Oct. 27, 1953 H. B. NEIS ET AL 2,657,009

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Fig. 1.

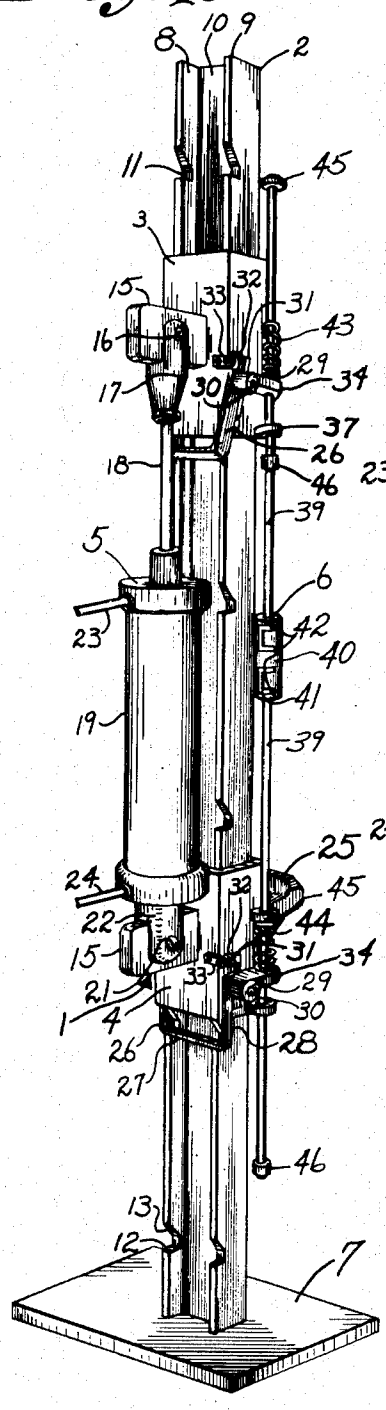
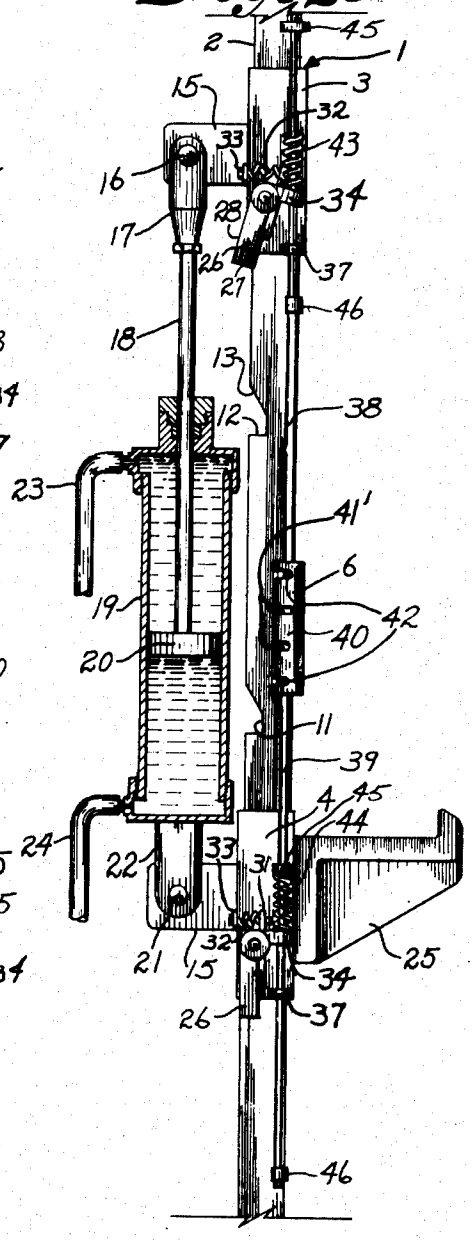


Fig. 2.



INVENTORS.
Robert W. Wood and
Harry B. Neis
BY
Fishburn & Mullendore
ATTORNEYS.

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Fig. 3.

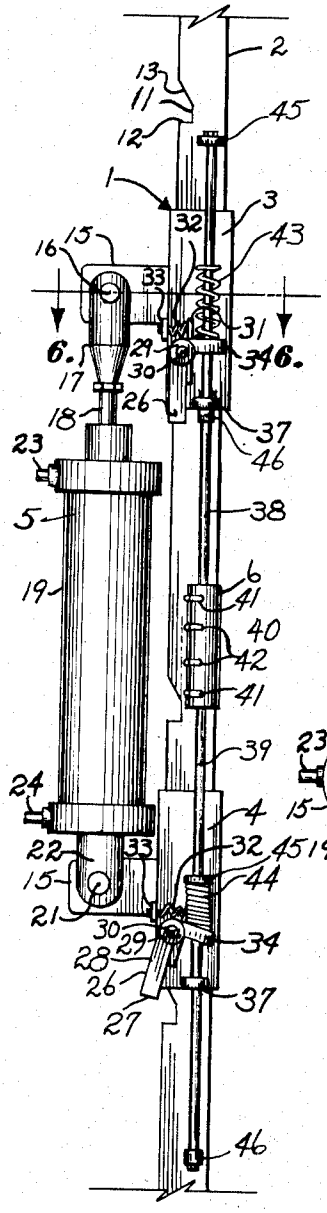


Fig. 5.

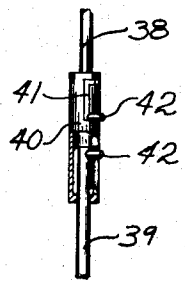


Fig. 6.

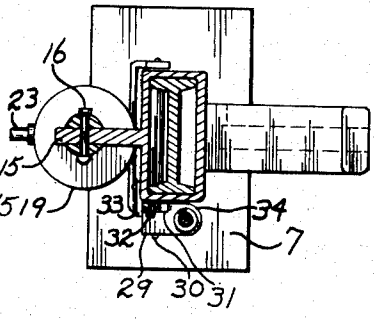
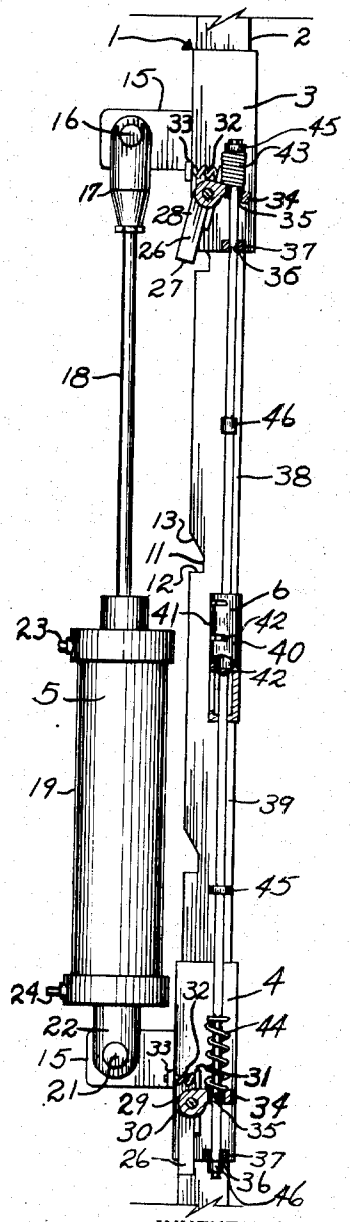


Fig. 4.



INVENTORS.
Robert W. Wood and
Harry B. Neis.
BY Fishburn & Mullendore
ATTORNEYS.

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UNITED STATES PATENT OFFICE

2,657,009

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Harry B. Neis and Robert W. Wood, Harrisonville, Mo., assignors, by direct and mesne assignments, of one-half to said Neis and one-half to Edgar C. Alexander, Creighton, Mo.

Application September 7, 1951, Serial No. 245,458

3 Claims. (Cl. 254—93)

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This invention relates to jacks and more particularly to a power jack of the climbing type having a step by step movement up or down a column or pedestal for lifting objects such as vehicles, tractors and the like.

The objects of the invention are to provide a jack mechanism including a column having spaced, sliding members thereon with latches for engaging the column to retain the sliding members in elevated positions with mechanism for effecting relative reciprocatory movement of the sliding members; to provide a fluid operated motor connected to the sliding members for effecting reciprocation of same; to provide latch receiving notches in vertically spaced arrangement on the column, said notches having upwardly sloping upper ends with lower ends of said notches forming abutments whereby the sliding members may be freely moved upwardly and the latches prevent downward movement thereof; to provide resilient members connected with the latching members for urging said latching members into engagement with the notches in the column; to provide latch control mechanism to selectively effect raising or lowering of the sliding members in response to reciprocation of the fluid motor; and to provide a jack structure which is sturdy yet economical to manufacture and capable of efficient step by step movement in response to reciprocation of a fluid motor.

In accomplishing these and other objects of the present invention, we have provided improved details of structure, the preferred forms of which are illustrated in the accompanying drawings, wherein:

Fig. 1 is a perspective view of a jack embodying the features of the present invention.

Fig. 2 is a side elevation of the jack with the control means in position for upward movement of the sliding members, the fluid motor being shown in vertical section.

Fig. 3 is a side elevational view of the jack with the control means in position for downward movement of the sliding members in response to reciprocation of the fluid motor, with the upper slide member latched in position and the lower slide member starting its downward movement.

Fig. 4 is a side elevational view, similar to Fig. 3, with the fluid motor in extended position with the lower slide member latched in position and the upper slide member starting its downward movement.

Fig. 5 is a detail perspective view of the adjustment sleeve of the control member, portions

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being broken away to better illustrate the structure thereof.

Fig. 6 is a horizontal sectional view through the jack structure on the line 6—6, Fig. 3.

Referring more in detail to the drawings:

1 designates a jack generally consisting of a column 2, upper and lower slide members 3 and 4, a reciprocating fluid motor 5, and a latch control mechanism 6. The column 2 preferably is formed of a structural shape, such as an I-beam, and has its lower end suitably secured to a base plate 7. Flanges 8 and 9 extending from one side of the web 10 of the column 2 are provided with a plurality of vertically spaced notches 11, so shaped that the lower ends of the notches form abutments 12 and the upper ends slope upwardly and outwardly as at 13. The spacing between the notches is preferably slightly less than the length of the stroke of the reciprocating fluid motor 5.

The slide members 3 and 4 are of such length and have sufficient engagement around the column 2 to slide thereon. In the form of the invention illustrated, the slide members are sleeves having rectangular openings extending vertically therethrough whereby the inside surfaces of the sleeves engage the edges and outer faces of the flanges of the column 2. Each of the slide members has arms 15 extending laterally therefrom, the arm on the upper slide member 3 being pivotally connected by a pin 16 to a yoke 17 on the end of a rod 18 which extends into the cylinder 19 and is connected to a piston 20. The arm 15 on the lower slide member 4 is pivotally connected by a pin 21 to ears 22 on the lower end of the cylinder 19. The ends of the cylinder have communication through suitable ducts 23 and 24 respectively with a source of fluid pressure, including a suitable valve arrangement (not shown) whereby the fluid pressure may be selectively applied to the cylinder on either end of the piston 20 whereby fluid pressure applied below the piston 20 will effect extension of the fluid motor and fluid pressure applied above the piston 20 will effect contraction of the fluid motor. A suitable lug 25 is removably mounted on either of the sleeves whereby it extends oppositely from the arms 15 and is adapted to engage the device to be lifted by the jack. The lug 25 may be of any desired shape to facilitate engagement thereof with the device to be lifted.

Latches 26 are pivotally mounted on each of the sliding members 3 and 4, said latches preferably being U-shaped with a bar 27 extending across the flanges 8 and 9 and legs 28 extending

upwardly on the exterior of the slide members and terminating in bosses 29 pivotally mounted on trunnions or pins 30 extending outwardly from the respective slide members. Ears 31 extend upwardly from one of the legs of each latch member and are connected to one end of tension springs 32, the other ends of which are secured to brackets 33 on the slide members whereby the tension of the springs 32 tends to swing the bar portions 27 of the latch members toward the column and into engagement with the notches 11 therein. Each latch member is provided with an ear 34 extending from a boss 29 oppositely from the bracket 33, said ears having apertures 35 therein in axial alignment with apertures 36 in ears 37 extending laterally from the lower end of the respective slide members. Upper and lower rods 38 and 39 are slidably mounted in the apertures 35 and 36 of the ears 34 and 37 on the slide members 3 and 4 respectively. The adjacent ends of the rods 38 and 39 extend into a sleeve member 40, having slots 41 therein for selective engagement with lugs 42 on the adjacent ends of the rods 38 and 39, said slots having lateral portions 41' in which the lugs 42 may be positioned in the sleeve and change the over-all length of the combined rods 38 and 39.

Sleeved on the rods 38 and 39 are springs 43 and 44 respectively, the lower ends of the respective springs resting on the ears 34. Each of the rods is provided with collars 45 above the springs 43 and 44 respectively for engaging same and cooperating with collars 46 mounted on the respective rods below the ears 37, whereby when the combined length of the rods 38 and 39 is at its shortest limit the compression of the springs 43 and 44 will alternately swing the latch members out of engagement with the notches 11 and move the sleeve members downwardly in step by step movement on the column 2, as later described.

In operating the jack structure for raising vehicles and the like, the flexible conduits 23 and 24 are connected through a suitable valve to a source of fluid pressure. The sleeve 40 is operated to move the lugs 42 in the slots 41 and position said lugs in the endmost lateral portions of the slots to extend the over-all length of the combined rods 38 and 39. The lower collar 45 then rests on the spring 44 but the lower spring 32 is of such strength that the weight of the rods and sleeve 40 does not swing the lower latch 26. The jack structure is then moved to position the lug 25 under a portion of the vehicle or the like to be raised with the piston 20 at the lower end of its stroke. The valve is operated to apply fluid pressure to the cylinder 19 forcing the piston 20 upwardly to apply force to the arm 15 of the upper slide member 3 to move same upwardly on the column. The upward movement of the slide member 3 effects engagement of the bar portion 27 of the latch 26 with the sloping portion 13 of the respective notch 11 whereby said latch rides out of the notch and up the edges of the flanges 8 and 9 as the slide member 3 is moved upwardly on the column. As the piston 20 approaches the upper limit of its stroke, the slide member 3 will move past the next upper notch 11 whereby the spring 32 will swing the latch member 26 into the notch, the bar 27 of the latch being positioned slightly above the abutment 12 of the notch at the upper limit of the movement of the piston 20. Then by operation of the valve to reverse the application of fluid pressure to the cylinder 19 to apply said fluid pressure above the piston 20, the piston 20 will move downwardly in the cylinder until the bar 27 on the latch carried by the upper slide member 3 engages the abutment 12 to prevent further downward movement of the piston 20. The fluid pressure applied to the upper portion of the cylinder then effects upward movement of the cylinder relative to the piston 20 to raise the lower slide member 4. The latch member 26 riding on the sloping surface 13 is moved out of the notch 11 and continued upward movement of the cylinder 19 raises the slide member 4 and lug 25 thereon to lift the vehicle or the like to which it is engaged. As the cylinder 19 approaches the upper limit of its stroke, the latch member of the lower slide member 4 will drop into the next upper notch 11. Then operation of the valve to again reverse the application of fluid pressure to the cylinder 19 will apply said fluid pressure below the piston 20 to again raise the upper slide member 3, providing a step by step movement of the slide members 3 and 4 upwardly on the column 2 until the device being elevated has reached a desired height.

When it is desired to lower the vehicle or other device, the sleeve 40 is rotated to move the lugs 42 into the vertical portion of the slots 41 and the rods 38 and 39 moved to position the lugs in the adjacent lateral portions of the slots 41, as shown in Fig. 5, thereby shortening the over-all length of the rods 38 and 39. When the piston is at its lower end of its stroke and the over-all length of the rods 38 and 39 is shortened, the upper collar 46 will engage the ear 37 on the upper slide member 3 and the lower collar 45 will engage the upper end of the spring 44 and compress same whereby the pressure of the spring 44 will overcome the tension of the spring 32 to swing the latch 26 on the lower slide member 4 out of the notch 11, as shown in Fig. 3. Then the valve is operated to apply fluid pressure at the lower end of the cylinder 19 to extend the fluid motor. The latch 26 on the upper slide member 3 is engaged with the abutment 12 of the notch 11 whereby fluid pressure below the piston 20 effects downward movement of the cylinder 19 and the pressure of the spring 44 maintains the latch 26 out of engagement with the adjacent notch 11 until the slide 4 has passed said notch. After the latch has passed the notch, the spring pressure is reduced whereby the bar 27 of the latch swings back into engagement with the edges of the flanges 8 and 9 and continued downward movement of the cylinder 19 will move the slide member 4 downwardly on the column 2 until the latch 26 is engaged with the next lower notch 11. During the last portion of the movement of the cylinder, the ear 37 on the lower slide member 4 engages the lower collar 46 on the rod 39 and the upper collar 45 on the rod 38 engages and compresses the spring 43, whereby the pressure of the spring 43 overcomes the tension of the spring 32 and swings the latch 26 on the upper slide 3 out of engagement with the notch 11. The valve is then operated to apply fluid pressure above the piston 20 to effect downward movement thereof, the cylinder being held by engagement of the latch 26 on the lower slide 4 with the adjacent notch 11. Downward movement of the piston moves the slide member 3 downwardly and the latch thereon is held out of engagement with the notch 11 until said latch has passed below the notch. The pressure of the spring is then reduced allowing

the latch to ride on the edges of the flanges 8 and 9, and when the upper slide member 3 nears the next lower notch 11 the latch thereon will swing into engagement therewith. This movement causes the collar 45 on the rod 39 to again compress the spring 44 to effect disengagement of the latch 26 on the lower slide member from the adjacent notch 11. The valve is again operated to apply fluid pressure below the piston 20 to again move the cylinder downwardly on the column, such operations moving the respective slide members downwardly on the column in a step by step movement.

It is believed obvious that we have provided an efficient jack for elevating or lowering devices by step by step movement.

What we claim and desire to secure by Letters Patent is:

1. A jack of the character described comprising, an upright column having an enlarged base on the lower end thereof, said column having a plurality of vertically spaced notches in a side thereof, said notches forming an abutment at their lower ends, upper and lower slide members movably mounted on the column in vertically spaced relation, means on one of the slide members adapted to engage an object to be elevated and lowered, latch members pivotally mounted on the slide members and adapted to engage in respective notches in the column to retain the slide members against downward movement, a fluid motor having relative reciprocable members, means pivotally connecting the respective reciprocable members to the slide members, the length of the relative reciprocation of said motor members being greater than the spacing between adjacent notches, means slidably mounted on the slide members and extending therebetween and having alternate resilient engagement with the respective latch members for disengaging the latches from the notches in response to reciprocation of the fluid motor members for lowering the slide members on the column in step by step movement, and means for lengthening said slidably mounted latch engaging means to prevent its engagement with the latch members during elevating movement of the slide members.

2. A jack of the character described comprising, an upright column having an enlarged base on the lower end thereof, said column having a plurality of vertically spaced notches in a side thereof, said notches forming an abutment at their lower ends and having upwardly and outwardly sloping upper portions, upper and lower slide members sleeved on the column in vertically spaced relation, a laterally extending lug on one of the slide members and adapted to engage an object to be elevated and lowered, latch

members pivotally mounted on the slide members and adapted to engage in respective notches in the column to retain the slide members against downward movement, means resiliently urging the latch members into engagement with the column and notches, a fluid motor having relative reciprocable members, means pivotally connecting the respective reciprocable members to the slide members, the length of the relative reciprocation of said motor members being greater than the spacing between adjacent notches whereby extension of the motor members elevates the upper slide member until the latch thereon engages an adjacent notch and then contraction of the motor members elevates the lower slide member until the latch thereon engages the next upper notch providing a step by step elevation of the slide members, means slidably mounted on the slide members and extending therebetween and having alternate resilient engagement with the respective latch members for disengaging the latches from the notches in response to reciprocation of the fluid motor members for lowering the slide members on the column in step by step movement, and means for lengthening said slidably mounted latch engaging means to prevent its engagement with the latch members during elevating movement of the slide members.

3. A jack of the character described comprising, an upright column, slide members movably mounted on the column in spaced relation, means on one of the slide members adapted to engage an object to be moved, latch members mounted on the slide members and adapted to engage the column to retain the slide members against downward movement, a fluid motor having relative reciprocable members, means connecting the respective reciprocable members to the slide members, means slidably mounted on the slide members and extending therebetween and having alternate resilient engagement with the respective latch members for disengaging the latch members from the column in response to reciprocation of the fluid motor members for moving the slide members in a step by step movement, and means for lengthening said slidably mounted latch engaging means to prevent its engagement with the latch members during elevating movement of the slide members.

HARRY B. NEIS.
ROBERT W. WOOD.

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