

March 7, 1933.

R. STATZ

1,900,528

JACK

Filed Jan. 28, 1932

2 Sheets-Sheet 1

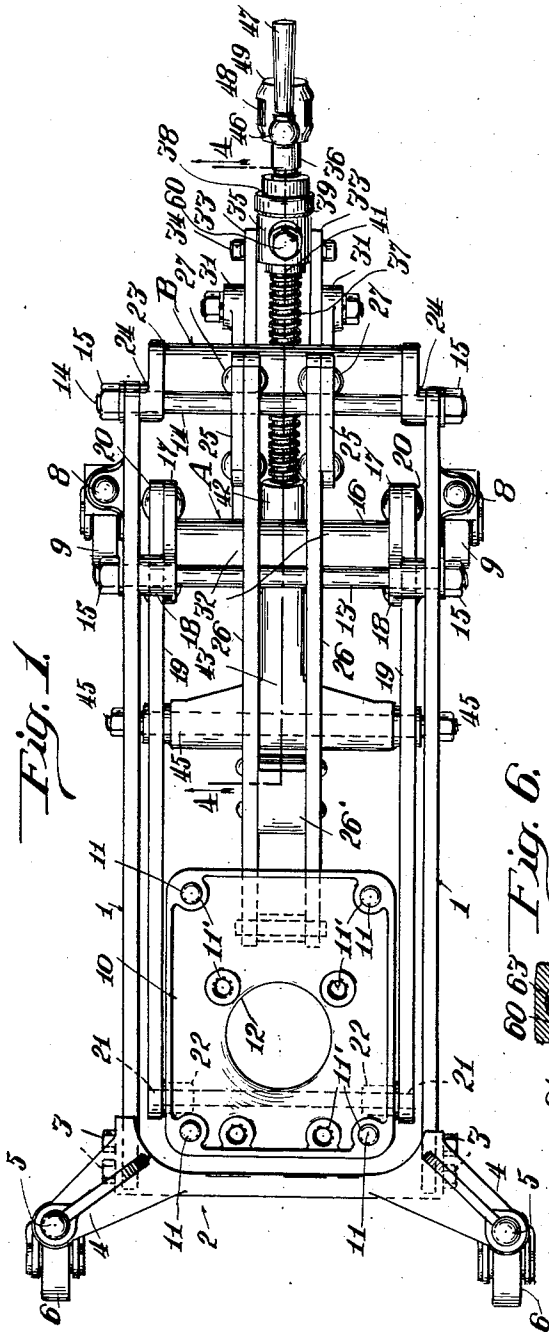


Fig. 1.

Fig. 6.

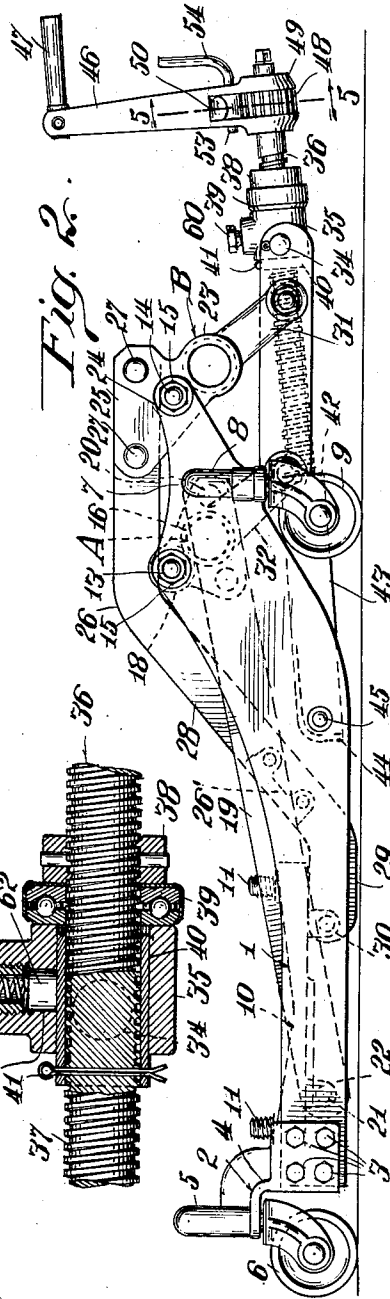


Fig. 2.

Inventor

Robert Statz

Barnett & Guman
Attorneys

March 7, 1933.

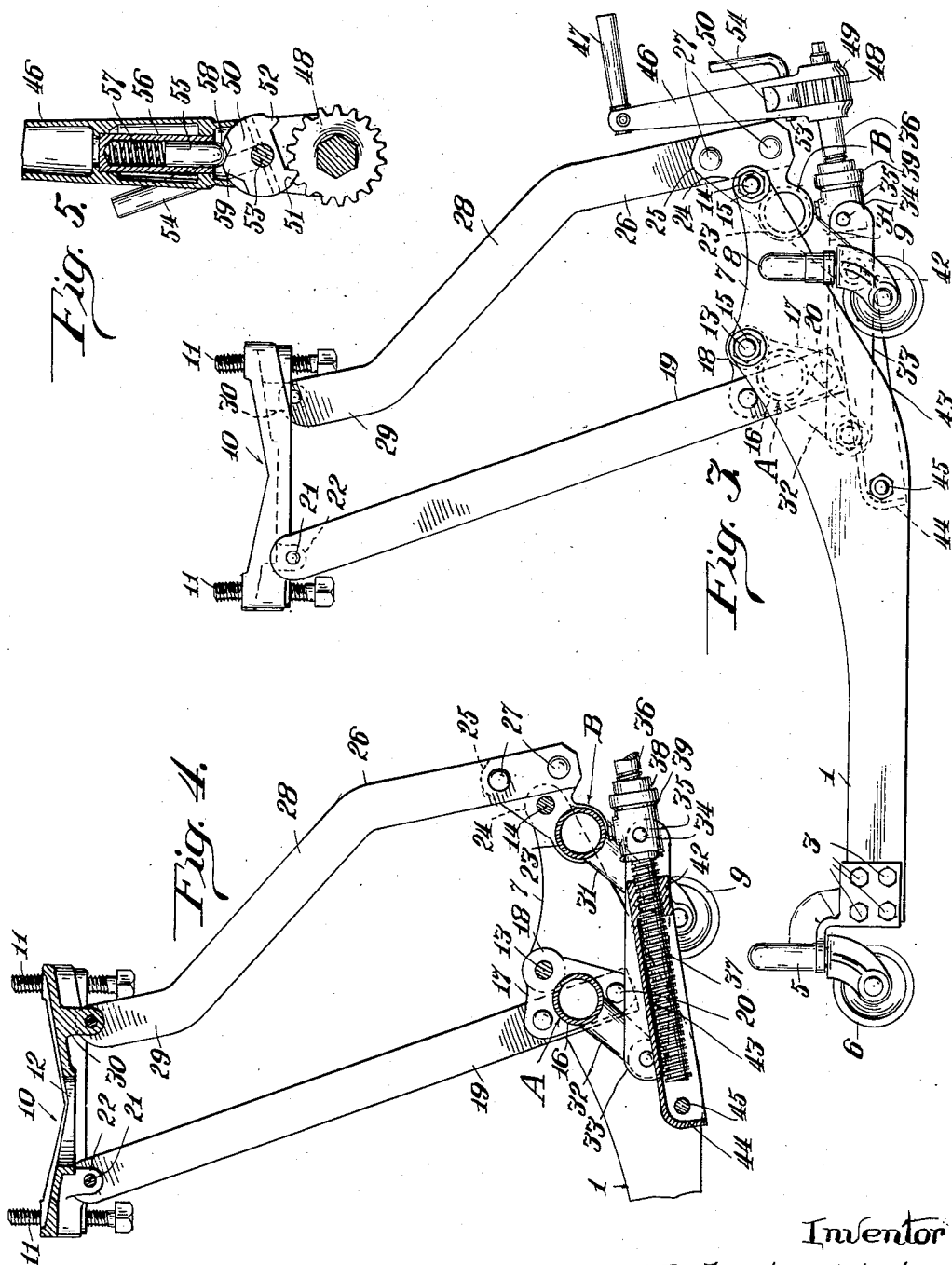
R. SATZ

1,900,528

JACK

Filed Jan. 28, 1932

2 Sheets-Sheet 2



Inventor
Robert Stutz

Robert Stutz

Barnett Truman
Attorneys

Attorneys

UNITED STATES PATENT OFFICE

ROBERT STATZ, OF RACINE, WISCONSIN, ASSIGNOR TO WALKER MANUFACTURING COMPANY, OF RACINE, WISCONSIN, A CORPORATION OF WISCONSIN

JACK

Application filed January 28, 1932. Serial No. 589,418.

This invention relates to a new and improved portable lifting jack, and more particularly to a jack especially designed for lifting, lowering and supporting various units of an automobile, truck or bus, for example, the transmission assembly of an automobile when such transmission is removed from or replaced in the car.

The jack is especially designed so as to have a minimum height above the floor or other supporting surface when lowered, so that the jack and the load carried thereby may be moved into and out of place beneath the vehicle. The load-supporting head has a broad or extensive surface and is provided with a plurality of adjusting screws so located as to properly engage and support the curved or irregular lower surface of the transmission housing. The lifting and lowering mechanism comprises a pair of similar lever mechanisms fulcrumed in the carriage frame and having their longer arms pivotally attached to the supporting head or other load-supporting member in such manner that the levers will swing with a parallel motion and maintain the supporting member in proper horizontal position at all heights to which it may be adjusted. An improved screw and nut mechanism is engaged between the carriage frame and the shorter arms of the levers so as to simultaneously swing both levers about their fulcrums and lift or lower the load.

The principal object of this invention is to provide an improved jack of the type briefly described hereinabove and disclosed more in detail in the specifications which follow.

Another object is to provide an improved form of lifting and lowering mechanism for a portable jack.

Other objects and advantages of this invention will be more apparent from the following detailed description of one approved form of apparatus designed according to the principles of this invention.

In the accompanying drawings:

Fig. 1 is a plan view of the jack in lowered position.

Fig. 2 is a side elevation of the jack in the lowered position as shown in Fig. 1.

Fig. 3 is a side elevation of the jack in elevated position.

Fig. 4 is a longitudinal vertical section taken substantially on the line 4—4 of Fig. 1, but showing the jack in elevated position as in Fig. 3.

Fig. 5 is a detail section, on a somewhat larger scale, taken substantially on the line 5—5 of Fig. 2.

Fig. 6 is a detail longitudinal vertical section, taken in the same plane as Fig. 4, through the thrust mechanism on the screw shaft.

The carriage frame comprises a pair of similar side bars 1, the front end portions of which are supported parallel to and quite closely adjacent the floor or other supporting surfaces, the front ends of the bars being secured to a forward casting 2 as by means of bolts 3, the casting 2 comprising outwardly extending side arms 4 formed with vertical sockets 5 in which are swiveled the casters 6 of well-known form. The rear portions of the side bars 1 are curved upwardly so as to be positioned at a greater height above the floor and are made somewhat broader (in a vertical plane) as indicated at 7. On the outer sides of these portions 7 are formed vertically extending sockets 8 in which are mounted the swiveling stems of the rear casters 9.

The load-supporting head 10 is of considerable horizontal area and of general rectangular shape, and is adapted to be lowered between the side bars 1 as shown in Fig. 2. A plurality of screw-bolts 11 are adapted to be selectively positioned in some of a plurality of bolt-holes 11' formed in various portions of the head 10, and are vertically adjustable individually in the supporting head so as to engage the curved or irregular lower surface of a load (such as a transmission housing) at spaced apart points and securely support the same. An opening 12 in the head 10 will receive the drain plug on the bottom of the transmission casing, or other similar downward projection on the load. This opening may also be used to receive the stem of an adapter or supplementary cap or load-supporting member,

especially designed for carrying a particular form of load.

The head 10 is raised and lowered, and supported at all times in a substantially horizontal position by means of a pair of similar bell-cranks or other lever mechanisms A and B. A pair of similar fulcrum rods 13 and 14 are mounted parallel with one another, and with their axes in substantially the same horizontal plane, in the upper portions of the elevated rear ends 7 of the side bars 1 of the carriage frame. In the form here shown, the end portions of these rods are of reduced diameter and threaded so as to extend through openings in the carriage frame and are held in place by nuts 15 secured on the projecting threaded end portions. The lever mechanism A comprises a tubular cross member 16 formed at its opposite ends with bracket plates 17 formed with upwardly projecting ears 18 which are pivoted on the fulcrum rod 13. The ears 18 are so spaced apart as to hold the lever mechanism centered between the carriage side frames 7. A pair of similar bars 19 which form the longer arms of the lever are riveted or otherwise secured at their rear ends 20 to the brackets 17 and project forwardly and downwardly (when the jack is lowered, as shown in Figs. 1 and 2), the front ends of these arms being pivoted at 21 to hinge lugs 22 formed at the respective lower forward corners of head 10.

The other lever mechanism B comprises a tubular cross member 23 formed adjacent its ends with the upwardly projecting ears 24 pivoted on the fulcrum rod 14 adjacent the carriage side plates 7. The tubular member 23 is formed at locations spaced inwardly from its ends with upwardly projecting bracket plates 25 to which the bars 26 which form the long arms of the lever are riveted or otherwise secured adjacent their rear ends 27. When the jack is in lowered position, as shown in Figs. 1 and 2, the bars 26 project horizontally forward so as to extend over the fulcrum rod 13, then extend downwardly and forwardly at 28 and then horizontally forward at 29 and are pivoted to opposite sides of a lug 30 extending downwardly from the rear portion of head 10. The pivotal connections 21 and 30 by which the lever arms 19 and 26 respectively are attached to head 10 are spaced apart, longitudinally of the jack, substantially the same distance as the fulcrum rods 13 and 14 so that when an equal and parallel swinging motion is imparted to the two sets of lever arms, the head 10 will be swung upwardly to the position shown in Figs. 3 and 4, or to some intermediate position, and will always remain substantially horizontal or parallel to the surface on which the jack is supported.

The lever arms 26 may be connected at an intermediate location by a bracing plate 26'.

The lever mechanism B is provided with a pair of relatively short crank arms 31 which project downwardly and rearwardly from the tubular member 23 when the jack is in lowered position, and downwardly and forwardly when the jack is elevated as shown in Figs. 3 and 4. These crank arms project downwardly from the central portion of tubular member 23 and may be positioned substantially in the same vertical planes as the upwardly projecting brackets 25. A pair of similar crank arms 32 are formed on the central portion of the tubular member 16 of lever mechanism A. The crank arms 32 are parallel to the crank arms 31, and are of substantially the same length and spaced the same distance apart.

The lower ends of the two pairs of crank arms 31 and 32 are pivotally connected to a swinging frame which comprises a pair of similar side plates 33 pivoted at their rear ends to the studs 34 projecting laterally from the opposite sides of a trunnion block or collar 35 which is formed with a cylindrical opening to rotatably receive the shaft 36, the greater portion of which is threaded as indicated at 37. A collar 38 is formed on or fixed to the shaft 36, in the example here shown this collar being a nut screwed in the threaded portion 37 of the shaft. An anti-friction thrust bearing assembly 39 surrounds shaft 36 and is interposed between the collars 35 and 38. A sleeve 40 is fixed to the threaded shaft 36 by any suitable means such as the cotter pin 41. This sleeve extends through the collar 35 and is rotatably journaled therein. As will be hereinafter apparent, the thrust of collar 35 will practically always be rearwardly along the shaft 36 and this thrust is taken up by the anti-friction bearing 39 interposed between the collars 35 and 38, so as to prevent movement of collar 35 rearwardly of the shaft without interfering with the rotation of the shaft in the non-rotary collar. A nut 42 in which the screw shaft 37 is threaded is formed in the rear end portion of a frame or casting 43, the laterally extending rear portion 44 of which is pivotally mounted adjacent its ends on the cross rod 45 which is secured transversely between the carriage side frames 1 in a manner similar to the fulcrum rods 13 and 14.

The shaft 36 is rotated by means of a crank 46 provided with a handle 47. Since the shaft 36 is positioned so close to the floor or other supporting surface that it will ordinarily be impossible to rotate the crank 46 through a complete revolution, a suitable ratchet mechanism is provided between the crank and shaft so that the crank may be oscillated through any convenient arc and impart an intermittent rotation to the shaft.

in the desired direction. Any suitable and well known form of reversible ratchet mechanism may be used for this purpose. As here shown, a ratchet wheel 48 is keyed to the shaft 36 adjacent its rear end, and the forked lower end of crank 46 is rotatably mounted on the shaft at the two sides of the ratchet. A pawl 50 provided with a pair of similar ratchet teeth 51—52 is secured to the pivot pin 53 journaled in the forked lower portion of the crank 46. One outer end of pivot pin 53 is provided with a handle or crank arm 54. A plug 55 slidably mounted in a socket 56 in crank arm 46 is yieldably urged toward the pawl 50 by means of a spring 57. The lower rounded end 58 of plug 55 engages one side or the other of the cam 59 formed on the upper side of pawl 50. With the parts in the position shown in Fig. 5, the tooth 51 of pawl 50 will be held in engagement with ratchet wheel 48 and will prevent rotation of the ratchet wheel in a clockwise direction, but will yield upwardly against the resistance of spring plug 55 to permit rotation of the ratchet in a counter clockwise direction. By swinging handle 54 to the right (Fig. 5) so that spring pressed plug 58 engages the other side of cam 59, the tooth 52 of the pawl will be held yieldably in engagement with ratchet 48 and will permit the ratchet to rotate in a clockwise direction but will prevent rotation in a counter-clockwise direction. It will thus be seen that the ratchet mechanism is reversible by merely throwing handle 54 to one side or the other.

An adjustable plug 60 is screwed into the upper end of a cylindrical opening 61 formed in the top of trunnion-block 35, and a button 62 in the lower portion of opening 61 is held in frictional engagement with the rotary sleeve 40 by means of a spring 63 positioned in a socket in screw-plug 60 and pressing against the top of button 62. The frictional resistance may be adjusted by screwing the plug 60 in or out. This spring-pressed button exerts a constant frictional drag on the rotary screw shaft 36 and serves to hold the shaft during the idle stroke of the crank and ratchet mechanism.

Assuming the jack to be in the lowered position shown in Figs. 1 and 2 and it is desired to elevate the supporting head 10, the ratchet mechanism will be adjusted so that oscillation of the crank 46 will intermittently rotate shaft 36 in such a direction that the screw 37 will move into the nut 42. This will serve to draw the swinging frame toward the cross rod 45, that is into the carriage frame, thus swinging the short arms 31 and 32 of the bell-cranks in a clockwise direction as seen in the drawings, and swinging the longer arms 19 and 26 of the bell-cranks up to an elevated position such as shown in Figs. 3 and 4. The

bolts 11 in head 10 will be adjusted so as to properly engage the lower surface of the transmission housing, or other load to be carried, and the head 10 will be swung up until the load is firmly engaged by these bolts 11. Then by simply swinging the handle 54 to the other side of its central position, and oscillating crank 46 in the same manner as before, the head 10 will be lowered to the position shown in Figs. 1 and 2, or to any desired intermediate position. It will be noted that the head 10 is of substantially no greater height over all than the side frames 1 of the carriage, and the head can be lowered between these side frames substantially to the floor level so that the transmission can be drawn out on the portable jack from beneath the low hanging portions of the automobile structure.

This improved jack is mounted on free casters so that it may be easily pushed or pulled into or from any desired position and is built so low, especially at the load-carrying end, that it can be moved into position beneath very low-hanging portions of the automobile structure. The load-supporting head is adjustable to engage and support curved or irregular surfaces. It will be noted that all of the levers which carry the head and hold it horizontal are power arms, there being no idle links, so that the weight is distributed and quite heavy loads can be handled advantageously.

I claim:

1. A jack comprising a carriage, a load-supporting member, a lever mechanism fulcrumed on the carriage and comprising long and short arms, the longer arm supporting the member, a swinging frame pivoted to the shorter arm of the lever mechanism, a nut pivotally supported in the carriage, a screw shaft threaded in the nut, a thrust-collar mechanism connecting the screw shaft with the frame so that the frame will move longitudinally with the screw, and means for rotating the screw-shaft.

2. A jack comprising a carriage, a load-supporting member, a lever mechanism fulcrumed on the carriage and comprising long and short arms, the longer arm supporting the member, a swinging frame pivoted to the shorter arm of the bell-crank mechanism, a nut pivotally supported in the carriage, a screw shaft threaded in the nut, a thrust-collar mechanism connecting the screw shaft with the swinging frame so that the frame will move longitudinally with the screw, a crank pivotally mounted on the free end portion of the screw shaft, and a reversible ratchet mechanism between the crank and shaft.

3. A jack comprising a carriage, a load-supporting member, two lever mechanisms

each pivoted at one end to the member at spaced apart locations, and each fulcrumed on the carriage at similarly spaced apart locations and operating mechanism directly engaging both lever mechanisms for simultaneously swinging both about their fulcrums to raise or lower the load-supporting member.

4. A jack comprising a carriage, a load-supporting head, two pairs of levers, one pair of the levers being pivoted at one end of each to the head at opposite sides of one end thereof, the other pair of levers being pivoted at one end of each to the opposite end portion of the head, the levers being fulcrumed adjacent the other ends thereof on the carriage, the distance between the fulcrums of the two pairs of levers corresponding to the distance between the pivotal attachments thereof on the head, and operating mechanism directly engaging both pairs of levers for simultaneously swinging them about their fulcrums to raise or lower the head.

5. A jack comprising a carriage, a load-supporting head, two bell-crank lever mechanisms intermediately fulcrumed on the carriage at spaced apart locations, each bell-crank comprising long and short arms, the longer arms of the bell-cranks being pivotally attached to the head at similarly spaced locations, a swinging frame to which the shorter arms of the bell-cranks are both pivoted and means for moving this frame with respect to the carriage to simultaneously swing the bell-cranks about their fulcrums and raise or lower the head.

6. A jack comprising a carriage, a load-supporting head, two bell-crank lever mechanisms intermediately fulcrumed on the carriage at spaced apart locations, each bell-crank comprising long and short arms, the longer arms of the bell-crank being pivotally attached to the head at similarly spaced locations, a swinging frame to which the shorter arms of the bell-cranks are both pivoted, a nut pivotally supported in the carriage, a screw shaft threaded in the nut, a collar pivotally mounted in the swinging frame and encircling the shaft, a collar fixed on the shaft, a thrust bearing between the collars, and means for rotating the screw shaft.

7. A jack comprising a carriage, a load-supporting head, two bell-crank lever mechanisms intermediately fulcrumed on the carriage at spaced apart locations, each bell-crank comprising long and short arms, the longer arms of the bell-cranks being pivotally attached to the head at similarly spaced locations, a swinging frame to which the shorter arms of the bell-cranks are both pivoted, a nut pivotally supported in the carriage, a screw shaft threaded in the nut, a collar pivotally mounted in the swinging frame and encircling the shaft, a collar fixed

on the shaft, a thrust bearing between the collars, a crank pivotally mounted on the free end portion of the screw shaft, and a reversible ratchet mechanism between the crank and screw shaft.

8. A jack comprising a carriage, a load-supporting head, two bell-cranks lever mechanisms intermediately fulcrumed on the carriage at spaced apart locations, each bell-crank comprising long and short arms, the longer arms of the bell-cranks being pivotally attached to the head at similarly spaced locations, a swinging frame to which the shorter arms of the bell-cranks are both pivoted, a nut pivotally supported in the carriage, a screw shaft threaded in the nut, a collar pivotally mounted in the swinging frame and encircling the shaft, a collar fixed on the shaft, a thrust bearing between the collars, a crank pivotally mounted on the free end portion of the screw shaft, a reversible ratchet mechanism between the crank and screw shaft, and a drag mechanism for constantly exerting frictional resistance to the rotation of the screw-shaft.

9. A jack comprising a carriage, a load-supporting head, two bell-crank lever mechanisms intermediately fulcrumed on the carriage at spaced apart locations, each bell-crank comprising long and short arms, the longer arms of the bell-cranks being pivotally attached to the head at similarly spaced locations, a swinging frame to which the shorter arms of the bell-cranks are both pivoted, a nut pivotally supported in the carriage, a screw shaft threaded in the nut, a collar pivotally mounted in the swinging frame and encircling the shaft, a collar fixed on the shaft, a thrust bearing between the collars, a crank pivotally mounted on the free end portion of the screw shaft, a reversible ratchet mechanism between the crank and screw shaft, and a friction button mounted in the collar in the swinging frame and engaging the rotatable shaft.

10. In a jack, a carriage comprising an open horizontally extending frame, and casters swiveled on the frame for supporting and transporting same, a load-supporting head adapted to be lowered between the sides of the frame, a pair of bell-crank mechanisms fulcrumed in the carriage frame at locations spaced apart longitudinally of the frame, one bell-crank mechanism comprising a pair of long arms and a pair of short arms, the long arms being pivoted at opposite sides of the head adjacent one end thereof, the other bell-crank mechanism comprising a long arm and a short arm, the long arm being pivoted to the head between the arms of the first mentioned bell-crank and adjacent the other end of the head, and means engaging the carriage frame and the short arms of the bell-cranks for simultaneously

swinging the bell-cranks to raise or lower the head.

11. In a jack, a carriage comprising an open horizontally extending frame, and casters swiveled on the frame for supporting and transporting same, a load-supporting head adapted to be lowered between the sides of the frame, a pair of bell-crank mechanisms, fulcrumed in the carriage frame at locations spaced apart longitudinally of the frame, one bell-crank mechanism comprising a pair of long arms and a pair of short arms, the long arms being pivoted at opposite sides of the head adjacent one end thereof, the other bell-crank mechanism comprising a long arm and a short arm, the long arm being pivoted to the head between the arms of the first mentioned bell-crank and adjacent the other end of the head, a swinging frame to which the short arms of the bell-cranks are pivoted, and means for moving the swinging frame with relation to the carriage to raise or lower the head.

12. In a jack, a carriage comprising an open horizontally extending frame, and casters swiveled on the frame for supporting and transporting same, a load-supporting head adapted to be lowered between the sides of the frame, a pair of bell-crank mechanisms fulcrumed in the carriage frame at locations spaced apart longitudinally of the frame, one bell-crank mechanism comprising a pair of long arms and a pair of short arms, the long arms being pivoted at opposite sides of the head adjacent one end thereof, the other bell-crank mechanism comprising a long arm and a short arm, the long arm being pivoted to the head between the arms of the first mentioned bell-crank and adjacent the other end of the head, a swinging frame to which the short arms of the bell-cranks are pivoted, a nut pivotally mounted in the carriage frame, a screw shaft having one end portion threaded in the nut, a thrust collar fixed on the shaft, a thrust collar pivotally mounted in the swinging frame, a thrust-bearing between the collars, and means for rotating the screw shaft.

13. In a jack, a carriage comprising an open horizontally extending frame, and casters swiveled on the frame for supporting and transporting same, a load-supporting head adapted to be lowered between the sides of the frame, a pair of bell-crank mechanisms fulcrumed in the carriage frame at locations spaced apart longitudinally of the frame, one bell-crank mechanism comprising a pair of long arms and a pair of short arms, the long arms being pivoted at opposite sides of the head adjacent one end thereof, the other bell-crank mechanism comprising a long arm and a short arm, the long arm being pivoted to the head between the arms of the first mentioned bell-crank

and adjacent the other end of the head, a swinging frame to which the short arms of the bell-cranks are pivoted, a nut pivotally mounted in the carriage frame, a screw shaft having one end portion threaded in the nut, a thrust collar fixed on the shaft, a thrust collar pivotally mounted in the swinging frame, a thrust-bearing between the collars, a crank pivoted on the free end of the screw shaft and a reversible ratchet mechanism between the crank and shaft.

14. In a jack, a carriage comprising an open horizontally extending frame, and casters swiveled on the frame for supporting and transporting same, a load-supporting head adapted to be lowered between the sides of the frame, a pair of bell-crank mechanisms fulcrumed in the carriage frame at locations spaced apart longitudinally of the frame, one bell-crank mechanism comprising a pair of long arms and a pair of short arms, the long arms being pivoted at opposite sides of the head adjacent one end thereof, the other bell-crank mechanism comprising a long arm and a short arm, the long arm being pivoted to the head between the arms of the first mentioned bell-crank and adjacent the other end of the head, a swinging frame to which the short arms of the bell-cranks are pivoted, a nut pivotally mounted in the carriage frame, a screw shaft having one end portion threaded in the nut, a thrust collar fixed on the shaft, a thrust collar pivotally mounted in the swinging frame, a thrust-bearing between the collars, a crank pivoted on the free end of the screw shaft, a reversible ratchet mechanism between the crank and shaft, and means for constantly exerting a frictional drag on the screw shaft.

15. In a jack, a carriage comprising an open horizontally extending frame consisting of spaced apart side bars, a casting connecting the front ends of the side bars, and casters swiveled on the frame for supporting and transporting same, a load-supporting head adapted to be lowered between the side bars of the frame adjacent the front casting, a plurality of lever mechanisms fulcrumed between the side bars adjacent the other end of the frame and comprising long and short arms, the longer arms of the levers being connected to and supporting the head, and means connected with the shorter arms of the levers and with the frame for swinging the levers about their fulcrums.

16. In a jack, a carriage comprising an open horizontally extending frame consisting of spaced apart side bars, a casting connecting the front ends of the side bars, and casters swiveled on the frame for supporting and transporting same, a load-supporting head adapted to be lowered between the side bars of the frame adjacent the front casting, a plurality of lever mechanisms ful-

crumed between the side bars adjacent the other end of the frame and comprising long and short arms, the longer arms of the levers being connected to and supporting the
5 head, a nut pivotally mounted in the frame, a screw shaft threaded in the nut, a swinging frame connecting the shorter arms of the levers with the screw shaft and means for rotating the shaft.

- 10 17. In a jack, a carriage comprising an open horizontally extending frame consisting of spaced apart side bars, a casting connecting the front ends of the side bars, and casters swiveled on the frame for supporting
15 ing and transporting same, a load-supporting head adapted to be lowered between the side bars of the frame adjacent the front casting, a plurality of lever mechanisms fulcrumed between the side bars adjacent the
20 other end of the frame and comprising long and short arms, the longer arms of the levers being connected to and supporting the head, a nut pivotally mounted in the frame, a screw shaft threaded in the nut, a swing-
25 ing frame connecting the shorter arms of the levers with the screw shaft, means for rotating the shaft and means for exerting a constant frictional drag on the screw shaft.

ROBERT STATZ.

30

35

40

45

50

55

60

65