec	Dec. 25, 1951
2,662,734	Allenbaugh	Dec. 15, 1953
2,720,266	Broussard	Oct. 11, 1955
2,726,755	Moser	Dec,. 13, 1955
2,742,261	Arnold	Apr. 17, 1956