March 14, 1944. F. W. COFFING 2,343,884

UNIVERSAL FREE TAPE HOIST

Filed April 30, 1941

FIG. 1

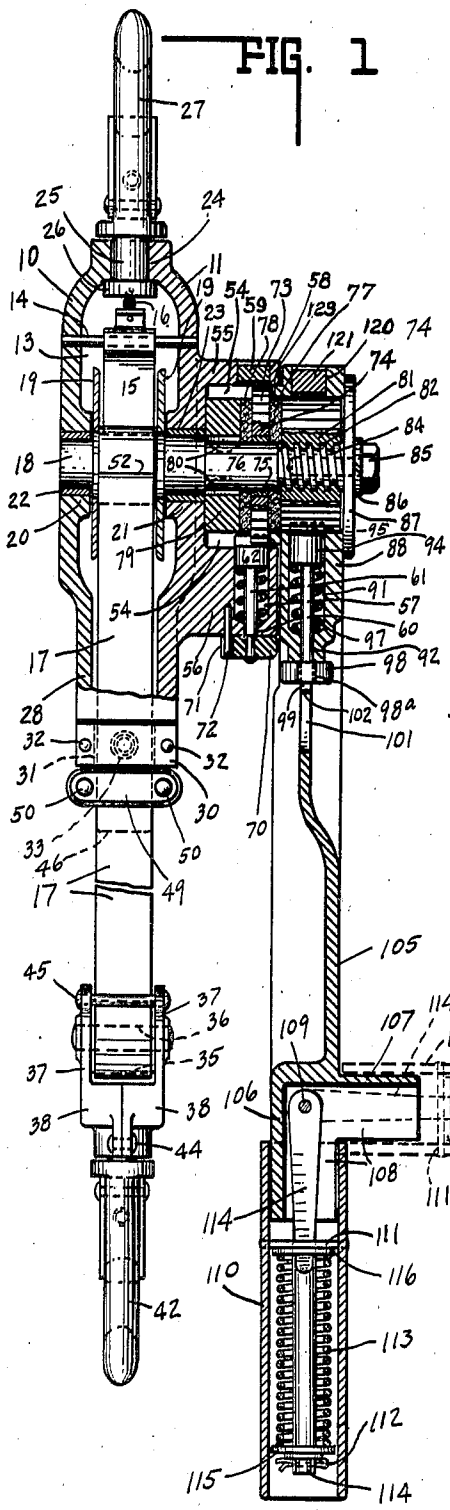
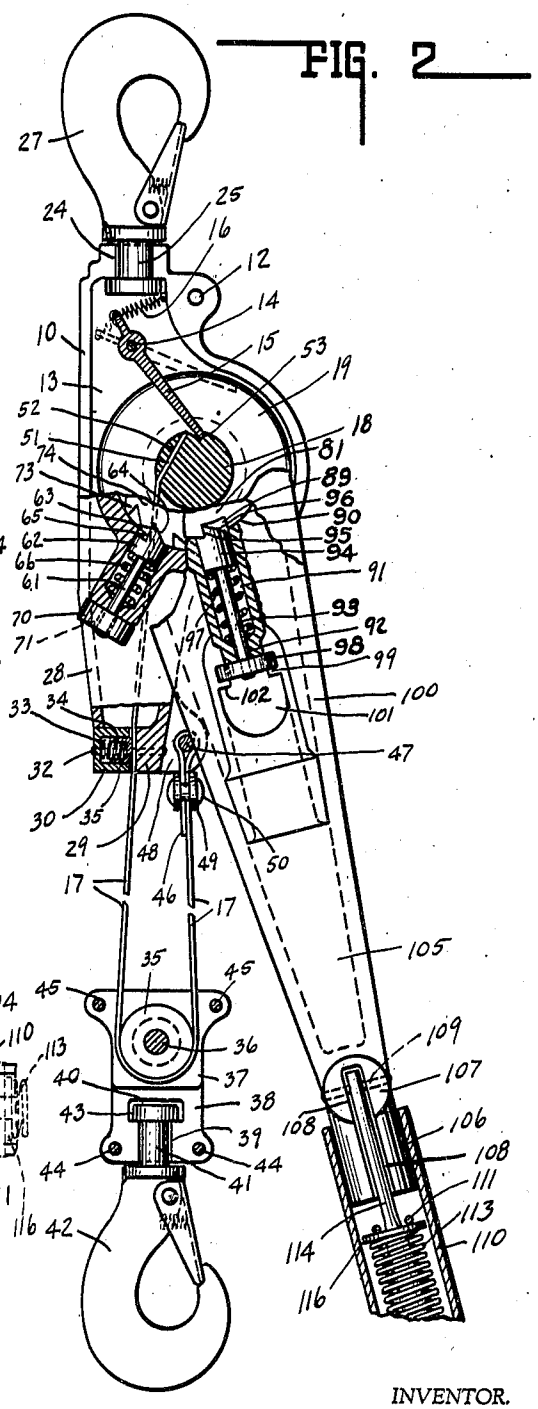


FIG. 2



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Patented Mar. 14, 1944

2,343,884

UNITED STATES PATENT OFFICE

2,343,884

UNIVERSAL FREE TAPE HOIST

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Application April 30, 1941, Serial No. 391,043

7 Claims. (Cl. 254—167)

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

The chief object of this invention is to provide a device capable of operating as aforesaid and 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 either lever fashion or crank handle fashion.

Another chief object of the invention is to provide a structure of the character indicated, which is capable of free tape action.

This application is a continuation-in-part of the copending application, Serial No. 288,319, filed August 4, 1939, now Patent No. 2,270,271, dated January 20, 1942, and entitled, "Tape hoist and tensioning device."

The chief feature of the present invention consists in the arrangement of the parts, whereby free tape action is possible. In other words, when the device is properly conditioned, the tape may be readily extended or reeled in for quick approximation of the desired length and for association with the parts to be tensioned or brought together or the load which is to be elevated or moved.

Another feature of the invention consists in the arrangement whereby the device may be conditioned for step by step shortening of the tape or lengthening of the tape for load elevating and load lowering, respectively, by way of example.

Another feature of the invention consists in the tape engaging throat arrangement.

Still a further feature of the device consists in looping the tape for multiple power purposes, the speed of movement being correspondingly reduced and the anchorage of one end of the tape to a fixed anchorage in such a manner that tape breaking at the anchorage is eliminated.

Another feature of the invention consists in providing means for stopping tape movement in the paying-out direction so that in load lowering or tape paying-out movement, the amount thereof is limited, thereby preventing excess strain on the tape as it reaches the end of its pay out movement and crystallization and consequently, breakage at the spool anchored end of the tape.

Still a further feature of the invention consists in the dual positionable handle and its specific construction and association with the actuating lever insofar as the present disclosure is an improvement upon that shown in the copending application referred to.

Other objects and features of the invention will be set forth more fully hereinafter.

The full nature of the invention will be understood from the accompanying drawing and the following specification and claims.

In the drawing,

Fig. 1 is in general a central sectional view through a tape type hoist embodying the preferred form of the invention.

Fig. 2 is a side elevational view thereof, parts being broken away to show the same and other parts in section and elevation, to more clearly illustrate certain parts of the invention.

It is to be noted that Fig. 1 is not a true "single" sectional view, but is taken in such a manner that the parts of the invention are more clearly illustrated than is possible in a single section.

In the drawing, the numeral 10 indicates one portion of the tape hoist housing and 11 the other portion. These two portions are suitably secured together as at 12 and elsewhere and together form a tape chamber 13. Extending across the tape chamber is a shaft 14 which pivotally supports a pawl 15, the tooth portion being constrained by the spring 16 into riding engagement with the tape 17 or the spool structure 18.

This spool or reel includes two side plate portions 19 and the spool structure is rotatably supported in bearings 20 and 21 in the body portions 10 and 11, respectively, by means of the bushings 22 and 23, respectively.

The upper ends of the two housing portions each have a semi-cylindrical groove therein forming a cylindrical bearing 24 which rotatably supports portion 25 of a snap hook having the head portion 26 retaining the hook in hoist association. The numeral 27 indicates the snap hook.

The body portion of the hoist is elongated as as 28 and terminates in a throat structure enlargement 29. Adjacent thereto and spaced therefrom is a cross member 30. This member 30 is grooved as at 31 and provides a channel for the tape 17 to pass therethrough between portion 29 and the member 30. Member 30 is suitably secured to both housing portions as at 32. Member 30 is recessed as at 33 and slidably mounted therein is a cup-like brass member 34 which seats one end of a spring 35 that normally bears against the inner end of the recess 33. This cup-like member, therefore, is normally con-

strained toward the adjacent face of the portion 29 and rides the tape in tape movement through the throat in either direction.

The tape 17 is herein illustrated as passing around a wheel 35 rotatable on axle 36 carried by the side portions 37 of a split body structure 38, the latter having semi-cylindrical confronting openings 39 communicating with chamber 40. Rotatably supported in the two semi-cylindrical and matching openings 39 is the pivotal portion 41 of a snap hook structure 42 having the head portion 43 seated in the chamber 40. Means such as indicated at 44 and 45 as well as the axle 36 secure the two housing portions together as shown. The upper members 45 serve as guides and confining members for the tape when necessary.

The free end of the tape is indicated by the numeral 46 and it is wrapped about a transverse members 47 carried by two spaced ears 48 on the housing members 10 and 11 near the throat portion. A pair of links 49 are positioned at opposite sides of the tape 17 and the end 46 thereof and the rivets 50 rigidly clamp the end 46 to the tape 17 adjacent its connection or relatively rigid anchorage 47. It thus will be apparent that the anchored end of the tape can swivel about the pivot 47 with links 49 riding bosses 48, thus preventing fracture of the tape incident to repeated bending on a short radius.

Referring to the reel or spool structure 18—19, the opposite end of the tape 17, indicated by the numeral 51, is seated in a slot 52 in the spool and may be suitably secured therein by any suitable or convenient arrangement, such as a screw unit, or the like, none of which, however, is herein illustrated. The spool structure, as stated, is formed by a portion of the shaft 18 which is enlarged between the two bearings 20 and 21 and which has press-fitted on the enlarged portions the two plates 19. These are spaced apart a distance but slightly greater than the width of the tape.

As long as the tape has one or more turns on shaft 18, the pawl or dog 15 rides the tape. When the last turn of the tape is paid-out—see Fig. 2—the pawl 15 drops into the notch 53 and prevents further counterclockwise rotation or paying-out movement of the tape. Naturally, when the tape is wound in upon the reel or spool, the dog or pawl 15 rides the tape and is not effective thereon. The purpose of this pawl or dog and notch 53 cooperation is to prevent the spool and shaft from rotating beyond the position shown in Fig. 2 and in a counterclockwise direction because to do so would cause the tape to be wrapped backward, as it were, from its normal reeling relation with respect to the spool and thus cause fracture or crystallization where the tape leaves the slot or notch 52. In this manner, therefore, each end of the tape is so anchored and so protected that short radius bends are not possible, thus preventing breaking of the tape at the anchorages. The tape, it is to be understood, preferably is of stainless steel character and the spring pressed abutment 34 normally exerts pressure upon the tape in its movement in and out of the magazine arrangement containing the spool.

The present invention, therefore, differs in several respects from that illustrated and described in the before mentioned application. The housing portion 11 is extended outwardly as at 55 and formed therein is a chamber 54. The extension 55 is enlarged as at 56. This enlargement is provided with a radially directed recess 57 which opens inwardly into the chamber 54. The opening 58, provided to form the recess 57, may be plugged as at 59.

The inward end of the recess 57 is provided with a smaller bore 60 that extends through the remainder of the portion 56 and therein is slidably supported a stem 61 that on its inner end mounts a plunger portion 62. This portion 62 has a tooth 63 with an inclined face 64 and a relieved portion 65. The resulting locking pawl is normally constrained so that it is projected into the chamber 54 by means of the spring 66 coaxial with the stem 61 and bearing at its inner end upon the rear wall portion of the recess and upon its outer end on the enlarged portion 62 of the load holding member.

The housing exposed end of the stem 61 has rigidly secured to it the member 70. This member 70 is notched as at 71—see Fig. 1—and seatable in said notch and carried by the portion 56 is a pin or post 72. As shown in Fig. 1 when the pin or post 72 is seated in the notch 71 the plunger or load holding member extends inwardly into the chamber 54 and is adapted to engage the teeth 73—see Fig. 2—of a ratchet 74. The ratchet 74 is provided with a bearing portion 75—see Fig. 1—that is rotatably supported by the reduced portion 76 of the shaft 18.

Positioned at each side of said ratchet 74 and in operative association therewith are the fibre clutch discs 77 and 78. These two clutch discs have operative engagement with two adjacent members. The inner adjacent member is indicated by the numeral 79 and may be keyed, or the like, as at 80 to the shaft 18. The other adjacent member is indicated by the numeral 81. It has an internal threaded arrangement 82 adapted to receive the reduced and threaded portion 84 of the shaft reduced portion 76.

The outer end of this portion 84—see Fig. 1—is tapped and threaded to receive a locking bolt 85, which bears on a lock washer 86 in turn bearing on the retaining washer 87. This washer 87 is adapted to form with an encircling portion 88 of a handle structure, a closed chamber in which is mounted the member 81. This member 81 has a toothed periphery, one notch of which is indicated most clearly in Fig. 2 by the numeral 89.

The portion 88 aforesaid provides an annular chamber 90 and the same is provided with a radially directed recess 91 opening into chamber 90. A bore 92 slidably supports the stem 93 of a reversible pawl or plunger member 94, the latter having the relieved portion 95 and the inclined portion 96. A spring 97 normally constrains this plunger or pawl inwardly toward the axis of the chamber. The outer end of the stem has secured to it the member 98—see Fig. 2—the latter being notched as at 98*a*—see Fig. 1—on opposite sides to seat the inwardly projecting portions 99 of the main handle portion 100—see Fig. 2—having the opening 101 therein. This opening 101 is of sufficient size to permit the member 98 to be moved outwardly and downwardly—see Fig. 2—into the recess 101 and permit turning of the member 98 so that when it is released to its constraint it may ride or bear upon the shoulders 102. When it does so, the toothed portion of the plunger is held out of engagement with the teeth 89 of the member 81.

When the member 98 has been sufficiently moved axially, it may be turned 180° from the

position shown in Figs. 1 and 2 in which event, it will be quite apparent that the tip of the tooth of the plunger 94 will engage the opposite wall of the notch 89 in the member 81.

The handle is extended as at 105 and the handle formation described includes two transverse extending cylindrical portions 106 and 107, the same being slotted as at 108 and extending across said slot is a pin or anchor member 109. A tube 110 is selectively seatable on either portion 106 or 107. It carries a pair of spaced pins 111. Pivoted on member 109 is member 114 that moves from slot to slot with the tube 110 and extends between pins 111. The outer end mounts a retainer 115 for spring 113, secured by washer and cotter key 112. This spring retains the tube or the hand gripping portion 110 in telescopic association with the part 106 or 107, since the opposite end bears upon a slotted washer 116 resting on pins 111.

Whenever lever type operation is not desired, the tube 110 is extended until the inner end of said tube clears the outer end of said portion 106. Then the tube is hinged 90° and seated on the portion 107, member 114 moving from groove 108 to the other groove 108. When the tubular handle portion thus is seated on the member 107, the construction is arranged for crank handle operation, the tube 110 then being at right angles to the longitudinal axis of the handle portion 105 and rotatable relative to member 114.

As shown clearly in Fig. 1, the portion 88 of the handle structure is bored as at 120 in alignment with the recess 91. This permits the recess 91 to be formed and following that formation the bore 120 is plugged as at 121. The portion 88 is herein shown provided with an inwardly directed collar portion 123 which seats within the chamber 54.

The operation is as follows: When the parts are positioned as shown in Fig. 2, and the handle 105 is rotated clockwise, it will be quite apparent that the ratchet 81 will be rotated clockwise and in so doing it will move toward the right hand friction clutch 77—see Fig. 1—and continued movement will cause said friction disc to move to the left, in turn moving the ratchet 73 to the left to engage the friction clutch 78 to the left thereof and continued movement will cause said last mentioned friction clutch to engage the member 79. Continued rotational movement of the ratchet 82 thus will bind all of the clutch parts together and when so bound, the shaft 76—16 will be rotated clockwise to reel in the tape 17 and wind it on the spool structure. Whenever clockwise movement of the handle structure ceases, the plunger 62 engages the ratchet 73 and holds the load.

During this load holding movement, the handle 105 may be rotated counterclockwise and when it does so, the inclined face 96 of the pawl or plunger 94 will ride the teeth 89 of the member 81 for handle repositioning. In this way, the handle may be oscillatable to and fro for clutch engagement and load elevation. When it is desired to completely rotate the handle for load elevation, the handle 105 is rotated clockwise to effect the same and as many complete rotations as may be necessary are effected.

When it is desired to lower the load, the plunger 94 is reversed in position from that as shown in Fig. 2, with the clutch parts still engaged as shown in Fig. 1. Then the handle is moved clockwise. Clockwise rotation of the handle, with pawl 94 reversed, releases the clutch engagement sufficient to permit load lowering even though pawl 62 holds ratchet 74. Load lowering tends to effect clutch engagement so that the handle must be turned to permit actual load lowering.

When free tape action is desired, no load being on the chain, it is quite apparent that the toothed plungers may be locked out of ratchet engagement and pulling upon the lower hook 42 will cause paying-out of the tape without any interference whatsoever, since there is no plunger holding action. There is no free tape action in tape winding other than can be effected through the handle structure operation.

It also will be noted that the greater the load to be accommodated by the hoist, the greater will be the clutching action effected between the several clutch parts. It also will be noted the portion 55 by reason of its chamber 54 receiving the inwardly directed end 123 of the portion 88 of handle 105 serves as a cylindrical guide for the handle.

Removal of the bolt 85, lock washer 86 and washer 87 permits the handle structure to be readily disassociated from the toothed ratchet 81, reel shaft 76, and the like. The clutch members on opposite sides of the inner ratchet are preferably of leather, composition or fibre while the two ratchets and the member 79 are metallic. When the handle has been removed, the outer ratchet member 81 may be readily unthreaded from the shaft 76 and following such movement, the inner ratchet 74 and friction clutch members 77 and 78 may be removed for replacement purposes.

It will be quite apparent the hoist as herein illustrated, is capable of operation as a lever handle hoist or as a crank handle hoist and in the operation, particularly for tensioning purposes or load elevation purposes, the initial handle rotation is for clutch conditioning, and the subsequent handle operation is primarily for tensioning or for load elevation.

As previously set forth, the amount of clutch action is proportional to the load to be handled. The present invention has the following possibility inherent therein. With the load holding plunger holding the load, the handle plunger may be associated with the outer ratchet so as to relieve the clutch action and thereby permit the load to slowly lower, as it were. Escape or full release of the load is prevented because when shaft 16 rotates under load release, it causes the clutch to move to binding position and to permit continued release of the load, the handle must be turned constantly to maintain the desired amount of clutch release.

While the invention has been illustrated and described in great detail in the drawing and 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 magazine type tape hoist, the combination of a housing having a tape receiving magazine chamber therein, a spool structure therein having a shaft, a flat elongated metallic tape strip windable thereon and unwindable therefrom and having its inner end secured to the spool shaft, said shaft having a notch therein, and a locking member normally constrained into tape and shaft engagement for all positions of the hoist and car-

ried by the housing and movable only toward the shaft axis for seating in the notch regardless of previous speed of shaft rotation and position of the hoist to prevent further shaft rotation in tape pay-out direction when the member engages the shaft.

2. In a tape type hoist the combination of a magazine type housing having a chamber therein, a unitary shaft extending across the magazine chamber and projecting through one side thereof, an anchoring member at one end of the housing and having a pivotal axis offset from the shaft axis, an elongated tubular extension of the housing directed oppositely from the anchoring member and communicating with the chamber and having throat means at the end of said tubular extension, said throat means and the anchoring member pivotal axis having a common alignment offset from the axis of the shaft and said alignment being approximately midway between the axis of the shaft and the chamber wall adjacent thereto and closest to said alignment, a tape reel carried by said shaft, a tape secured at one end of the reel and windable thereon and unwindable therefrom, said throat means being positioned at a greater distance from the reel axis than the full diameter of the reel and to one side thereof as set forth and operatively associated with the tape for guidance, aligned and clearance purposes, ratchet and pawl means operatively associated with said housing and shaft for the control of the latter, a handle rotatably mounted on the projecting end of said shaft, other ratchet and pawl means interposed between the handle and shaft for shaft movement, means normally constraining each of the pawl portions of the ratchet and pawl means into ratchet portion engagement, and manually operable means associated with each pawl for the independent control of the same in opposition to the constraint imposed thereon.

3. In a hoist the combination of a magazine type housing having a chamber therein, a unitary shaft extending across the magazine chamber and projecting through one side thereof, an anchoring member at one end of the housing, an elongated tubular extension directed oppositely therefrom and communicating with the chamber and having throat means at the end of said tubular extension, the anchoring member and extension having a substantially 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, said throat means being positioned at a greater distance from the reel axis than the full diameter of the reel and to one side of said axis and on the same side of the axis as the anchoring member and operatively associated with the tape for guidance, alignment and clearance purposes, a ratchet operatively carried by the shaft, a pawl, yielding means normally constraining the pawl to ratchet engagement for tape tension, means for rotating the shaft for tape tensioning, and 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.

4. In a hoist the combination of a magazine type housing having a chamber therein, a unitary shaft extending across the magazine chamber and projecting through one side thereof, an anchoring member at one end of the housing, an elongated tubular extension directed oppositely therefrom and communicating with the chamber and having throat means at the end of said tubular extension, 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, said throat means being positioned at a greater distance from the reel axis than the full diameter of the reel and to one side of said axis and on the same side of the axis as the anchoring member and operatively associated with the tape for guidance, alignment and clearance purposes, a ratchet operatively carried by the shaft, a pawl, yielding means normally constraining the pawl to ratchet engagement for tape tension, 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 shaft rotating means rotating the shaft for tape tensioning and including a ratchet operatively 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 last mentioned ratchet and including a pawl constrained to last mentioned ratchet engagement, and means exposed upon the handle and arranged for handle pawl ratchet disengagement in opposition to the constraint upon the handle pawl.

5. In a magazine type tape hoist, the combination of a housing having a tape receiving magazine chamber therein, a spool structure rotatable therein, a flat elongated metallic tape strip windable thereon and unwindable therefrom and having its inner end secured to the spool structure, an elongated throat communicating at the inlet end with the chamber and constituting an extension of the housing and recessed at one end, and tape engaging means at the outlet end of the throat for tape braking purposes and including a throat outlet forming member seated in the throat recess and completing the throat and housing and secured thereto, a tape engaging member, and means yieldingly constraining said tape engaging member to tape engagement, said first mentioned member and the adjacent portion of the outlet end of the throat providing a restricted mouth therebetween for peripheral tape envelopment and accommodation.

6. In a magazine type tape hoist, the combination of a housing having a tape receiving magazine chamber therein, a spool structure rotatable therein, a flat elongated metallic tape strip windable thereon and unwindable therefrom and having its inner end secured to the spool structure, an elongated throat communicating at the inlet end with the chamber and constituting an extension of the housing and recessed at one end, and tape engaging means at the outlet end of the throat for tape braking purposes and including a throat outlet forming member seated in the throat recess and completing the throat and housing and secured thereto, a tape engaging member, and means yieldingly constraining said tape engaging member to tape engagement, said first mentioned member and the adjacent portion of the outlet end of the throat providing a restricted mouth therebetween for peripheral tape envelopment and accommodation, said first mentioned member being grooved intermediate its ends on the tape confronting face for tape ac-

commodation and abutting at the ends of the grooved face said throat portion to form said restricted mouth and said second mentioned tape braking member being carried by the first member.

7. A hoist structure having in combination a housing including a chamber with a load carrying member therein, a single shaft rigid with the member and projecting from the chamber at one end, the free end of the load supporting shaft including a thread portion, a ratchet coaxial with the member and having a threaded portion operatively associated with the shaft thread portion, relative rotation in opposite directions therebetween causing the ratchet to move towards or away from the load carrying member, a second ratchet freely rotatable on said shaft, clutch members at opposite sides of the second ratchet, another member rigid with the shaft, one clutch member being interposed between said second mentioned rigid member and said second mentioned ratchet and the other clutch member being interposed between the ratchets, a load holding pawl normally constrained to second ratchet engagement, a tubular projection upon the housing and nesting the second mentioned rigid member and ratchet and included clutch member, an operating pawl normally constrained to first ratchet engagement and chambered means coaxially mounted relative to the shaft and pivotally movable, said means supporting the operating pawl and enclosing the first mentioned ratchet and having direct bearing association with the free end of the tubular projection, the chamber being of magazine type, the load carrying member being of tape spool character, said magazine having a tape accommodating throat with an outlet appreciably remote from the shaft axis, the outlet being of tape enveloping character, a hoist support carried by the housing opposite from the throat, the outlet and longitudinal center of said support being substantially aligned and slightly offset from the shaft axis.

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