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2,270,271

TAPE HOIST AND TENSIONING DEVICE

Filed Aug. 4, 1939

2 Sheets-Sheet 1

FIG. 1

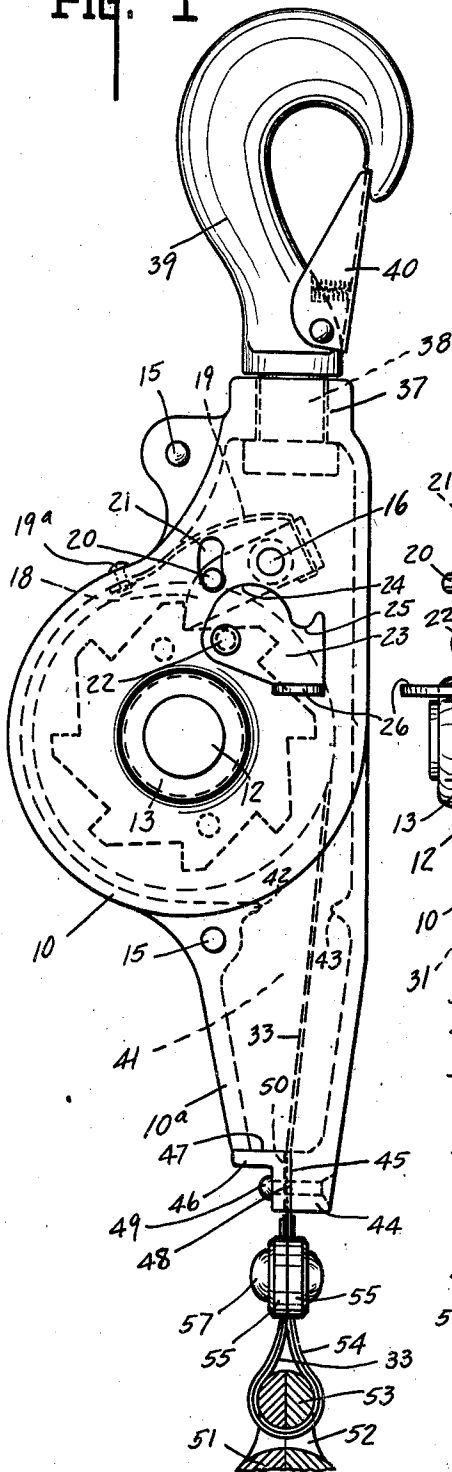


FIG. 2

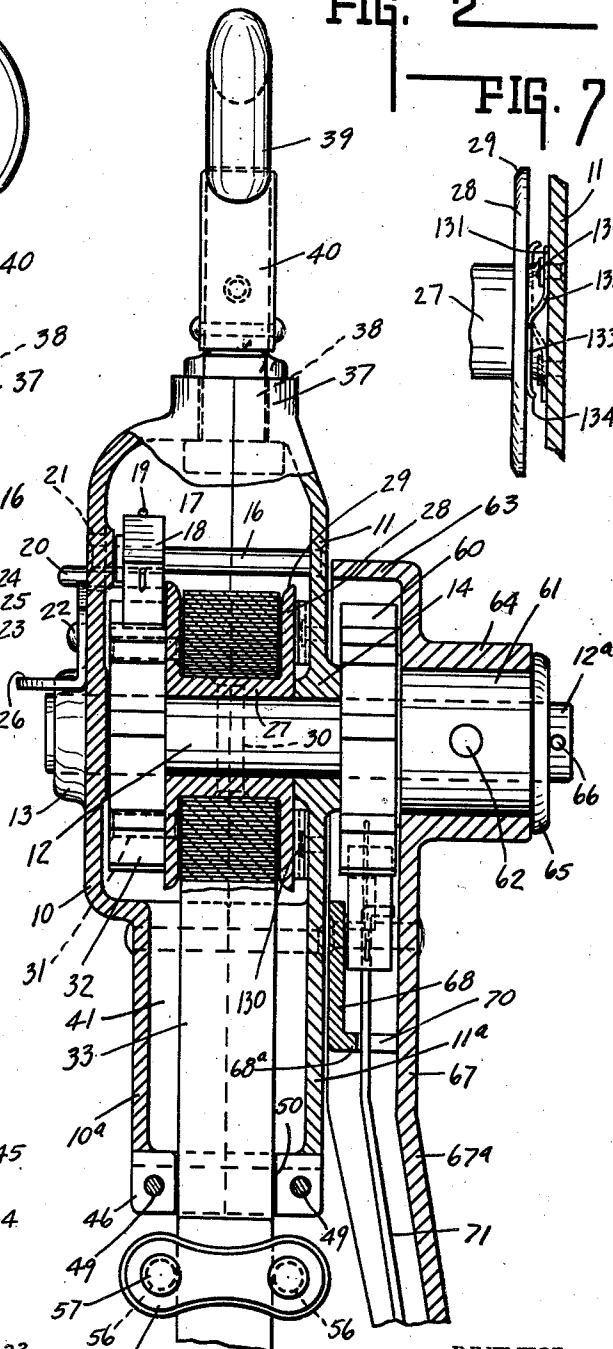
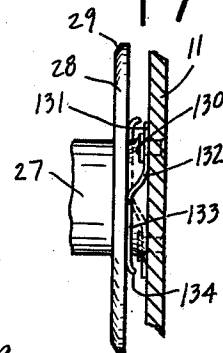


FIG. 7



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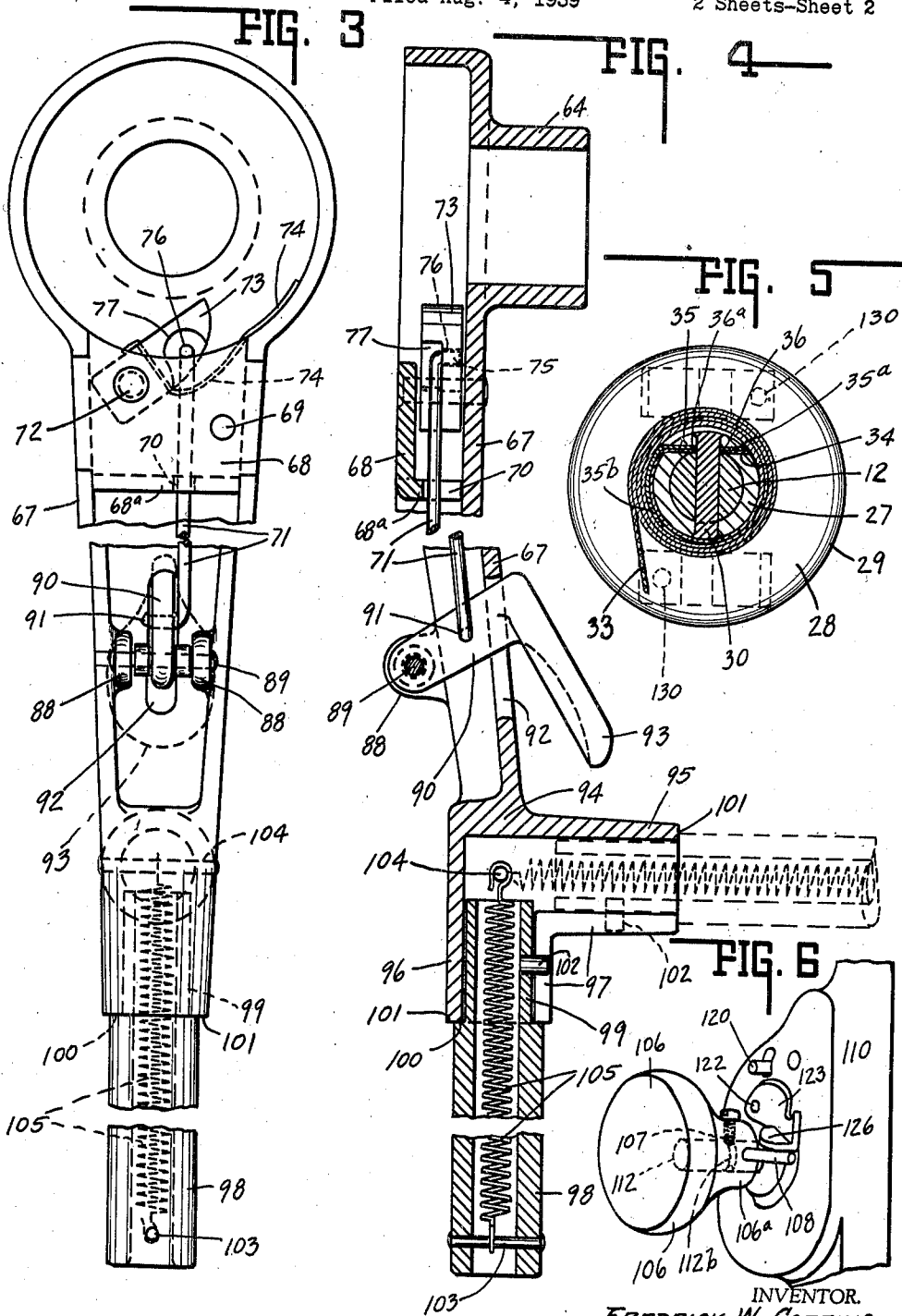
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TAPE HOIST AND TENSIONING DEVICE

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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TAPE HOIST AND TENSIONING DEVICE

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5 Claims. (Cl. 254—167)

This invention relates to a device capable of operation as a hoist, cable or fence slack eliminator or the like.

The chief object of this invention is to provide such a device which is relatively simple in character, having but few parts and these of comparatively light weight but of sufficient strength, and which device is easily operable.

Broadly expressed, the device is a step-by-step ratchet operable device which is capable of being locked in the desired cable or fence tensioning or load sustaining position and which when released can be operated for tension release or load lowering.

The chief feature of the device consists in the tape type element and magazine therefor.

A further feature of the invention consists in the provision of means for insuring a true scroll type rewinding of the tape if of metal strip form and the non-conical, lateral or non-binding rewind actuation.

A further feature of the invention consists in the several support and handle features for facilitating the support and operation of the device.

Other objects and features of the invention will be understood from the accompanying drawings and the following description and claims:

In the drawings,

Fig. 1 is a side elevation of one embodiment of a tape hoist, the movable anchor member being shown in section.

Fig. 2 is substantially a central sectional view of such a hoist, the tape guide and throat and "stationary" ends being shown in elevation.

Fig. 3 is an "inside" elevational view of the handle, a portion being shown in "lever handle" position.

Fig. 4 is a sectional view of the handle, the dotted lines indicating a portion of the handle in "crank handle" position.

Fig. 5 is a central sectional view through the main shaft, spool and metal tape illustrating the anchorage connections therebetween.

Fig. 6 is a perspective view of a support addition for the hoist.

Fig. 7 is a plan view of a brake structure associated with the spool.

In Figs. 1 and 2 of the drawings, 10 and 11 indicate half housings which together rotatably support shaft 12 in aligned bearings 13 and 14 respectively. These housings are secured together as at 15 and 16. The latter, see Fig. 2, in chamber 17 in the housing provides a spindle upon which pivots the load holding pawl 18 nor-

mally constrained into load holding position by spring 19.

This pawl carries a pin 20 that extends beyond chamber 17 through arcuate slot 21 in the housing member 10. Adjacent said slot and pivoted at 22 on the housing member 10 is a latch member 23 having a cam face 24, seat 25 and lateral finger engageable portion 26, the operation and purpose of which will be set forth more fully hereinafter.

Within chamber 17 is a metal tape winding and storing spool having the hub portion 27 and side plates or flanges 28 oppositely relieved at their adjacent interior edges as at 29. This spool is secured to shaft 12 by rivet 30. To the exterior lefthand face, see Fig. 2, of the spool as by rivets 31 is secured a ratchet wheel 32, the toothed periphery being aligned with load holding pawl 18 as shown, the latter being constrained into engagement with said ratchet by spring 19 anchored at 19a.

When member 23 is positioned as shown in Fig. 1, the pawl, due to slot 21 being elongated, can pivot in the counterclockwise rotation of the adjacent ratchet. When reverse movement of this ratchet is desired for rapid "paying" out of the tape, hereinafter to be described, the member 23 will be tilted counterclockwise. Cam 24 engages pin 20 which tilts pawl 18 clockwise out of ratchet engagement position and the pawl is held in this position when the seat 25 engages the pin 20.

The teeth of the ratchet and face of the pawl may have cooperating faces of locking draft character, as shown, that is, to elevate the pawl from the root tooth seating, the ratchet must be advanced slightly—moved counterclockwise, see Fig. 1.

The extensible flexible member 33 is herein illustrated as a metallic tape, such as a strip of spring steel. The spool, reel or wheel is slotted as at 34—see Fig. 5. This slot in length is the width of the tape and the end 35 thereof—see Fig. 5—seated in the slot is apertured at 36. A reenforcement 35a in the form of a short length of tape metal is also apertured at 36a and is seatable in the slot 34. Its other end is curved as at 35b. Thus, rivet 30, which is transverse to the slot, passes through the slot seated apertured ends of the tape and its reenforcement to anchor the tape to the spool. This reenforcement upon tape exhaustion exerts a spring pressure upon the tape proper immediately ahead of the anchored end thereof, thereby cushioning the shock upon full unwinding of the tape under load and thus tends to prevent tape breakage.

At one end of the housing is bearing 37—see Figs. 1 and 2—in which is mounted portion 38 or stem of a snap hook 39 having the spring pressed retainer portion 40. The swivel axis—see Fig. 1—is offset from the plane of the axis of the shaft 12.

Both housing members at the end opposite bearing 37 and in alignment therewith, are extended as at 10a and 11a to form an extension for feeding tape onto spool 27. This guide and extension is very important as the tape cannot be used without this guide to balance the hoist when pulling on the lever or winding on the crank.

The mouth of the throat structure is of peculiar formation, which mouth in addition to relief 29 on the spool insures true scroll winding of the tape, that is, prevents twisting thereof as well as plate riding. The mouth serves as a tape cleaner.

The lower end of housing portions are extended as at 44, see Fig. 1, and are faced as at 45 which is substantially in alignment with the axis of bearing 37. An angular member 46 closes as at 47 the lower ends of the shorter portions of the extensions. The face 48 of member 46 abuts face 45 and the parts are secured together at opposite ends as at 49. This face 48 is slotted or recessed as at 50 to provide a tape slide and guide with portion 44, or more particularly, face 45 thereof. This elongated mouth structure not only serves as a tape cleaner but a guide for the tape in the winding and unwinding thereof.

The housings may be made of aluminum alloy and the angle mouth of steel, suitably treated to resist rusting. The tape as shown is of spring steel approximately $\frac{3}{4}$ " wide and 0.012 more or less in thickness and having a tensile strength of 2,500 lbs.

To further insure proper tape action and also prevent tape breaking at its spool anchorage, there is provided one or more spool friction springs—see Figs. 5 and 7. Herein, two diametrically positioned springs are illustrated—see Figs. 2, 5 and 7. Herein, the numeral 130 indicates a housing supported unit or the like, which anchors one end 131 of a spring strip, offset intermediate its ends as at 132 to position portion 133 adjacent and in contact with the adjacent face 28 of the spool. The free end may be relieved as at 134, if desired.

The free end of the tape is connected to a suitable anchoring member such as a snap hook similar or identical to that illustrated in the upper portions of Figs. 1 and 2. The swivel portion thereof is swivally supported in a bearing—not shown—in a socket structure, only the upper portion of which is illustrated in the lower portion of Fig. 1. It is of two-piece character suitably secured together by means not shown. This socket structure 51 at its upper end is apertured as at 52 to form a cylindrical portion 53.

The free end of the tape 33 passes through aperture 52 and laps the adjacent portion of the tape as shown. A short section 54 of tape material, or the like, U-shaped in section, embraces the aperture received and cylindrical mounted tape end. Two chain link or the like side plates 55, having apertures 56—see Fig. 2—at opposite ends and tape width apart, are riveted together as at 57 with the tape end, tape, and U-shaped tape member ends in abutting relation. This constitutes the connection at the lower end of the tape.

It is apparent that each of the hooks may

swivel and that the socket and tape have a rotational connection. Hence, the hoist body may be held stationary, as it were, upon its longitudinal axis even though the hook, or hooks, are required to turn, et cetera.

Reference now will be had to Figs. 2 to 4, inclusive, for an explanation of the tape winding, load tensioning, or load elevating mechanism.

Shaft 12 projects beyond housing member 11 and on the extended end 12a is keyed or otherwise suitably secured thereto as at 62, a ratchet 60. The number of teeth in ratchets 18 and 60 are the same as herein illustrated. A sleeve portion 61 constitutes a hub on said ratchet and forms a bearing, for the handle structure.

The handle structure includes a cup-like chamber forming portion 63—see Fig. 2—from which coaxially extends portion 64 which rides on bearing 61. A washer 65 pinned or otherwise secured as at 66 to shaft end 12a, retains the handle structure onto lifting ratchet bearing hub and in operative position.

The cup-like chamber forming portion 63 includes a channel sectioned elongated extension 67 having a slight offset at 67a—see Fig. 2. An angular member 68 secured as at 69—see Fig. 3—to this extension forms an offset housing. Portion 68a is apertured at 70 to slidably support rod 71.

Pivoted on rivet and shaft 72 in this offset housing is pawl 73 arranged for engagement with ratchet wheel 60, being normally constrained towards such engagement by spring 74. The adjacent end 75 of rod 71 is offset—see Fig. 4—and is pivotally connected to the pawl as at 76, the latter being relieved as at 77 to accommodate same and the rod and thus permit shaft length to be kept to a minimum.

Near the free end of the handle, there is provided spaced ears 88 which carry pin 89 pivotally supporting angle shaped lever 90 to which, as at 91, rod 71 is connected. The handle extension 67 is apertured as at 92 between the ears and therethrough extends the lever 90, the offset portion 93 lying adjacent the extension 67 and constituting a thumb actuatable portion. When portion 93 is depressed from portion 67, pawl 73 is withdrawn from engagement with the teeth of ratchet 60 and the handle structure is freed relative to the previous shaft connection through said pawl.

This handle structure may be of dual character, as illustrated. It may be of lever type, or crank type, as desired. When the device can be readily actuated as for initial tensioning of a fence, or taking up the tape immediately prior thereto, the parts may be positioned as shown by the dotted lines in Fig. 4 and the handle used as a crank and rapidly rotated until the crank operation has a tendency to be resisted or to twist the device upon its longitudinal axis. Then the handle end of the structure is positioned as shown by the full lines in Figs. 3 and 4 and it is used as a lever. Of course, the lever arrangement can be rotated when desired, just as the crank arrangement can be oscillated. In other words, the handle structure may be oscillated or rotated as desired and when the handle end is lever arranged or crank arranged, although when lever arranged (aligned) an increase in lever arm results.

Briefly, this changeable end structure of the handle includes portion 94 providing two tubular portions 95 and 96 at right angles and opening outwardly. Adjacent inner walls thereof are

slotted as at 97. These may be provided with extensions remote from the outer ends and angular, if desired, for bayonet seat formation.

A tubular hand grip portion 98 is reduced as at 99 providing shoulder 100 which when portion 99 is seated in portion 95 or 96—see Figs. 3 and 4—bears against the end 101 thereof. The reduced portion 99 carries pin 102 that seats in the slot 97 of the socket in which the grip portion is mounted.

A pin 103 extends through the hand grip portion near its outer end. A pin 104 extends through the socketed portions 95 and 96 where same communicate with each other and registers with the axial intersection thereof. A spring 105 is secured at opposite ends to pins 103 and 104. Thus, when pin 102 is seated in slots 97, spring 105 holds pin 102 in slots 97 and prevents the hand grip 98 from turning to prevent twisting spring 105 in two.

Reference now will be had to Fig. 6. In this figure shaft 112 is extended beyond housing 110 and is annularly grooved as at 112b intermediate its end and the housing. A hand grip or knob 106 includes hub portion 106a that is rotatable on said shaft extension and carries a cap screw 107 or the like seatable in the groove 112b. A projecting pin 108 is carried thereby so that when this hand grip is used for device steadying purpose, rotation of the grip in one direction relative to hoist body will cause pin 108 to engage the finger piece portion 126 and lock pin 120 for pawl lockout purposes. When the grip is reversely rotated, pin 108 will unlock said pin 120 from the member 123 and return the latter to the released position permitting the inside pawl to reengage the inside ratchet.

When the inside pawl 18—see Fig. 1—is held out of inside ratchet engagement by cam 24 and the handle pawl 73 is held out of outside ratchet engagement, the tape may be freely extended the desired length. Also, if desired, and in some instances when a tape tension device is properly provided or an automatic rewind be provided, such pawl release then will permit the tape to automatically rewind upon the spool if the tape then be under no load or tension. Such automatic rewind mechanism is for simplicity, not illustrated herein.

While the invention has been illustrated and described in great detail in the foregoing description, the same is to be considered as illustrative and not restrictive in character.

The several modifications described herein as well as others which will readily suggest themselves to persons skilled in this art, all are considered to be within the broad scope of the invention, reference being had to the appended claims.

The invention claimed is:

1. In a hoist, the combination of a magazine type housing, a unitary shaft extending across the magazine and projecting through one side thereof, an anchoring member at one end of the housing, a tubular extension directed oppositely therefrom, the anchoring member and extension having a common alignment offset from the axis of the shaft, a tape reel carried by said shaft, a tape secured at one end to said reel and windable thereon and unwindable therefrom, throat means at the end of said tubular extension and operatively associated with the tape for guidance, alignment and clearance purposes, a ratchet rigid with the shaft, a pawl, yielding means normally constraining the pawl toward ratchet engage-

ment for tape tensioning, means for rotating the shaft for tape tensioning, housing exposed means overcoming, when manually operable, the constraint imposed by the yielding means for removing the pawl from ratchet engagement for permitting paying-out of the tape from the magazine, the means for rotating the shaft for tape tensioning, including a ratchet carried by the shaft externally of the magazine and on the projecting end of said shaft, a handle rotatably mounted on said projecting end of said shaft and in juxtaposition to said ratchet and including a pawl constrained to last mentioned ratchet engagement, and means terminating adjacent the outer end of the handle and arranged for handle pawl ratchet disengagement in opposition to the constraint upon the handle pawl, the free end of said handle terminating in a tubular structure including transversely arranged tubular sockets and a single member selectively seatable in either of said sockets and normally constrained toward seating engagement therein and having an interlocking connection therewith when in either of the sockets for forming a crank structure or a lever extension structure.

2. In a hoist, the combination of a magazine type housing, a unitary shaft extending across the magazine and projecting through one side thereof, an anchoring member at one end of the housing, a tubular extension directed oppositely therefrom, the anchoring member and extension having a common alignment offset from the axis of the shaft, a tape reel carried by said shaft, a tape secured at one end to said reel and windable thereon and unwindable therefrom, throat means at the end of said tubular extension and operatively associated with the tape for guidance, alignment and clearance purposes, a ratchet rigid with the shaft, a pawl, yielding means normally constraining the pawl toward ratchet engagement for tape tensioning, means for rotating the shaft for tape tensioning, housing exposed means overcoming, when manually operable, the constraint imposed by the yielding means for removing the pawl from ratchet engagement for permitting paying-out of the tape from the magazine, and a hand grip portion operatively carried by the shaft, the latter portion being rotatable relative to the shaft and including means for cooperation with the manually operable means in the rotation of the hand grip and for hoist control through the first mentioned pawl.

3. In a hoist, the combination of a magazine type housing, a unitary shaft extending across the magazine and projecting through one side thereof, an anchoring member at one end of the housing, a tubular extension directed oppositely therefrom, the anchoring member and extension having a common alignment offset from the axis of the shaft, a tape reel carried by said shaft, a tape secured at one end to said reel and windable thereon and unwindable therefrom, throat means at the end of said tubular extension and operatively associated with the tape for guidance, alignment and clearance purposes, a ratchet rigid with the shaft, a pawl, yielding means normally constraining the pawl toward ratchet engagement for tape tensioning, means for rotating the shaft for tape tensioning, housing exposed means overcoming, when manually operable, the constraint imposed by the yielding means for removing the pawl from ratchet engagement for permitting paying-out of the tape from the magazine, and a hand grip portion

operatively carried by the shaft, the shaft being rotatable relative to the hand grip portion, and hand grip actuated means for cooperation with the manually operable means in the rotation of the hand grip for hoist control, the manually operable means having an exposed portion eccentric of the shaft axis and a latch pivotally mounted adjacent the shaft axis and in juxtaposition to the exposed portion of the manually operable means and the hand grip actuated means for operation of the latch by the hand grip actuated means.

4. In a hoist, the combination of a magazine type housing, a unitary shaft extending across the magazine and projecting through one side thereof, an anchoring member at one end of the housing, a tubular extension directed oppositely therefrom, the anchoring member and extension having a common alignment offset from the axis of the shaft, a tape reel carried by said shaft, a tape secured at one end to said reel and windable thereon and unwindable therefrom, throat means at the end of said tubular extension and operatively associated with the tape for guidance, alignment and clearance purposes, a ratchet rigid with the shaft, a pawl, yielding means normally constraining the pawl toward ratchet engagement for tape tensioning, means for rotating the shaft for tape tensioning, housing exposed means overcoming, when manually operable, the constraint imposed by the yielding means for removing the pawl from ratchet engagement for permitting paying-out of the tape from the magazine, a hand grip portion operatively carried by the shaft, the latter portion being rotatable relative to the shaft and including means for cooperation with the manually operable means in the rotation of the hand grip and for hoist control through the first mentioned pawl, and friction means interposed between the magazine type housing and the reel to insure

proper unwinding of the tape from the reel and tension winding of the tape upon the reel.

5. In a hoist, the combination of a magazine type housing, a unitary shaft extending across the magazine and projecting through one side thereof, an anchoring member at one end of the housing, a tubular extension directed oppositely therefrom, the anchoring member and extension having a common alignment offset from the axis of the shaft, a tape reel carried by said shaft, a tape secured at one end to said reel and windable thereon and unwindable therefrom, throat means at the end of said tubular extension and operatively associated with the tape for guidance, alignment and clearance purposes, a ratchet rigid with the shaft, a pawl, yielding means normally constraining the pawl toward ratchet engagement for tape tensioning, means for rotating the shaft for tape tensioning, housing exposed means overcoming, when manually operable, the constraint imposed by the yielding means for removing the pawl from ratchet engagement for permitting paying-out of the tape from the magazine, a hand grip portion operatively carried by the shaft, the shaft being rotatable relative to the hand grip portion, hand grip actuated means for cooperation with the manually operable means in the rotation of the hand grip for hoist control, the manually operable means having an exposed portion eccentric of the shaft axis and a latch pivotally mounted adjacent the shaft axis and in juxtaposition to the exposed portion of the manually operable means and the hand grip actuated means for operation of the latch by the hand grip actuated means, and friction means interposed between the magazine type housing and the reel to insure proper unwinding of the tape from the reel and the tension winding of the tape upon the reel.

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