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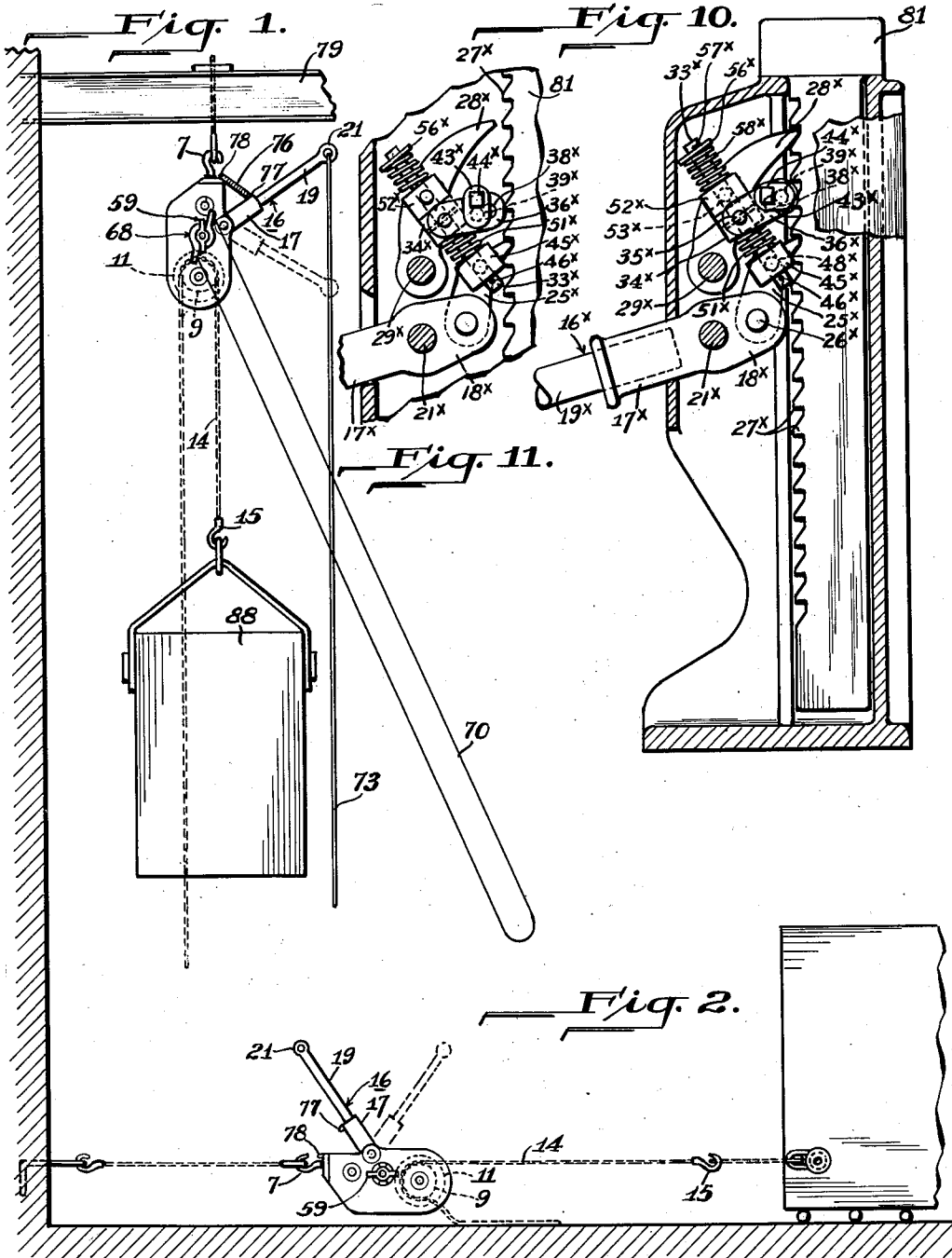
T. H. EDELBLUTE

2,051,832

PULLER HOIST

Filed Dec. 13, 1934

3 Sheets-Sheet 1



WITNESSES
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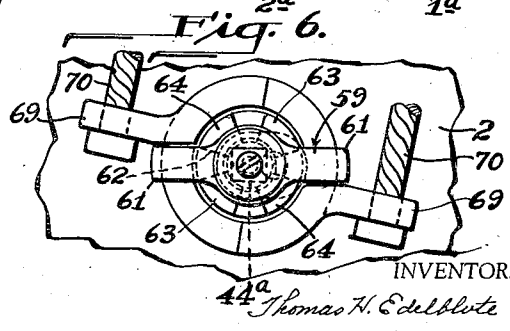
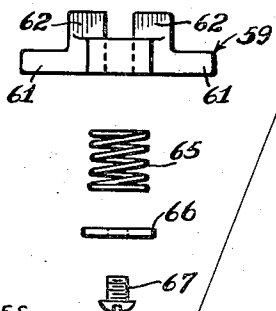
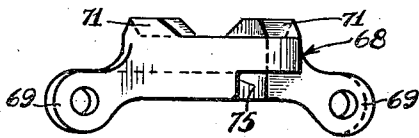
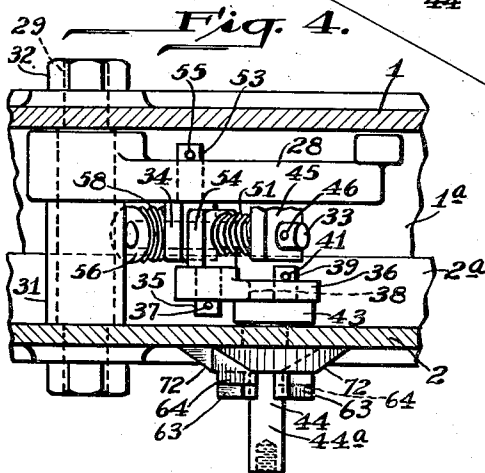
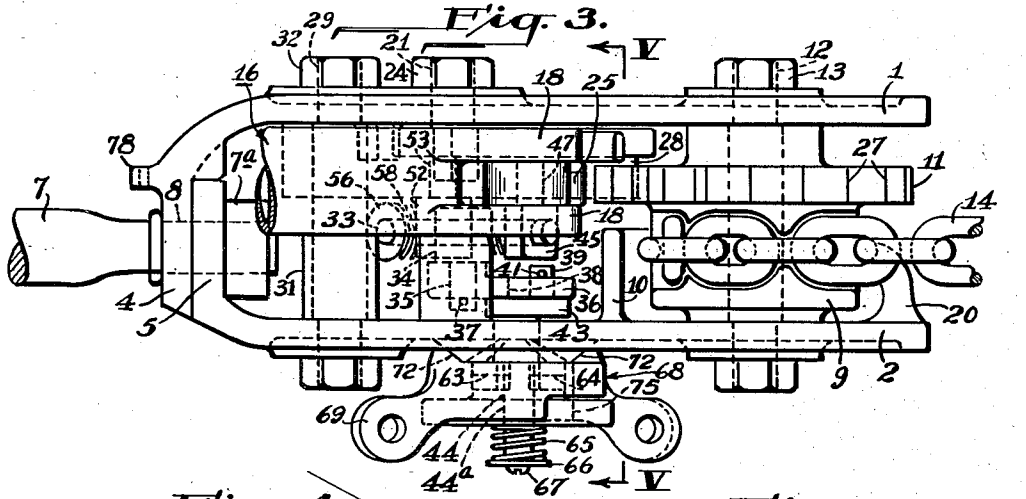
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3 Sheets-Sheet 2



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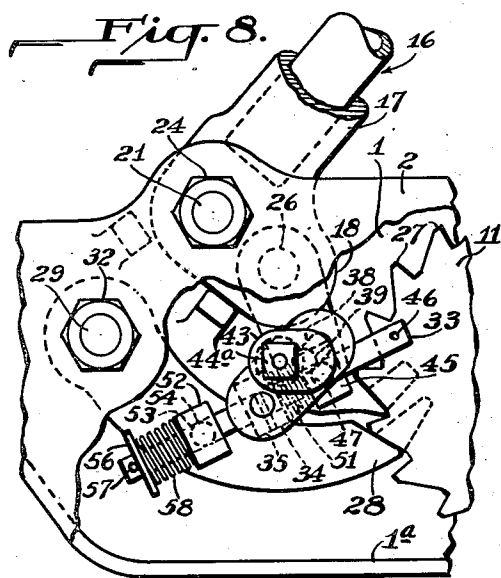
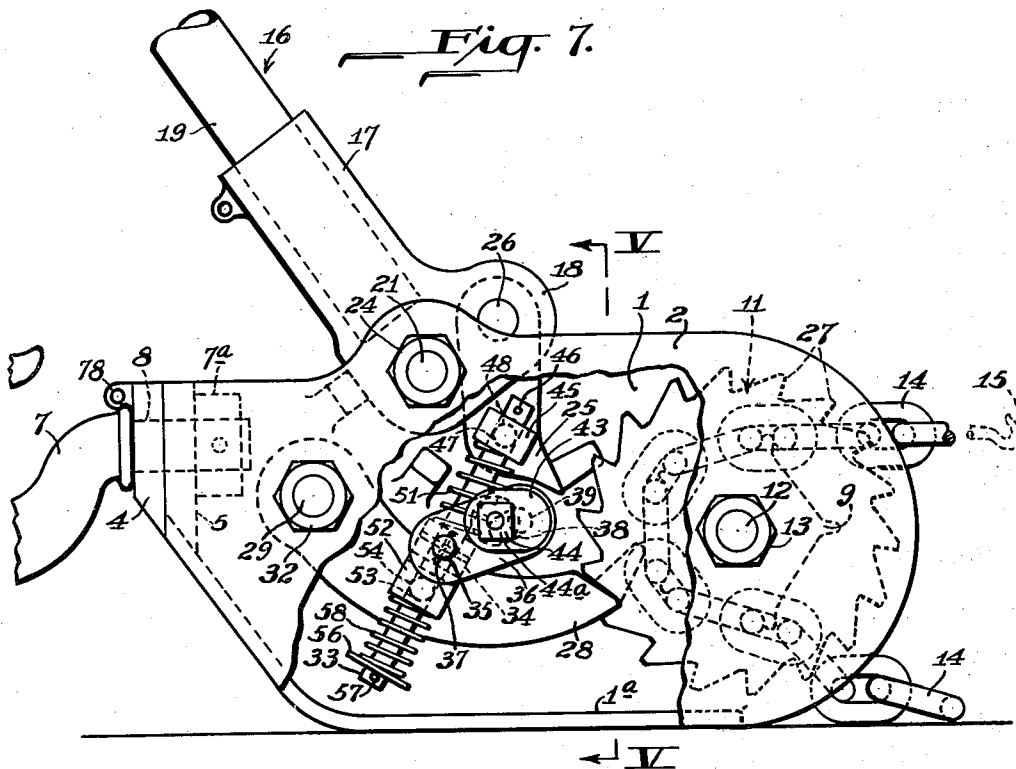
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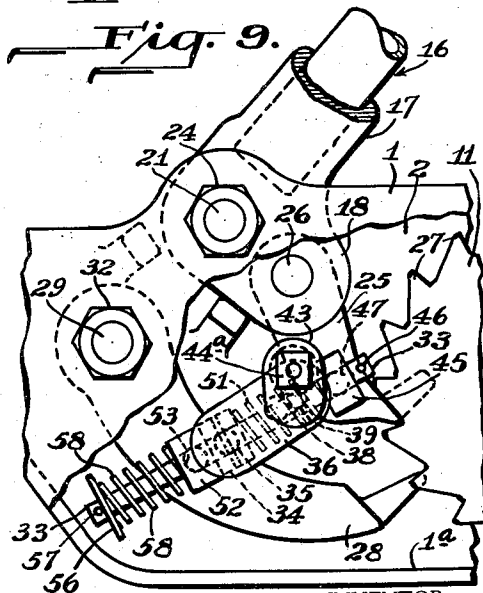
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3 Sheets-Sheet 3



WITNESSES

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2,051,832

PULLER HOIST

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Application December 13, 1934, Serial No. 757,296

4 Claims. (Cl. 254-111)

This invention relates to power jacks and hoists, and while not necessarily so limited has to do more particularly with lever operated force multiplying devices of this character in which a pawl and ratchet arrangement is employed to transmit the movement of the power element to the work element, and vice versa.

One of the objects of the invention is to provide an improved power-transmitting, holding and releasing pawl and ratchet arrangement for use in devices of this character which is simple and sturdy of construction and dependable in operation irrespective of the position in which the device is operated.

Another object is to provide in a power-multiplying unit of this type for easily and quickly reversing the operation of the work element and for doing so in such a way that the operating lever is relieved of the load pressure between strokes.

A further object is to provide a simple, compact and sturdily constructed power device of the aforementioned character which may be operated as either a hoist or a jack and as effectively in one position as in another.

A still further object is to provide a power unit of this type in which the driving and holding pawls function automatically at all times.

These and various other objects, as well as, the various other novel features and advantages of the invention will be apparent when the following detailed description is read in conjunction with the accompanying drawings, of which Fig. 1 is an elevational view of a power unit constructed in accordance with the invention showing it suspended from an overhead support and utilized as a hoist; Fig. 2 a similar view illustrating the unit in a horizontal position being used as a puller jack; Fig. 3 a plan view looking into the top of the unit; Fig. 4 an exploded view of the pawl-controlling mechanism and a fragmentary sectional view of the housing and pawls; Fig. 5 a vertical section taken on the line V—V of Fig. 3 but showing the pawls and operating connections therefor in elevation; Fig. 6 a side view looking at the reversing latch construction for the pawl-controlling mechanism; Fig. 7 a view looking into the side of the unit with portions of the side frame removed and showing the pawl-controlling mechanism adjusted for normal power-applying operation, and the power lever disposed in its rearmost position; Fig. 8 a fragmentary view similar to Fig. 7 showing the power lever actuated to its foremost position; Fig. 9 a view similar to Fig. 8 but showing the pawl-controlling mechanism

adjusted for reversing the operation of the unit; Fig. 10 a vertical section taken through a ratchet type power jack constructed in accordance with the invention and showing the pawl-controlling mechanism adjusted for lifting; and Fig. 11 a fragmentary view similar to Fig. 10 but illustrating the pawl-controlling mechanism adjusted for lowering the lifting element.

Referring in detail to these drawings and first more particularly to the embodiment of the invention illustrated in Figs. 1 to 9 inclusive, the numerals 1 and 2 designate a pair of side frames which form a housing for the device. As shown, these frames are provided with flange-like projections 1a and 2a along their bottom and rear edges which extend to mid-section of the housing and form a bottom and rear enclosing wall therefor as well as function to hold the side frames in spaced relation from one another. To hold these frames together irrespective of anything else a lug 3 is provided on the upper mid-section of the flanges 2a to project over the adjacent flange 1a of the abutting side frame and a pair of overlapping flange portions 4 and 5 is provided on the upper end of the back wall formed by the flanges 1a and 2a, respectively. A screw or bolt 6 is passed through the flange 1a and secured to the lug 3 while the inner end of an anchor hook 7 is secured by a nut 7a in a hole 8 extending through the sections 4 and 5, the hook being utilized for connecting the device between an anchor and the load as will presently appear.

In the forward end of the housing there are provided a chain sprocket 9 and a ratchet wheel 11 which are secured rigidly together and in the present embodiment are formed by a single casting which is mounted loosely on a shaft 12 the ends of which are projected through suitable holes in the side frames 1 and 2 and securely held in place by nuts 13. To prevent any binding between the ratchet and sprocket wheels and the side frames when the nuts are tightened the ends of the shaft 12 are reduced to provide shoulders thereon which bear against and maintain the proper spacing of the side frames.

Around the sprocket wheel 9 there is mounted a chain 14 which is provided at one end with a hook or other suitable means 15 for connecting it to a load. As shown, this is an ordinary link type of chain but may take any other form which the sprocket wheel may be adapted to receive, and to prevent this chain jumping off the sprocket wheel a baffle wall or guide 10 is cast integral with the side frame 2 opposite the periphery of

the sprocket wheel, while to prevent fouling of the chain a hook-like guide 20 is also cast integral with the side frame 2 and projected so as to extend in the link groove at the center line of the sprocket wheel between the two points of contact of the chain on the outer side of said wheel.

For operating the ratchet wheel 9 and likewise the sprocket wheel 11 a power lever 16 is employed. While this lever may take other forms it comprises, as shown, three parts consisting of a tubular casting or socket 17 which has a pair of spaced crank-forming ears 18 on its lower end, a handle-forming tube 19 mounted in the upper end of the socket 17, and a plug ring 21 mounted in the upper end of the handle 19 which is so shaped as to receive an operating cable 73 and also prevent an extension being applied to the lever. At its lower end the casting 17 is loosely mounted to the rear of the sprocket and ratchet wheels on a supporting shaft 21 in the upper central part of the housing, and held in alignment with the ratchet wheel 9 by a collar 23 mounted between the casting and the side of the housing adjacent the sprocket wheel. Like the sprocket wheel shaft 12 this shaft is reduced at its ends to maintain the proper spacing of the side frames and is held in place by suitable nuts 24.

Between the crank ears 18 on the lever socket 17 a relatively small curved power-transmitting pawl 25 is mounted. The upper end of this pawl is pivotally secured to a pin 26 retained in the outer end of the ears 18, and it is so sized and formed as to adapt it to engage the teeth 27 of the ratchet wheel and rotate the latter when the lever 17 is moved from its rearward to its forward position.

Below the driving pawl 25 there is provided a holding pawl 28 which is somewhat longer than the driving pawl and disposed to function to hold the load on the ratchet wheel when the latter is not being moved by the driving pawl. As shown, this holding pawl has a shape quite similar to the driving pawl but is pivotally mounted at its supported end on a fixed shaft 29 which is extended through the side frames 1 and 2 and equipped with a collar 31 to maintain the holding pawl in proper alignment with the ratchet wheel 11. Like the shafts 12 and 21 this latter shaft is also provided with reduced ends and equipped with nuts 32 for holding it in place.

For automatically controlling the operation of both the driving and holding pawls 25 and 28, respectively, a guiding and tripping mechanism is provided. As illustrated this comprises a spring rod 33 on which a block 34 is keyed slightly below its mid-section on which there is provided a stub shaft or trunnion 35 that is pivotally mounted in one end of a supporting link 36 being held therein by a cotter pin 37. At the opposite end of this link 36 there is provided an axially disposed slot 38, in which a stub shaft 39 formed on an eccentric or crank member 43 is projected, the link being held on this stub shaft by a cotter pin 41. On the opposite end and side of the eccentric 43 there is provided a pin 44 which is projected through an opening in the side frame 2 and about which the eccentric is permitted to rotate for adjusting the position of the slide rod 33 and the operation of the pawls 25 and 28 as will presently appear.

On the upper end of the spring rod 33 there is loosely fitted a slide block 45 which is held against removal from the rod by a cotter pin 46

and provided at one side with a stub shaft or pin 47 which is mounted for free rotary movement in an opening 48 provided in the driving pawl 25 slightly below its center, being held therein by a cotter pin 49. Between the block 45 secured to the driving pawl 25 and the block 34 keyed to the mid-section of the spring rod 33 there is arranged a coil spring 51. Below the keyed block 34 on the spring rod 33 there is loosely mounted a second slide block 52 which is provided like the block 45 with a stub shaft 53. This latter stub shaft is extended through an opening 54 in the mid-section of the holding pawl 28 and held therein by a cotter pin 55. Between this second slide block 52 and a washer 56 held by a cotter pin 57 on the lower end of the spring rod 33 there is arranged a second coil spring 58 which is preferably similar to and interchangeable with the upper coil spring 51.

In accordance with the invention, these parts are so arranged and proportioned that when the eccentric is retained in the position shown in Figs. 7 and 8 the stub shaft 39 on the eccentric will engage the outer end of the slot 38 in the link 36 and hold the block 34 keyed to the spring rod 33 in such a position as to cause the lower coil spring 58 mounted on the spring rod to constantly bias the holding pawl against the periphery of the ratchet wheel and also cause the upper coil spring 51 and the rod 33 to so guide the driving pawl 25 when the lever 16 is actuated in the forward direction as to cause the driving pawl to engage the ratchet wheel two teeth above the holding pawl and in a full stroke of the lever to rotate the ratchet wheel a distance equal to slightly more than one tooth length. Hence as the holding pawl 28 is constantly held against the periphery of the ratchet wheel under these conditions it will slide over one tooth as the ratchet wheel is rotated by the driving pawl and seat itself in the root of the next succeeding tooth thereby holding the load on the back stroke of the lever.

When the eccentric 43 is actuated to the vertical position shown in Fig. 9, that is, with the stub shaft 39 disposed in its lowermost position, the keyed block 34 and the spring rod 33 are lowered slightly and the stub shaft 39 on the eccentric 43 moves inwardly in the slot 38 of the link 36. The link 36 is now loose to slide, and through the block 34 does not cause any tension on the spring 51. The entire reverse mechanism is not forced to any movements by reason of connections to the eccentric 43. Under these conditions, when the power lever 16 is at the opposite position to that shown in Fig. 9, spring 58 is compressed under some tension, and the load is on the holding pawl 28. This frees the driving pawl 25 from the load, and as the lever 16 is moved forward, the spring 58, acting against the washer 56 pulls the spring rod 33 down and by the pin 46 lifts the driving pawl 25 over the edge of the ratchet tooth and causes the driving pawl to engage the tooth of the ratchet wheel next above the tooth engaged by the holding pawl, and as a result only moves the ratchet wheel sufficiently when actuated to its foremost position to permit the holding pawl to disengage the ratchet wheel. During the forward movement of the lever the slide block 45 moves downwardly on the spring rod placing the spring 51 under compression, and as soon as the holding pawl 28 is in a position to be released the pressure on the spring 51 causes the connecting link 36 together with the spring rod and the holding pawl 28 to

be projected backwardly and downwardly with the holding pawl moving into the position shown in full lines in Fig. 9, out of engagement with the ratchet wheel. With the release of the holding pawl 28 the lever 16 is backed away carrying the load with it until the holding pawl is again pulled into engagement with the ratchet wheel by the spring rod and its spring assembly which occurs after the rotatable wheel has been permitted to rotate a distance equal to one tooth length. This operation can, of course, be repeated without any further adjustment of the device, and without regard to the pawls as they function automatically.

15 To permit the chain sprocket to be rotated freely in either direction when not loaded the pawl-controlling mechanism is so designed that the two pawls can be supported out of contact with the teeth of the ratchet wheel at the same time. This is accomplished by adjusting the eccentric 43 to the reversing position and after releasing the holding pawl 28 moving the lever 16 into midway position.

For controlling the adjustment of the eccentric 43 its supporting shaft 44 is provided with a non-circular outer end 44a. On this there is mounted for axial displacement a latch 59 which is provided with a pair of diametrically opposed projections 61 to form a handle and a pair of axially extending diametrically opposed lugs 62. To cooperate with these lugs 62 angularly spaced lugs 63 and 64 shown best in Figs. 3, 4, 5 and 6, are provided on the exterior of the side frame 2 around the opening through which the shaft 44 of the eccentric is projected. The spacing of these lugs is made such that when the projections 62 are engaged between two opposed sets of them the eccentric 43 will be held in one operative position and when engaged between the other two it will be held in the other operative position. As shown, the lugs 63 are made shorter in length than the lugs 64. This is done to permit the latch 59 to be rotated only over the shorter ones, whereby limiting the extent of movement of the control latch.

To permit the latch to be lifted out of one set of the openings between the different lugs and rotated into engagement with another set, it is resiliently held in place by a spring 65 which is mounted on the end of the shaft 44 projecting beyond the latch 59 by a washer 66 and set screw 67. In adjusting the latch 59 it is lifted axially away from the side frame 2 against the resistance of the spring 65 and then rotated to the position selected, the spring being provided with a strength to hold the latch in place once it is in position.

To adapt the device for use as an overhead hoist and provide for operating the control latch 59 from the floor when the power unit is out of reach of the operator, a shifting element 68 is provided. This element consists of a disc-like member provided with diametrically opposed ears 69 in which the ends of a cable 70 long enough to reach the operator are connected. The inner face of such element is provided with a pair of opposed inclined cams 71 which are adapted to normally seat between a pair of similar cooperating angular cams 72 provided on the side frame 2 adjacent the lugs 63 and 64. As shown best in Figs. 3, 4, 5 and 6, the cams 72 on the side frame are so disposed that when the shifting element 68 is rotated by the cable 70 they engage the cams 71 and cause the latch 59 to be lifted outwardly against the resistance of the spring 65. To rotate the latch from one position to another,

other, diametrically opposed offsets 75 are provided on the outer face of the shifting element to engage the projections 61, these offsets being made sufficiently large to permit the proper turning of the shifting element to effect the ready shifting of the latch 59.

For operating the power lever 16 from the floor a cable 73 is attached to the plug ring 21 provided in the free end of the operating lever 16, and to return the operating lever to its rearmost position after each lifting movement a coil spring 76 is connected between a boss 77 on the outer end of the casting 17 and a boss 78 on the rear end of the housing of the device. Consequently, after each downward movement the lever 16 is automatically returned to its retrieved or backward position.

In accordance with this invention as illustrated in Fig. 1, the power unit may be connected to an overhead support such as the beam 79 by the hook 7 and the chain 14 connected to the load 80 by the hook 15. To lift the load 80 the latch 59 is adjusted by the cable 70 to the position shown in Figs. 7 and 8 and the lever 16 operated by the cable 73. If it is desired to lower the load the latch 59 is shifted to its reversing position by the cable 70 and lever 16 operated in the same manner as for lifting.

To use the device as a puller jack as illustrated in Fig. 2, the unit is placed in a horizontal position and connected to the anchor and load in the same fashion as shown in Fig. 1. For operation in this manner the shifting element 68 may be removed if desired and the latch 59 manipulated by hand without the aid of a cable. Also, the spring 76 may be taken off if desired as it will be unnecessary to have the power handle 16 returned to its retrieved position automatically.

Referring to Figs. 10 and 11, the invention is illustrated in connection with a lifting jack. As illustrated, however, it differs from the previously described embodiment essentially only in its shape and in the substitution of a ratchet bar 81 for the chain sprocket 9 and ratchet wheel 11. For this reason it is deemed unnecessary to show the latch mechanism or to repeat the description of this embodiment in detail, it being believed sufficient to merely call attention to the fact that the corresponding parts have been designated in the drawings by the same numerals previously used but distinguished therefrom by the use of the suffix x.

The operation of this latter embodiment of the invention is identical with the operation of the previously described embodiment and accordingly the operation thereof is also not repeated.

According to the provisions of the patent statutes, I have explained the principle and mode of operation of my invention, and have illustrated and described what I now consider to be its best embodiment. However, I desire to have it understood that, within the scope of the appended claims the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. An adjusting mechanism for a pivotally supported element, comprising, a wall in which said element is mounted, a series of offsets formed in said walls about said element, a latch member mounted on said element for rotation therewith but relative thereto in an axial direction, yieldable means normally tending to bias said latch member into engagement with said offsets, and means on said latch to facilitate its adjustment from one operative position to another.

2. An adjusting mechanism according to claim 1 but including in addition thereto a shifting cam disposed between said latch and said wall, said cam being provided with a plurality of cam surfaces on its wall-engaging face, and said wall provided with a cooperating plurality of cam developments which assists said shifting cam in releasing said latch element and carry it to a new position when said cam element is rotated.
- 10 3. A force multiplying unit comprising a supporting frame, a work element mounted therein and equipped with a series of ratchet teeth, a lever fulcrumed in said frame, a driving pawl mounted on said lever to engage the teeth of said work element and move it when the lever is actuated, a holding pawl mounted in said frame to engage said teeth and prevent backward movement of said work element, a block pivotally mounted on one side of each of said pawls and provided with an opening therethrough, a control rod slidably mounted in said openings, retaining members connected to the opposite ends of said rod, means rigidly connected to the central portion of the rod, a coil spring encircling said rod between said means and the block on the driving pawl, a second coil spring encircling the rod between the block on the holding pawl and the adjacent retaining member, means pivotally connected to said first-mentioned means and said frame, and manually operable means for shifting the position of said last-mentioned means whereby to shift the positions of said control rod and pawls to permit the direction of movement of said work element to be reversed.
4. A force multiplying unit comprising a supporting frame, a work element mounted therein and equipped with a series of ratchet teeth, a lever fulcrumed in said frame, a driving pawl mounted on said lever to engage the teeth of said work element and move it when the lever is actuated, a holding pawl mounted in said frame to engage said teeth and prevent backward movement of said work element, a block pivotally mounted on one side of each of said pawls and provided with an opening therethrough, a control rod slidably mounted in said openings, retaining members connected to the opposite ends of said rod, means rigidly connected to the central portion of the rod, a coil spring encircling said rod between said means and the block on the driving pawl, a second coil spring encircling the rod between the block on the holding pawl and the adjacent retaining member, means pivotally connected to said first-mentioned means and said frame, manually operable means for shifting the position of said last-mentioned means whereby to shift the positions of said control rod and pawls to permit the direction of movement of said work element to be reversed, means connected to said manually operable means for operating it from a remote position, resilient means for automatically returning said lever to its original position after each work movement, and means connected to said lever for also operating it from said remote position.

THOMAS H. EDELBLUTE.