May 27, 1941. F. E. STAHL 2,243,361

PULLER

Original Filed May 26, 1936 2 Sheets-Sheet 1

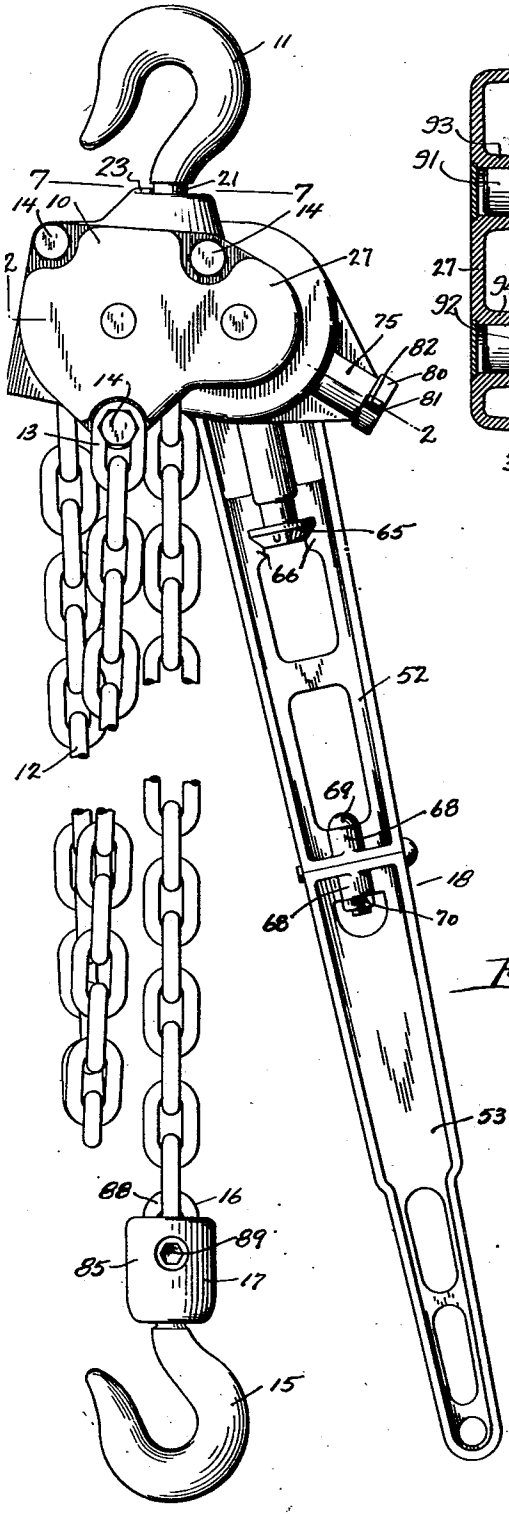

Fig. 1.

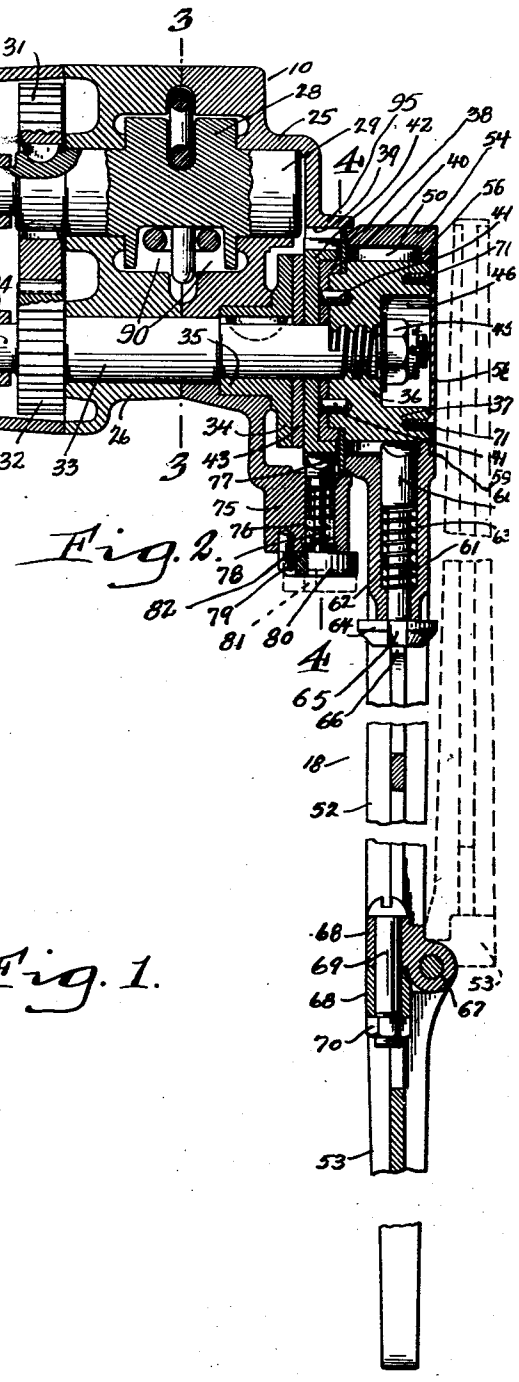

Fig. 2.

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Fig. 3.

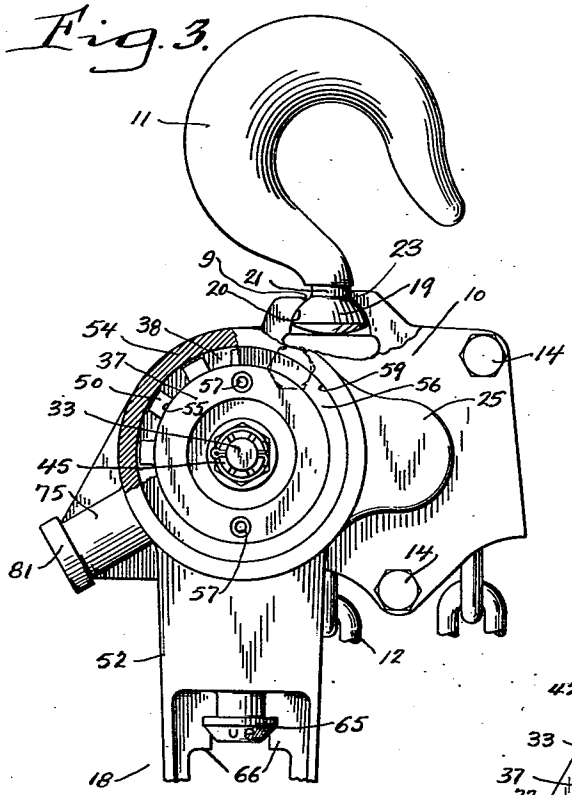


Fig. 5.

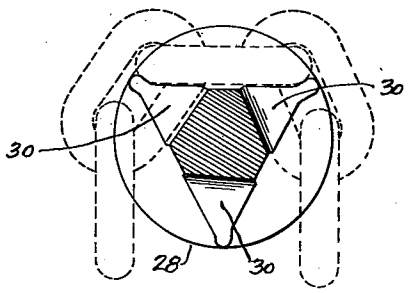
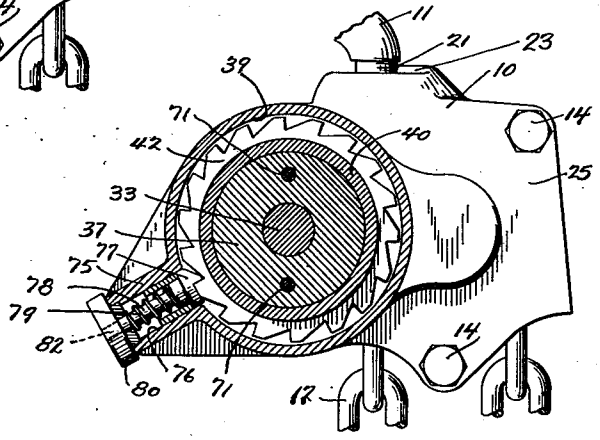


Fig. 4.



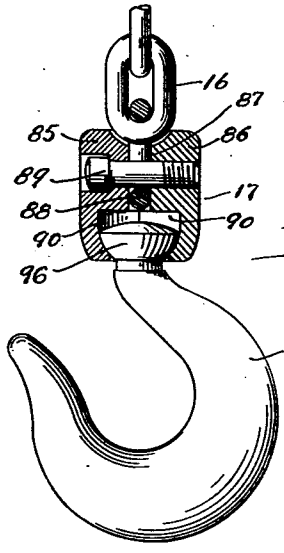
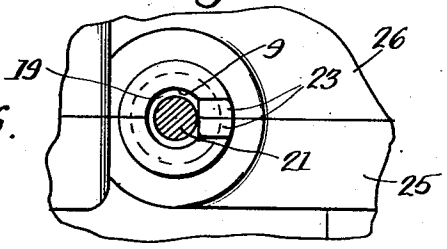


Fig. 6.

Fig. 7.



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Patented May 27, 1941 2,243,361

UNITED STATES PATENT OFFICE

2,243,361

PULLER

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Application May 26, 1936, Serial No. 81,893
Renewed December 23, 1939

9 Claims. (Cl. 254—167)

My invention relates in general to hoisting devices and in particular to pullers operated by lever and ratchet means.

It is well known to those skilled in the art that in pullers of this type, the device is actuated in step-by-step manner by suitable ratchet means. When the tension placed upon such a puller is released or the load suspended thereby is lowered, the same step-by-step movement is used, and the tension being released and the load being lowered must be taken by the actuating lever. Unless great care is exercised, the workman is likely to lose control of the lever, since the load is suddenly applied thereto, with the result that the tooth engaged by the lever may be broken or the workman or the load may be injured.

One of the principal objects of my invention has been to provide a lever puller which shall employ suitable brake means for not only sustaining the load as it is being elevated or the tension as it is being applied, but for holding the load and sustaining the tension as long as desired and during the time the device is being operated in step-by-step reverse manner.

Another object has been to provide such a brake mechanism for pullers which shall be of few parts and durable in construction.

Another object has been to provide a puller so designed that the hooks thereof shall be as close as mechanically possible when they assume their extreme inner positions.

Another object has been to design a puller of this nature which may be inexpensively manufactured.

Furthermore, my hoist is provided with a foldable handle so that the device may be made compact for storage purposes.

Moreover, my hoist is so designed that a load-lift wheel having a small number of chain link pockets may be employed, thus making it easy to operate.

Another object has been to provide means for connecting the lower hook to the chain in such manner that a compact, inexpensive, swivel joint is possible.

The above objects and advantages have been accomplished by the device shown in the accompanying drawings, of which:

Fig. 1 is a side elevation of my complete invention.

Fig. 2 is an enlarged, plan, sectional view taken on line 2—2 of Fig. 1 with the operating handle in horizontal position.

Fig. 3 is a fragmentary, face view of the operating handle with the cover plate removed, and a fragmentary, sectional view taken on line 3—3 of Fig. 2.

Fig. 4 is a fragmentary, sectional view taken on line 4—4 of Fig. 2.

Fig. 5 is a transverse, sectional view of the load-lift wheel of my device.

Fig. 6 is a sectional view taken through the lower hook block, showing the hook in position.

Fig. 7 is a fragmentary, sectional, plan view taken on line 7—7 of Fig. 1.

My puller comprises a casing 10 provided with a casing hook 11 at one end thereof. The chain 12 which passes into the casing and over the load-lift wheel, to be hereinafter described, has its free end 13 attached to the casing by means of one of the casing bolts 14. The chain hook 15 is attached to the end 16 of the chain by means of a swivel block 17. A handle 18 is provided for operating the puller.

The casing hook 11 of my device has an upper end of standard shape and is provided at its lower end with a substantially semi-spherical member 19 which is designed to be engaged by substantially semi-spherical recesses 20 formed in the casing parts 25 and 26 which, for convenience, will hereinafter be referred to as a ratchet casing and a wheel casing, respectively. The recesses 20 are formed in the adjacent faces of the casing parts near the top thereof and are therefore located on each side of the joint between these casing parts, whereby the hook may be readily assembled when the coacting casing parts are placed together. The hook is provided with a reduced or neck portion 21 immediately above the semi-spherical portion 19, and connects this portion with the upper part of the hook. The mouth 9 formed at the upper edges of the recesses 20 terminates at the upper edges of the casing parts and is so proportioned with respect to the neck 21 that the hook will have limited universal movement within the casing parts. A raised portion 23 constituting a stop is formed on each of the casing parts 25 and 26 at each side of the joint therebetween. These portions extend across the mouth 9 at one side of the joint, as clearly shown in Figs. 3 and 4 and the registering inner edge surfaces thereof are located at a distance from the axis of the mouth which is substantially equal to the radius of the neck 21 of the hook so that the stop will contact with the neck when the hook is in straight-line position. Thus the hook may have universal movement in all directions, but will be held against movement beyond the point at which it will be located in straight-line position when the load is being sustained by the hoist, thus serving to hold these parts in substantially rigid position whereby ratcheting of the operating handle is facilitated.

Referring now to Fig. 2, the housing 10 comprises the ratchet casing 25 and wheel casing 26, above referred to, and also a gear casing 27, which parts are held together by suitable bolts 14. Mounted in recesses 90 formed within the

ratchet casing 25 and the wheel casing 26 is the load-lift wheel 28 carried by a load-lift shaft 29. In order to provide a puller which is compact and powerful I make the load-lift wheel an integral part of the load-lift shaft, which enables me to provide a minimum number of link pockets 30. As shown, only three of such pockets are provided which brings the chain close to the axis of the load-lift wheel. The load-lift shaft 29 is supported in bearings provided in the casing parts 25 and 26.

The operating shaft 33 of my device is also suitably supported in bearings formed in the casing parts 25 and 26. Since my device is of the spur gear type the load-lift shaft 29 and the operating shaft 33 are connected together by means of gears 31 and 32. The gear 31 is mounted upon a projection of the load-lift shaft located outside the wheel casing 26 and the gear 32, which is preferably made integral with the operating shaft, is also located outside the wheel casing part. The shafts 29 and 33 may be provided beyond the gears with reduced extensions 91 and 92, respectively, which are engaged by bearings 93 and 94, respectively, carried by the gear casing 27, which encloses and protects the gears as well as providing a grease retaining cover therefor.

The brake means of my device is carried by the operating shaft 33, and comprises a friction flange 34 carried thereby. This flange is provided with a hub 35 which is preferably journalled in the casing part 25. This flange is fastened to the shaft preferably by being keyed thereon so that relative axial and longitudinal movement thereof with and upon the shaft is prevented. The outer end of the operating shaft is provided with screwthreads 36 upon which is mounted the brake nut 37 of my device which is formed on its outer periphery with a plurality of square-shaped ratchet teeth 50. This brake nut carries a brake nut washer 38 near its inner face which fits into a bore 39 formed in the ratchet casing 25 and the flange extension 95 thereof for closing the casing at this point and forming a housing for enclosing part of the brake mechanism of my device. Arranged adjacent the inside face of the nut 37 is a brake nut friction plate 40 which may be made of bronze and which is rotatably mounted upon the shaft 33 and connected to the nut preferably by means of dowel pins 41, which prevent relative rotation of the plate with the nut, thus providing a wearing surface for the nut. Adjacent to the friction plate is the ratchet wheel 42 of my device which is rotatably mounted upon the operating shaft. Also rotatably mounted upon the operating shaft and arranged between the ratchet wheel 42 and the friction flange 34 is a friction washer 43 which is preferably made of asbestos composition. A retaining nut 45 is screwthreaded onto the extreme outer end of the operating shaft and is secured in place by any suitable means as, for instance, a cotter pin. This nut is mounted in a recess 46 formed in the brake nut 37 and serves to limit the outward movement of the brake nut upon the operating shaft.

The operating handle 18 of my device is divided at a point substantially midway its length, thus providing an upper part 52 and a lower part 53. The upper part of the handle is provided with a hub portion 54 which fits over the outer notched periphery of the brake nut 37 and coacts with the ratchet casing 25 to substantially enclose the brake mechanism. The teeth 50 on the brake nut are shorter than the width of the nut so that a reduced shoulder 55 is provided thereon with which an inwardly extending flange 56 of the hub portion 54 engages. The brake nut is provided with two threaded apertures 57, and a cover plate 58 is provided for enclosing the recess 46 in the nut 37 and it is held in a recess 59 formed in the hub portion 54 of the handle, by means of suitable screws 71 which engage with screwthreaded apertures 57 formed in the nut. This plate bears against the flange 56 and thus prevents the upper part 52 of the handle from becoming disengaged from the brake nut. The upper part 52 and hub portion 54 of the handle are provided with a reversible ratchet pawl 60. This pawl is carried by a stem 61 which passes through a suitable aperture 62 formed in the handle and which is smaller in diameter than the ratchet pawl or the aperture so that a helical spring 63 may be disposed therein. The spring serves to keep the pawl pressed into engagement with the notches formed between the teeth 50 on the brake nut periphery. A button 64 is located on the outer end of the stem and this button is provided with a notch 65 on each side thereof for engagement with the webs 66 of the handle.

The upper part 52 and the lower part 53 of the handle are secured together by a hinge joint 67. This hinge joint is offset, as shown, and on the opposite side of each portion of the handle there is provided a lug 68 in each of which is formed a bore. When the handle is extended a bolt 69 may be passed through these registering bores and held in place by a nut 70. By means of this construction the handle may be folded up when the hoist is to be stored, as shown in the dotted-line position of Fig. 2, or securely held in extended position, as shown in the full-line position of this figure.

The casing part 25 is formed at one side with an outwardly extending boss 75 in which is formed a bore 76 so located as to be opposite the ratchet wheel 42. Mounted within this bore is a ratchet pawl 77 having a stem 78 of reduced diameter, about which is arranged a helical spring 79. A button 80 is provided on the outer end of the stem 78 and it is provided at one side with a notch 81 for engagement with a pin 82 carried by the boss 75. By withdrawing the button 80 and rotating it slightly, the bottom surface thereof will engage with the top of the pin and thus keep the ratchet pawl 77 out of engagement with the teeth of the ratchet wheel 42.

The swivel block 17 is composed of two parts 85 and 86 formed in their adjacent faces with recesses 87 for the reception of the link 88 and with recesses 90 for the reception of the semi-spherical end 96 of the hook 15. A screw 89 passes through the parts and through the link, thereby holding the parts together and the link in place.

From the foregoing it will be obvious that my device is of such nature that it may be used in a horizontal position, or in a vertical position, if desired, to perform the usual functions of a hoist. When the device is to be put into use, the casing hook is suspended from a suitable support above the load or is attached to a fixed object, and the operating handle ratchet button 64 is pulled outwardly so as to cause the slot 65 to become disengaged from the webs of the handle, whereupon it is given a rotation of substantially 90° which will cause the bottom surfaces of the button to engage with the webs and keep the ratchet pawl 60 out of engagement with the teeth of the brake

nut. The ratchet pawl button 60 controlling the ratchet wheel pawl 77 is also drawn outwardly so as to cause the slot 61 thereof to become disengaged from the pin 62 whereupon it is given slight rotation so as to bring the slot 61 out of registration with the button, whereupon the button will be held in its extended position and the ratchet pawl 77 held out of engagement with the teeth of the ratchet wheel 42. In this position, the load-lift wheel is free to rotate and the chain may thus be drawn through the puller in either direction so as to bring the chain hook to such convenient position where it may be easily attached to the load or to the object to be pulled. The button 60 is now moved so that the slot 61 is in engagement with the pin 62, whereupon the ratchet pawl 77 will become engaged with the ratchet wheel and thus serve to hold the wheel against rotation in the lowering direction. The ratchet button 64 is then rotated so that the side marked "Up" will be toward the outside of the puller, which will cause the ratchet pawl 60 to be so positioned that manipulation of the lever 18 will cause the load-lift wheel to be operated in such a direction as to draw the chain hook toward the puller casing and thus raise the load or cause the object to which the chain hook is attached to be pulled toward the casing. It will be obvious that the lever may be operated in any convenient position and through as limited a movement as desired or found necessary, or through the entire circle if it is possible and so desired.

Due to the construction of the brake mechanism of my device, the ratchet wheel 42 will be maintained in the position to which it is operated by means of the ratchet pawl 77. Any tendency of the load to operate the hoist will cause the shaft 33 to be rotated, and the brake nut 37 will then be forced toward the friction flange 34, which will cause the washer 43 to be gripped between the ratchet wheel and friction flange. Such movement will bring the hoist to a stop and thus maintain the load in suspended position. When it is now desired to release the tension upon the load chain, the ratchet button 64 is drawn outwardly and is rotated substantially 180° or until the mark "Down" is toward the operator, whereupon when the notches 65 again engage the flanges of the lever, the ratchet pawl 60 will be engaged with the teeth on the brake nut in such manner as to cause rotation of the operating shaft in opposite direction. When the lever is now operated, the nut 37 will be rotated upon the shaft 33 and, therefore, moved axially thereon only enough to permit sufficient release of the frictional engagement between the ratchet wheel 42 and the flange 34 to allow the load to be lowered by movement of the lever, but not sufficiently to allow the load to fall or to be taken by the operator through the lever. Just as soon as the load is released, the rotation of the operating shaft causes the nut to be drawn toward the friction washer and thus to again apply sufficient pressure on the brake parts to prevent further movement of the load. The load is thus lowered or tension released in the same step-by-step manner as it is elevated or produced.

It will be obvious from the foregoing that my puller, when compared to the pullers of the prior art, has greater load capacity, and at the same time is small and compact in size and light in weight, due largely to the specific construction made possible by the casing parts and arrangement. While I have shown in the drawings the gear casing 27 as being formed with bearings engageable with projections formed on the shafts 29 and 33, it is obvious that the bearing support given to these shafts by the wheel and ratchet casings 26 and 25, respectively, is ample for all practical purposes and may be solely depended upon to provide ample bearing for my device.

Obviously, some modifications of the details herein shown and described may be made without departing from the spirit of my invention or the scope of the appended claims, and I do not, therefore, wish to be limited to the exact embodiment herein shown and described, the form shown being merely a preferred embodiment thereof.

Having thus described my invention, what I claim is:

1. The combination with a ratchet puller having a multiple part casing, of a casing hook formed with a substantially semi-spherical member and a cylindrical neck connecting the hook member with the semi-spherical member, said casing parts being formed in the joint between them with substantially semi-spherical recesses for receiving the semi-spherical member of the hook and also being formed with an aperture connected with the recesses, such aperture being larger in diameter than the neck of the hook for permitting universal movement of the hook, a stop formed on the casing and extending across said aperture at one side thereof and engaging said neck for maintaining said hook in straight-line position when the load is applied, and means for securing the casing parts together.

2. A puller, comprisng a housing, consisting of a ratchet casing, a wheel casing, and a gear casing, a one-piece, load-lift wheel and load shaft rotatably supported by all the casing parts, a hoist hook universally mounted at the joint between the ratchet casing and the wheel casing and disposed in recesses formed in the adjacent faces of said last mentioned casing parts, an operating shaft rotatably supported by all of the casing parts, a gear carried by said load-lift shaft, and an intermeshing gear integral with said operating shaft, said gears being mounted within said gear casing, and brake mechanism carried by the operating shaft and the ratchet casing and partly enclosed by said ratchet casing.

3. A puller, comprising a housing, consisting of a ratchet casing, a wheel casing, and a gear casing, a one-piece, load-lift wheel and load shaft rotatably supported by all the casing parts, a hoist hook universally mounted at the joint between the ratchet casing and the wheel casing and disposed in recesses formed in the adjacent faces of said last mentioned casing parts, an operating shaft rotatably supported by all of the casing parts, a gear carried by said load-lift shaft, and an intermeshing gear integral with said operating shaft, said gears being mounted within said gear casing, brake mechanism carried by the operating shaft and the ratchet casing, suitable ratchet means carried by the brake mechanism, a brake nut carried by said operating shaft, an operating lever rotatably mounted upon the brake nut, means carried by said lever and engageable with said brake nut for operating said nut in either direction, and a hub formed on said lever for cooperation with the ratchet casing and substantially enclosing the brake mechanism.

4. A puller, comprising a housing, consisting

of a ratchet casing, a wheel casing, and a gear casing, a one-piece, load-lift wheel and load shaft rotatably supported by all the casing parts, a hoist hook universally mounted at the joint between the ratchet casing and the wheel casing and disposed in recesses formed in the adjacent faces of said last mentioned casing parts, an operating shaft rotatably supported by all of the casing parts, a gear carried by said load-lift shaft, and an intermeshing gear integral with said operating shaft, said gears being mounted within said gear casing, brake mechanism carried by the operating shaft and the ratchet casing, suitable ratchet means carried by the brake mechanism, a brake nut carried by said operating shaft, an operating lever rotatably mounted upon the brake nut, and means carried by said lever and engageable with said brake nut for operating said nut in either direction.

5. A puller comprising a one-piece load-lift shaft and load wheel, said shaft having a projecting end and carrying a driven gear arranged in spaced relation with said wheel, an operating shaft, a driving gear fixed on said operating shaft and intermeshing with said driven gear, a casing part providing bearing support for said load-lift shaft between said load-lift wheel and said driven gear, said casing part also providing bearing support for said operating shaft, a second casing part cooperating with said first casing part to house the load-lift wheel and itself formed with a bearing for receiving and giving support to the projecting end of said load-lift shaft, said second casing part also providing bearing support for said operating shaft, a third casing part seating against the first casing part on the opposite side of the second casing part for enclosing said gears, and a suspension member having an integral casing engaging portion of general semi-spherical formation, the first and second casing parts having opposing portions forming a socket for the reception of the casing engaging portion of said suspension member for limited universal movement therein, whereby the shafts are given direct suspension by each casing section.

6. A puller comprising a one-piece load-lift shaft and load wheel, said shaft having a projecting end and carrying a driven gear arranged in spaced relation with said wheel, an operating shaft, a driving gear fixed on said operating shaft and intermeshing with said driven gear, a casing part providing bearing support for said load-lift shaft between said load-lift wheel and said driven gear, said casing part also providing bearing support for said operating shaft, a second casing part cooperating with said first casing part to house the load-lift wheel and itself formed with a bearing for receiving and giving support to the projecting end of said load-lift shaft, said second casing part also providing bearing support for said operating shaft, brake mechanism carried by the operating shaft and the second casing part comprising suitable ratchet means and a brake nut mounted upon said operating shaft, an operating lever carried by said nut and having a hub cooperating with said second casing part to enclose said brake mechanism, and a suspension member having an integral casing engaging portion of general semi-spherical formation, said casing parts having opposing portions forming a socket for the reception of the casing engaging portion of said suspension member for limited universal movement therein, whereby the shafts are given direct suspension by each casing section.

7. A puller, comprising a housing, consisting of a ratchet casing, a wheel casing, and a gear casing, a one-piece load-lift wheel and load shaft, said shaft being rotatably supported by the ratchet casing and the wheel casing, said load wheel being mounted within said last mentioned casing parts, a hoist hook universally mounted at the joint between the ratchet casing and the wheel casing and disposed in recesses formed in the adjacent faces of said last mentioned casing parts, an operating shaft rotatably supported by said ratchet casing and said wheel casing, a gear carried by said load-lift shaft, an intermeshing gear integral with said operating shaft, said gears being mounted within said gear casing, and brake mechanism carried by the operating shaft and the ratchet casing and partly enclosed by said ratchet casing.

8. A puller, comprising a housing, consisting of a ratchet casing, a wheel casing, and a gear casing, a one-piece load-lift wheel and load shaft, said shaft being rotatably supported by the ratchet casing and the wheel casing, said load wheel being mounted within said last mentioned casing parts, a hoist hook universally mounted at the joint between the ratchet casing and the wheel casing and disposed in recesses formed in the adjacent faces of said last mentioned casing parts, an operating shaft rotatably supported by said ratchet casing and said wheel casing, a gear carried by said load-lift shaft, an intermeshing gear integral with said operating shaft, said gears being mounted within said gear casing, brake mechanism carried by the operating shaft and the ratchet casing, suitable ratchet means carried by the brake mechanism, a brake nut carried by said operating shaft, an operating lever rotatably mounted upon said brake nut, and means carried by said lever and engageable with said brake nut for operating said nut in either direction.

9. A puller, comprising a housing, consisting of a ratchet casing, a wheel casing, and a gear casing, a one-piece load-lift wheel and load shaft, said shaft being rotatably supported by the ratchet casing and the wheel casing, said load wheel being mounted within said last mentioned casing parts, a hoist hook universally mounted at the joint between the ratchet casing and the wheel casing and disposed in recesses formed in the adjacent faces of said last mentioned casing parts, an operating shaft rotatably supported by said ratchet casing and said wheel casing, a gear carried by said load-lift shaft, an intermeshing gear integral with said operating shaft, said gears being mounted within said gear casing, brake mechanism carried by the operating shaft and the ratchet casing, suitable ratchet means carried by the brake mechanism, a brake nut carried by said operating shaft, an operating lever rotatably mounted upon said brake nut, means carried by said lever and engageable with said brake nut for operating said nut in either direction, and a hub formed on said lever for cooperation with the ratchet casing and substantially enclosing said brake mechanism.

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