W. A. WHITNEY.

BALL BEARING JACK.

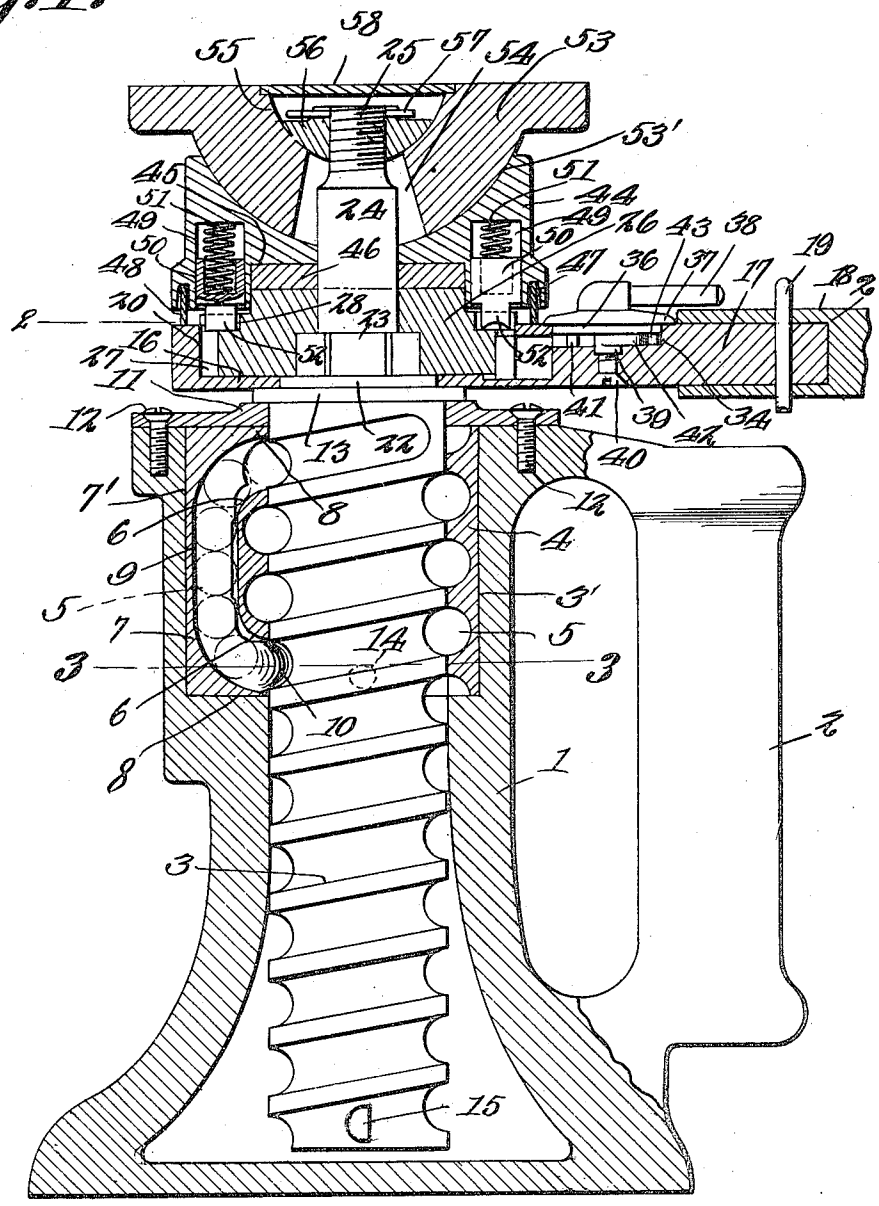
APPLICATION FILED AUG. 21, 1917.

1,272,589.

Patented July 16, 1918.

2 SHEETS—SHEET 1.

Fig. 1.



Witness

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2 SHEETS—SHEET 2.

Fig. 2.

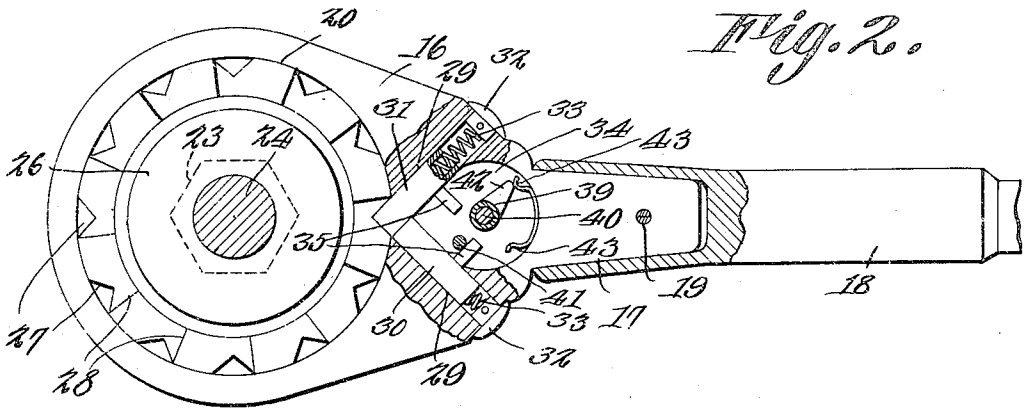
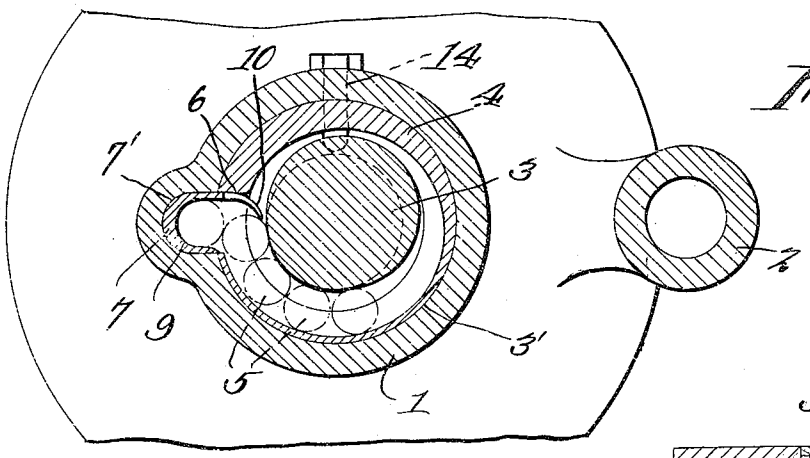


Fig. 3.



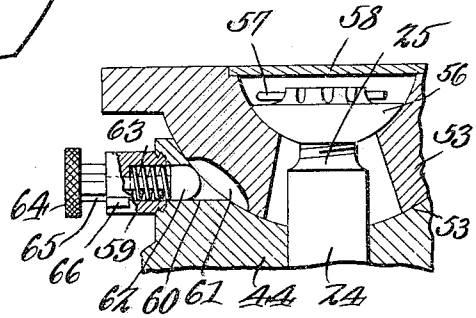


Fig. 4.

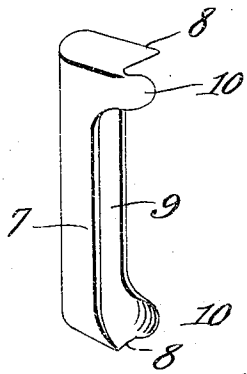


Fig. 5.

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UNITED STATES PATENT OFFICE.

WILLIAM A. WHITNEY, OF OREGON, ILLINOIS.

BALL-BEARING JACK.

1,272,589. Specification of Letters Patent. Patented July 16, 1918.

Application filed August 21, 1917. Serial No. 187,448.

To all whom it may concern:

Be it known that I, WILLIAM A. WHITNEY, a citizen of the United States, residing at Oregon, in the county of Ogle and State of Illinois, have invented a new and useful Ball-Bearing Jack, of which the following is a specification.

The present invention appertains to jacks, and aims to provide a jack of novel and improved construction which is provided with anti-frictional means whereby it operates easily and smoothly.

It is the object of the invention to provide a jack wherein the screw is supported in a novel manner by the use of anti-frictional balls.

Another object of the invention is the provision of a novel ratchet mechanism for operating the screw and controlling the movement thereof.

A still further object of the invention is the provision of a jack having the characteristics above noted and embodying a novel assemblage of the component elements and improved details of construction, to enhance the utility and efficiency of the jack.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed, can be made within the scope of what is claimed, without departing from the spirit of the invention.

The invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a vertical median section of the improved jack, portions being shown in elevation.

Figs. 2 and 3 are horizontal cross sections taken on the respective lines 2—2 and 3—3 of Fig. 1.

Fig. 4 is a sectional detail illustrating the means for locking together the rocking seat member and ring interposed between said member and ratchet wheel.

Fig. 5 is a perspective view of the ball transferring guide.

The jack embodies an upright tubular standard or body 1 having a suitable base, and preferably provided at one side with a handle 2, said standard receiving the vertical screw 3. The standard 1 is provided at its upper end with a counter bore or recess 3′ in which is seated the nut 4. The grooves of the screw and nut are concaved transversely and complement each other, to provide a helical passage between the screw and nut in which a helical series of anti-frictional balls 5 is disposed, said balls seating in the grooves of both the screw and nut. The balls serve to support the screw from the nut with a minimum amount of friction, being capable of rolling motion between the screw and nut, and providing the threaded connection which may be said to be "floating" since the balls can move helically but still maintain the threaded connection beween the parts.

In order to transfer the balls between the upper and lower ends of the helical passage or runway thereof provided between the screw and nut, the nut is provided at one side adjacent to its upper and lower ends with cut away portions or notches 6 extending from the end portions of the spiral ball runway to the periphery of the nut. A vertical ball transferring guide 7 is fitted in a pocket 7′ with which the standard 1 is provided at one side of the recess 3′, and the ends of the guide 7 has lugs 8 fitted in the notches 6, the guide 7 being applied to the nut before the nut is inserted downwardly in the recess 3′. The guide 7 is provided with a longitudinal vertical channel or groove 9 curved at its ends into the lugs 8 to communicate with the ends of the spiral ball runway, and the lugs 8 are provided with spoon-shaped deflectors 10 projecting into the groove of the screw for properly directing the balls between the runway and channel 9. Thus, when the screw is screwed upwardly, the balls 5 can roll upwardly between the screw and nut, and in reaching the upper end of the runway will be deflected by the upper deflector 10 into the upper end of the channel 9 and will move downwardly in said channel to the lower end of the ball runway, thus providing for a circuitous movement of the balls, which is desirable to permit the balls to roll freely. Conversely, when the screw is screwed downwardly, the balls will roll downwardly and will be deflected by the lower deflector 10 into the channel 9, wherein they will be raised and forced into the upper end of the ball runway to provide the circuitous movement. In this manner, the screw is supported by the anti-frictional balls, to

turn easily and with little friction, whereas with the ordinary jacks, considerable friction is present, especially when lifting or jacking a heavy load.

A retaining plate 11 surrounds the screw and is secured upon the standard 1 by means of screws 12 or other securing elements, for holding the nut 4 and guide 7 in place, the screw having an outstanding flange 13 to seat upon the plate 11 when the screw reaches its lowermost position, as seen in Fig. 1. A set screw 14 is engaged into the standard 1 and projects through the lower portion of the nut 4 to prevent said nut from turning, and the set screw 14 also extends into the groove of the screw to limit the upward movement thereof, the screw having a stop 15 at its lower end which in striking the set screw 14 will prevent the lower end of the screw from moving upwardly into the nut, which would be objectionable, since it would allow balls to drop out.

An oscillatory actuating member 16 is mounted upon the screw and seats upon the flange 13, and is provided with a radially extending shank 17 with which a socketed end of a suitable handle lever 18 is engageable, being removably held in place by means of a cotter pin 19 or other retaining element. The member 16 has a recess 20 concentric with the screw, said screw having a portion 22 upstanding from the flange 13 around which the member 16 is rotatable, and a boss 23 of non-circular outline extends upwardly from the portion 22, while a stem 24 extends upwardly from the boss 23 and has a reduced threaded end 25.

There is a ratchet connection between the member 16 and screw, the same embodying a double ratchet wheel 26 disposed within the recess 20 and engaged over the boss 23 to rotate with the screw. The ratchet wheel 26 has teeth 27 in its periphery, the shoulders of which face in opposite directions, and said ratchet wheel is further provided in its upper face with ratchet teeth 28, the shoulders of which face in one direction only, clockwise, as seen in Fig. 2. The member 16 is provided adjacent to the shank 17 with bores 29 diverging away from the recess 20 and the ratchet wheel and in which diverging pawls or dogs 30 and 31 are slidable reversely tangential to the ratchet wheel. Plugs 32 or other suitable members are detachably applied to the member 16 to close the outer ends of the passages 29 and coiled wire expansion springs 33 are disposed between the pawls and said plugs 32 for projecting the pawls into engagement with the ratchet wheel. The member 16 has a recess 34 between the bores 29 and pawls, and said pawls have pins 35 projecting into said recess, as clearly seen in Fig. 2. A rotatable member 36 is fitted within the upper portion of the recess 34, and also serves to close the same, said member having a flange 37 resting upon the actuating member 16, and is further provided with a finger piece 38. The member 36 has a lug 41 depending therefrom between the pins 35, and centrally of said member 36 it has a depending hub 39 with which a retaining screw 40 is engaged from below, for holding said member 36 removably in place for oscillation about the vertical axis of said screw 40 and hub 39. The member 36 also has the cam 42 extending from the hub 39 away from the lug 41, to engage suitable detent springs or means 43, for holding the member 36 in one position or the other. Thus, by swinging the member 36 counterclockwise, as seen in Fig. 2, the lug 41 in striking the pin 35 of pawl 30, will retract said pawl, thereby releasing the pawl 31 and allowing it to engage the ratchet wheel, whereby when the member 16 is swung clockwise, the pawl 31 in engaging the ratchet wheel will be forced against its spring 33, but when the member 16 is swung counter clockwise, the pawl 31 will carry the ratchet wheel 26 with it. Conversely, when the member 36 is swung in the other direction so that its lug 41 moves the pin 35 of the pawl 31, said pawl is retracted, and the other pawl 30 allowed to project into engagement with the ratchet wheel, thereby turning the ratchet wheel 26 clockwise, as seen in Fig. 2, with the member 16 but allowing the parts to slip when the member 16 is moved in the opposite direction. The member 36 is held in either position by the engagement of the cam 42 past the springs or detent means 43. It is thus an easy matter to bring one pawl or the other into operation by reversing the member 36 through the medium of the finger piece 38.

Disposed above the ratchet wheel 26 and rotatable upon the stem 24 of the screw, is a ring or annulus 44 having the lower recess 45 receiving the upstanding hub of the ratchet wheel, a washer 46 being preferably disposed within the recess 45 between the ring 44 and ratchet wheel. The ring 44 is preferably provided adjacent to its periphery with a lower groove 47 in which a ring 48 is seated, to close the slot between the ring 44 and member 16. The ring 44 is provided within the outline of the groove 47 with downwardly opening recesses 49 in which plungers 50 are slidable vertically, said plungers being depressed by coiled wire expansion springs 51 bearing thereagainst and disposed within the recesses 49. The lower ends of the plungers 50 have the pawls or dogs 52 seating upon the upper face of the ratchet wheel and engaging the ratchet teeth 28 thereof. Thus, a ratchet connection between the ratchet wheel 26 and ring 44 is provided. There is a ratchet connection between the ring 44 and the ratchet

wheel 26 fixed to the screw 3, and a reversible ratchet connection between the oscillatory actuating member 16 and the ratchet wheel. When the ratchet 26 is rotated clockwise, as seen in Fig. 2, its teeth 28 abut against the pawls 52, thereby stopping said rotation of the ratchet wheel, but the ratchet wheel can readily rotate counterclockwise, that is, when the member 44 is held against rotation.

The upper surface of the ring or member 44 has a concaved recess 53′ in which is seated the lower convexed surface of a rocking seat member 53 having a central opening 54 through which the stem 24 extends. The member 53 has an upper concaved cavity or pocket 55 in which a nut 56 or other retaining element is seated, said nut having a lower convexed surface concentric with the lower convexed surface of the member 53. The nut 56 is held in place by means of a cotter pin 57 or other retaining element, and the cavity 55 is preferably covered by means of a removable disk or plate 58 set in flush with the upper surface of the member 53. The member 53 is adapted to support the object to be lifted, and the dished portion of the member 53 in fitting between the recess 53′ and nut 56 can rock in various directions, so as to bear properly against the under surface of the object.

A means is provided for locking the ring 44 and member 53 together to prevent relative rotation therebetween, and for this purpose, a short tubular guide 59 is threaded or otherwise engaged with the ring 44 in alinement with a radial bore 60 thereof, the convexed surface of the member 53 having a socket 61 adapted to be brought into alinement with the bore 60. A lock bolt 62 is slidable through the guide 59 and within the bore 60, and is pressed inwardly by means of a coiled wire expansion spring 63 confined between the bolt and guide 59, said parts having shoulders against which the terminals of the spring bear. The bolt 62 is provided at its outer end with a knob 64 and with a lug 65 adjacent to said knob, while the outer end of the guide 59 has a notch 66. When the knob 64 is turned so that the lug 65 can enter the notch 66, the spring 63 will project the bolt 62 inwardly into the socket 61, thereby preventing relative rotation between the ring 44 and member 53. By pulling the knob 64 outwardly to retract the bolt, and turning knob, the lug 65 will seat against the outer end of the guide 59, thereby holding the bolt retracted, to allow the parts 44 and 53 to rotate relatively.

In operation, the rotation of the screw is greatly facilitated by the provision of the anti-frictional mounting therefor, as will be apparent from the foregoing. The ratchet mechanism between the screw and actuating member 16 is for the purpose of rotating the screw in opposite directions, while the ratchet mechanism between the screw and ring 44 is for the purpose of preventing the downward screwing of the screw under the weight of the object supported, since it will be apparent that if the screw is free to turn, there being little friction, the object might press the screw downwardly. Therefore, by engaging the bolt 62 with the seat member of head 53 as above explained, this will prevent the rotation of the ring 44, since the object in seating upon the member 53 will prevent said member from rotating, which in turn holds the ring 44 against rotary movement. Consequently, when the pawl 31 is engaged with the ratchet wheel 26 to rotate the same counter clockwise, so as to raise the screw 3 and object supported thereby, the pawls 52 in engaging the ratchet teeth 28, will prevent the clockwise rotation of the ratchet wheel and screw. This will prevent the downward movement of the screw when the lever 18 is released or swung clockwise, as seen in Fig. 2, during the oscillation thereof for jacking up the object. By releasing the bolt 62 from the seat member 53, this will permit the ring 44 to turn with the ratchet wheel 26 and screw 3, so that the screw can move downwardly under the weight of the object, without the necessity of rotating the screw clockwise, as seen in Fig. 2, excepting in unusual cases. When it is necessary to forcibly screw the screw 3 downwardly, the pawl 30 can be brought into play by retracting the pawl 31 through the medium of the member 36. The seat member 53 is swiveled to the upper end of the screw, but by the provision of the intervening ring 44, pawls 52 and ratchet wheel 26, will serve to prevent the rotation of the screw in one direction to travel downwardly.

Having thus described the invention, what is claimed as new is:—

1. A jack embodying a screw and a nut having complementary helical grooves providing a helical ball runway, balls seated in said grooves to roll in said runway, the nut having notches at the ends of said runway, and a guide having lugs entering said notches and a channel extending from one lug to the other for transferring the balls between the ends of the runway, said lugs having deflectors extending into the groove of the screw for deflecting the balls into the guide.

2. A jack embodying a standard having an upper recess and pocket, a nut seated in said recess, a screw extending through the nut, said screw and nut having complementary helical grooves providing a helical ball runway, balls seated in said grooves to roll in said runway, a guide fitted in said pocket and having lugs at its upper and lower ends, the nut having notches at the ends of said runway receiving said lugs, the guide hav-

ing a channel extending from one lug to the other for transferring the balls between the ends of the runway, said lugs having deflectors extending into the groove of the screw for deflecting the balls into the guide, and means for holding the nut and guide in said recess and pocket.

3. A jack embodying a standard, a screw having a threaded connection therewith, a seat member swiveled to the screw, a member rotatable upon the screw, means for locking said members together to prevent relative rotation therebetween, and a ratchet connection between the second mentioned member and the screw.

4. A jack embodying a standard, a screw having a threaded connection therewith, a ratchet wheel engaged non-rotatably upon the screw, a member mounted rotatably upon the screw, a pawl carried by said member and engageable with the ratchet wheel, a seat member swiveled upon the screw, and means for locking said members together to prevent relative rotation therebetween.

5. A jack embodying a standard, a screw having a threaded connection therewith, a ratchet wheel seated upon the screw and engaged thereto to rotate therewith, a member seated above said ratchet wheel and mounted rotatably upon the screw, a pawl carried by said member to engage the ratchet wheel, a seat member swiveled upon the screw and seated upon the aforesaid member, and means for locking said members together to prevent relative rotation therebetween.

6. A jack embodying a standard, a screw having a threaded connection therewith, a member supported by the screw having a concaved recess, a seat member having a lower convexed surface seated in said recess and an upper concaved cavity concentric with said recess, and a convexed member seated in said cavity and connected to the screw.

7. A jack embodying a standard, a screw having a threaded connection therewith, a member supported by the screw having a concaved recess, a seat member having a lower convexed surface seated in said recess and an opening through which the screw extends, said seat member having an upper concaved cavity, and a retaining member engaging the screw and having a convexed surface seating in said cavity.

8. A jack embodying a standard, a screw having a threaded connection therewith, an oscillatory member mounted upon the screw, a ratchet wheel fixed to the screw, diverging spring pressed pawls carried by said member for engaging the ratchet wheel in reverse positions, each pawl being projectible across the end of the other to hold it in inoperative position, and means for retracting either pawl.

9. A jack embodying a standard, a screw having a threaded connection therewith, a ratchet wheel fixed to the screw, an oscillatory member mounted upon the screw, pawls carried by said member engageable with the ratchet wheel, a member mounted for rotation upon the screw, a pawl carried by the second mentioned member engageable with the ratchet wheel, a seat member swiveled upon the screw, and means for locking the second and third mentioned members together to prevent relative rotation therebetween.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

WILLIAM A. WHITNEY.

Witnesses:

CHARLES D. ETNYRE,

CLARENCE S. HAAS.