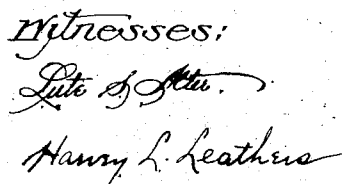


APPLICATION FILED MAY 27, 1909.

Patented Oct. 25, 1910.

5 SHEETS--SHEET 1.



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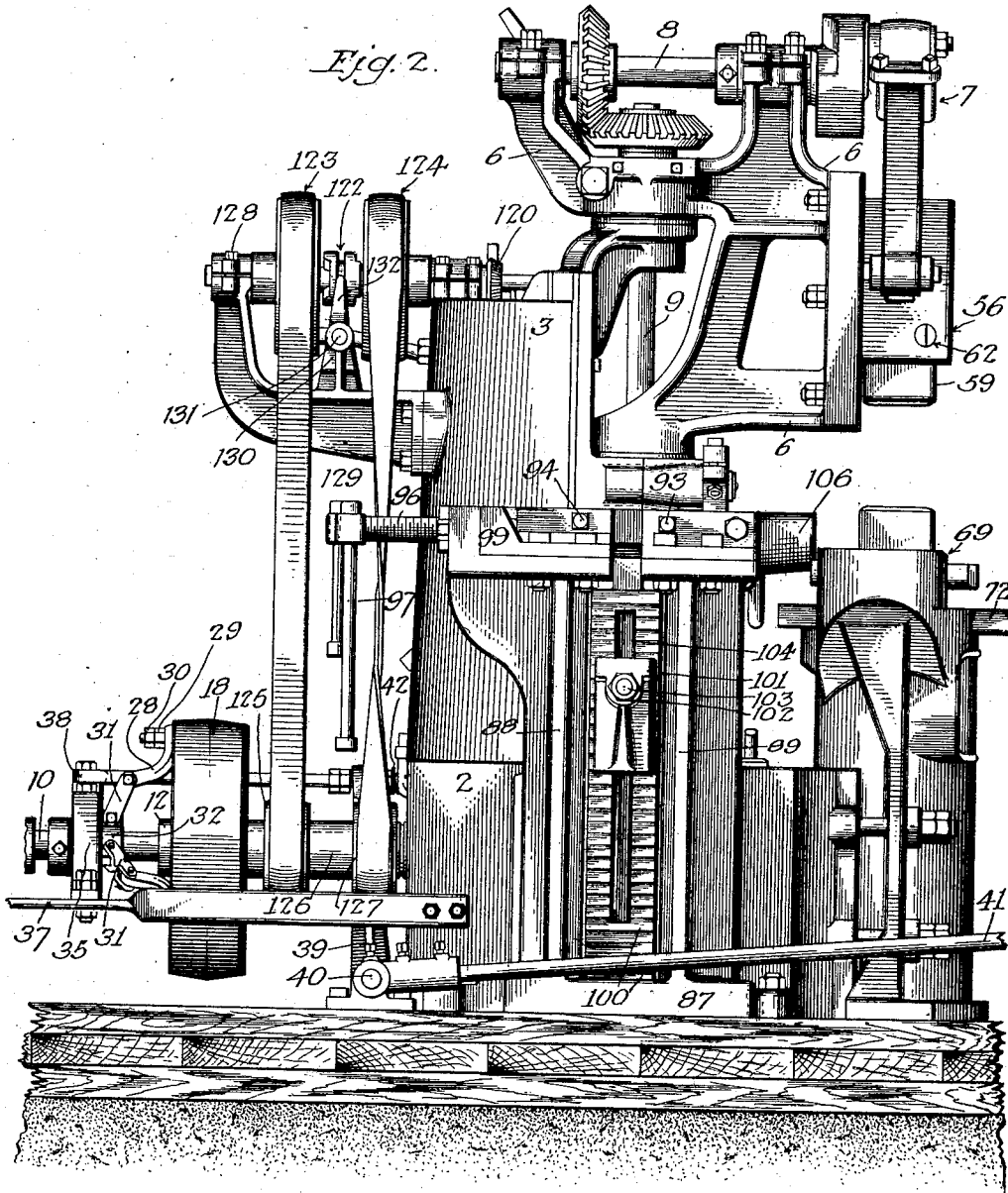
J. A. BROWN & F. E. SUTHERLAND.  
POWER HAMMER.

973,620.

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5 SHEETS-SHEET 2.



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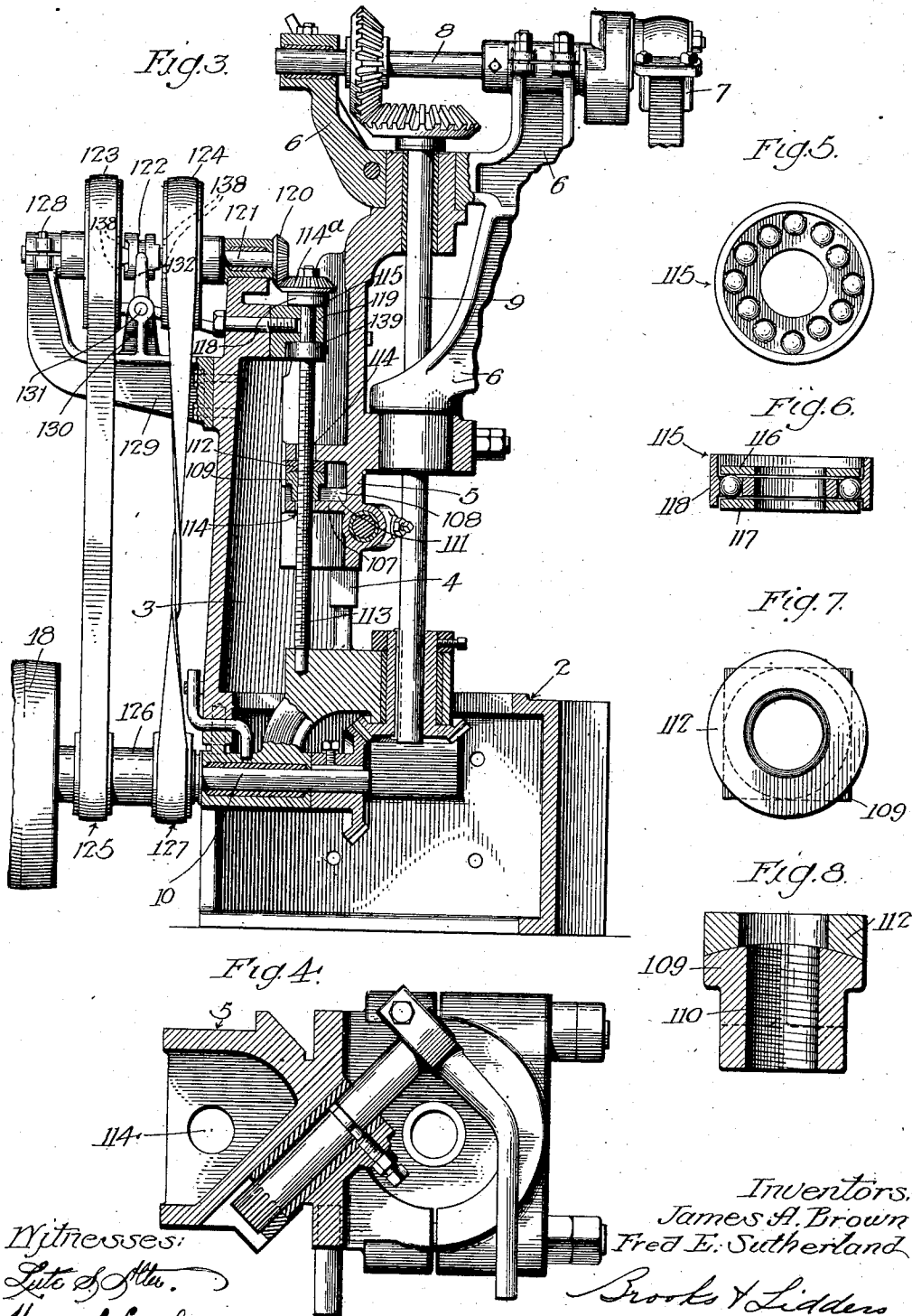
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5 SHEETS—SHEET 3.



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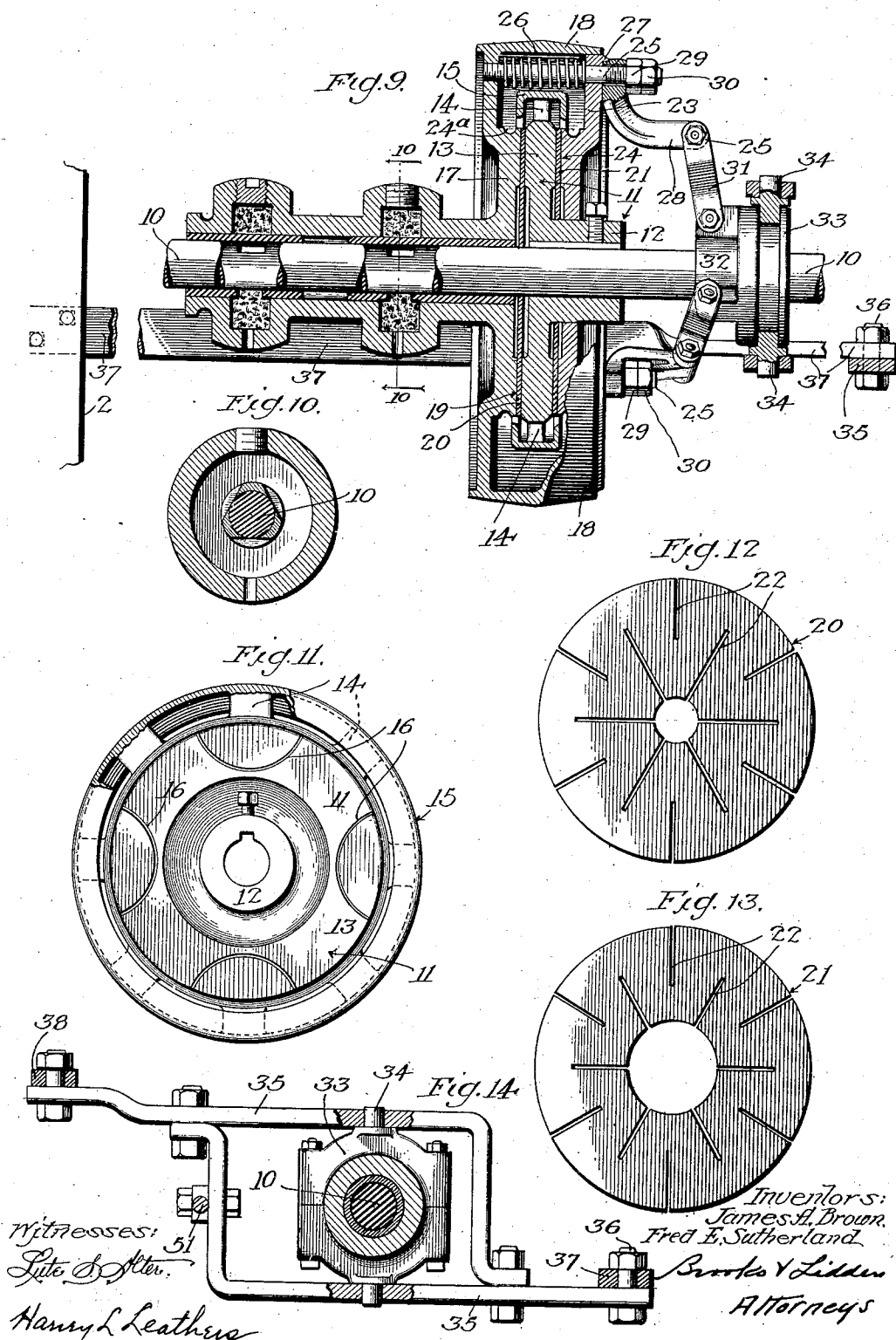
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5 SHEETS—SHEET 4.



J. A. BROWN & F. E. SUTHERLAND.

POWER HAMMER.

APPLICATION FILED MAY 27, 1909.

973,620.

Patented Oct. 25, 1910.

5 SHEETS—SHEET 5.

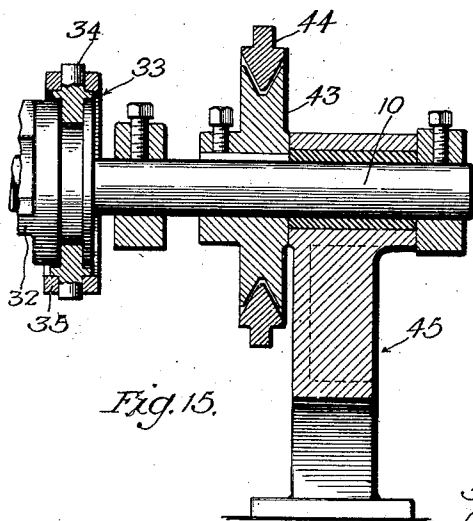


Fig. 15.

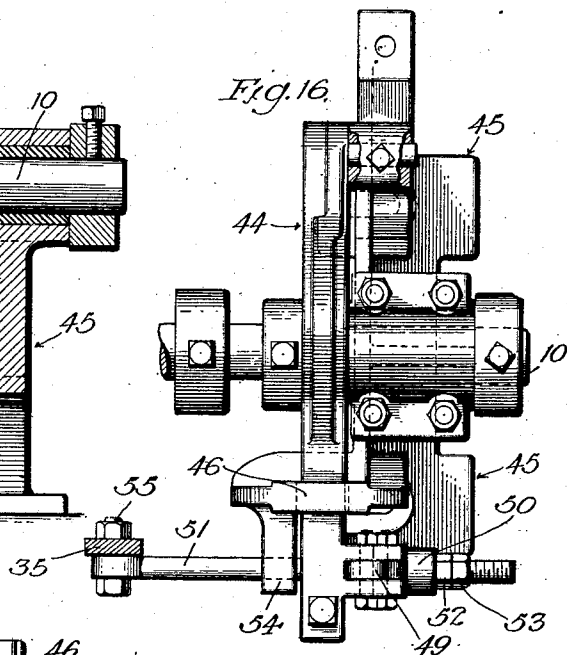


Fig. 16.

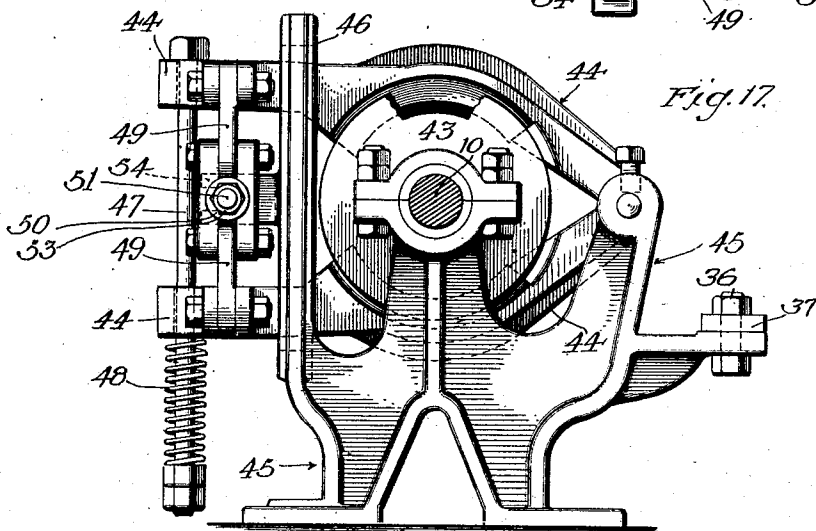


Fig. 17.

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# UNITED STATES PATENT OFFICE.

JAMES A. BROWN AND FRED E. SUTHERLAND, OF LOS ANGELES, CALIFORNIA, ASSIGNORS TO THE RADIAL POWER HAMMER COMPANY, OF LOS ANGELES, CALIFORNIA, A CORPORATION OF CALIFORNIA.

## POWER-HAMMER.

973,620.

Specification of Letters Patent.

Patented Oct. 25, 1910.

Application filed May 27, 1909. Serial No. 498,765.

*To all whom it may concern:*

Be it known that we, JAMES A. BROWN and FRED E. SUTHERLAND, citizens of the United States of America, both residing at Los Angeles, the county of Los Angeles, State of California, have invented certain new and useful Improvements in Power-Hammers; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in power hammers, and more particularly to novel features in the construction and combination of the parts in the different organizations for performing various functions of the machine.

While the improvements are adapted for use in other relations, they are in this case shown as used in connection with a radial power hammer, one form of which is disclosed in an application for Letters Patent filed June 23, 1908, Serial No. 440,003.

The objects and the advantages of the invention will be apparent to those skilled in the art from a consideration of the following description of the preferred forms of construction embodying the invention, taken in connection with the accompanying drawings, in which—

Figure 1 is a perspective of the complete machine; Fig. 2 is a side view of the machine with certain parts broken off; Fig. 3 is a partial central section, showing the means for reciprocating the hammer head, and for elevating and lowering the same; Fig. 4 is a bottom view of the vertically sliding frame; Figs. 5, 6, 7 and 8 are details of the raising and lowering mechanism; Fig. 9 is a central section through the clutch mechanism, with parts in elevation; Fig. 10 is a section on line 10—10 of Fig. 9; Fig. 11 is an end elevation of the driven member of the clutch; Figs. 12 and 13 are elevations of the clutch disks; Fig. 14 is an elevation with parts in section, of the clutch shifter; Fig. 15 is a section through the brake; Fig. 16 is a plan view of the brake; Fig. 17 is an end elevation of the brake.

Certain general features in the construction of the radial power hammer having already been pointed out in the application above referred to, an extended description of the same is not deemed necessary in this case.

The frame of the machine comprises the base 2 supporting near its rear end hollow column 3 fitted with guideways 4 for the slide 5 carrying the swinging bracket 6 which carries the hammer mechanism 7. The driving means for the hammer mechanism comprises the horizontal shaft 8 carried by bracket 6 and geared to the vertical shaft 9, which in turn is slidably connected with the main shaft 10.

Referring particularly now to Figs. 9 to 14, on main shaft 10 may be rigidly mounted the driven member 11 of the clutch, having a hub 12 and a flange 13 at the periphery of which are a plurality of pieces 14 connecting the flange 13 with an annular conduit or trough 15, designed to catch and return the oil to the working faces of the clutch. Each face of the flange 13 is provided with a plurality of oil grooves 16, with openings near to the periphery of the flange.

The driving member of the clutch may comprise a casing 17 loosely mounted on shaft 10. The outer portion of casing 17 preferably constitutes the main driving pulley 18 of the machine, and has therein a face 19. A disk 20 of fiber or other suitable material is placed on shaft 10 next to face 19 and next to said disk is placed the driven member 11. A second disk 21 similar to disk 20 except that the hole in its center is of a size to fit over hub 12, is placed against the face of flange 13 on the side next to hub 12. Both disks 20 and 21 are provided with substantially radial passages 22.

The grooves 16 in the faces of flange 13 have their openings near the periphery of the flange and may preferably be of the form shown in Fig. 11, that is to say, the grooves lead from and return to the periphery of the flange. Therefore, when relative movement takes place between the frictional

surfaces, oil is drawn into one end of each of the grooves 16 and a portion thereof is discharged at the other end of the groove. The passages 22 aid in the uniform distribution of the oil over the surfaces. Ample lubrication is thus insured.

A plate 23 may fit closely in the open end of casing 17 and have a face 24 opposite disk 21. Contiguous to faces 19 and 24 are oil shedding grooves 24<sup>a</sup> which catch oil and return it to conduit 15. Studs 25 pass freely through plate 23 and are secured to casing 17. On studs 25 are springs 26 interposed between plate 23 and the point of attachment of the studs to casing 17. These springs serve to normally keep the frictional surfaces disengaged. Near the periphery of the plate 23 may be an annular rim 27 with which may contact the ends of levers 28 loosely mounted on studs 25. The ends of studs 25 projecting beyond levers 28 receive nuts 29 and lock nuts 30. The end of each lever 28 remote from studs 25 is jointedly connected to one end of toggle links 31, the other end of said toggle links being jointedly connected to a collar 32 slidable on shaft 10.

When collar 32 is moved toward plate 23, the plate 23 is pressed into casing 17 and the faces 19 and 24 moved toward each other, pressing the disks 20 and 21 against the faces of flange 13, thus engaging the clutch. On collar 32 is revolubly mounted a yoke 33 having trunnions 34 pivotally engaged by a shifter 35. One end of shifter 35 is held stationary by a pivot 36 affixed to bar 37, attached to the frame of the machine. The movable end of shifter 35 is attached to a rod 38 connected to pedal lever 39 mounted on pedal shaft 40, to which is attached a pedal 41.

Rod 38 is slidably mounted at its forward end in a part of the frame of the machine, and has a spring 42 which, reacting between the frame and a collar on the rod, normally presses the latter to a position to disengage the clutch.

The brake, Figs. 1, 15, 16 and 17, comprises a wheel 43 mounted on main shaft 10 and engaged by shoe levers 44 pivotally attached at one end to brake frame 45, their movable end portions passing between the sides of a guide 46 on said frame. The shoe portion of the levers may be normally held toward each other and in contact with the wheel by means of a bolt 47 passing through holes in their movable ends and having a spring 48, interposed between one of the levers and a nut on the bolt. The ends of the levers are moved against the action of spring 48 by means of toggle links 49 connected at their ends to the shoe levers 44 and to a yoke 50 loosely mounted on rod 51

and held from longitudinal movement on said rod by nut 52 and lock nut 53. Rod 51 slides in a guide 54 on frame 45 and is attached to shifter 35 by bolt 55.

From the foregoing it will be seen that when pedal 41 is depressed the brake is released and the clutch is engaged, and upon the pedal being released the clutch is disengaged and the brake actuated.

The clutch and brake mechanisms are the subject of divisional application Serial No. 527,086, filed Nov. 9, 1909, and divisional application Serial No. 546,554, filed Feb. 28, 1910.

Referring now to the means for raising and lowering the slide 5 as shown in Figs. 1 to 8, a bracket 107 may be formed at the rear of the slide and have therein a pocket 108, in which is a nut 109 (Figs. 7 and 8) having a threaded portion 110 and preferably having an upper spherically curved surface. The lower part of nut 109 may be squared to fit between bars 111 in pocket 108. Fitting the upper spherically curved surface of nut 109 is the lower surface of a washer 112, the upper side of which contacts with the top wall of pocket 108. A screw 113 passes through holes 114 in the top and bottom of pocket 108 and through nut 109. The peculiar construction and arrangement of the nut and associated parts permits the nut 109 to accommodate itself to the screw 113 and prevents binding between the screw and nut. The upper end of screw 113 is secured to bevel gear 114<sup>a</sup> beneath which is an antifriction device 115 (Figs. 5 and 6), preferably comprising ball races 116 and 117 and ball retainer 118. Ball race 117 may rest upon a bracket 119 secured to column 3. Meshing with bevel gear 114<sup>a</sup> is bevel gear 120 upon counter-shaft 121 on which is splined clutch crab 122 and loosely mounted pulleys 123 and 124. Pulley 123 is connected by an open belt with a pulley 125 upon a quill 126 formed integral with clutch casing 17, and pulley 124 is connected by a crossed belt with pulley 127 upon the quill 126. The outer end of counter-shaft 121 is carried in a bearing 128 on bracket 129 secured to column 3. Bracket 129 carries bearings 130 for shipper shaft 131 on which is mounted shipper 132, the bifurcated end of which engages the clutch crab 122. An actuating lever 133 is formed integral with or may be attached to shaft 131, and is bent forwardly to a position to be in the path of contact pieces 134 and 135 carried by slide 5 (Fig. 1). Lever 133 is provided with a handle 136 whereby it may be moved when it is desired to actuate the raising and lowering mechanism for the slide. A rib 137 is formed upon column 3 and has a depression about midway of its length into

which lever 133 springs and is retained when the mechanism is inoperative. To actuate the mechanism to raise the slide, for instance, lever 133 is pulled out of the depression and depressed by means of handle 5 136 to have shipper 132 engage clutch crab 122 with the teeth 138 on the pulley 124, whereupon the screw 113 turns to raise the slide. When the slide reaches the desired height, lever 133 is moved to its neutral position, where it is retained by the rib 137. To lower the slide 5, the actuating lever 133 is pulled out of the depression and raised to effect engagement of the clutch crab with 15 the teeth 138 on the pulley 123, whereupon the screw 113 turns to lower the slide. Screw 113 is prevented from rising by collar 139 disposed at the lower side of bracket 119. If, through inadvertence or mistake, the actuating lever 133 should not be brought to 20 its neutral position when the slide is near either the upper or lower limits of its travel, one of the pieces 134 or 135 will contact therewith and move it to its neutral position, where it will be retained by the rib 137.

While one form of apparatus in which the invention may be embodied has been illustrated and described, it is obvious that various modifications and changes may be made, 30 and the right is reserved to all such modifications and changes as do not depart from the spirit and scope of the invention.

We claim:

1. In a power hammer, in combination, a 35 slide, hammer mechanism carried thereby, raising and lowering mechanism for said slide, and automatic means including a lever and pieces on said slide adapted to contact with said lever for suspending the operation 40 of said raising and lowering mechanism at the upper and lower limits of travel of the slide.

2. In a power hammer, in combination, a slide, hammer mechanism carried thereby, 45 raising and lowering mechanism for said slide, devices including a lever for rendering operative said raising and lowering mechanism, means on said slide adapted to contact with said lever for rendering said devices inactive when the slide is near either 50 the upper or lower limits of its travel, and means for holding said devices in an inactive position.

3. In a power hammer, the combination of 55 a slide, with hammer mechanism carried thereby, raising and lowering mechanism for said slide, actuating means associated with said mechanism, including a lever, and contact pieces on said slide for moving said 60 lever to a neutral position when the slide is near either the upper or lower limits of its travel.

4. In a power hammer, the combination of

a slide, with hammer mechanism carried thereby, raising and lowering mechanism for 65 said slide, actuating means associated with said mechanism, including a lever, contact pieces on said slide for moving said lever to a neutral position, and means for retaining the lever in the neutral position when 70 the slide is near either the upper or lower limits of its travel.

5. In a power hammer, the combination with a slide provided with a pocket, of raising and lowering mechanism, including a 75 screw, and means in said pocket for making a non-binding connection of the slide with said screw.

6. In a power hammer, the combination with a slide provided with a bracket having 80 a pocket therein, of raising and lowering mechanism, including a screw passing through holes in said bracket, a nut threaded on said screw and arranged non-rotatively in said pocket, said nut having a 85 curved upper surface and a washer fitting on said surface and contacting with the top wall of said pocket, substantially as described.

7. In a power hammer, the combination 90 with a frame, of a slide on said frame, raising and lowering mechanism for said slide, said mechanism including a screw, a shaft, a bevel gear connection between said screw and shaft, oppositely driven pulleys on said 95 shaft, means for connecting either of said pulleys with said shaft at will, and means adapted to coact with said first means for automatically suspending the operation of said mechanism when the slide is near either 100 the upper or lower limits of its travel.

8. In a power hammer, the combination with a frame, of a main shaft and a counter-shaft carried thereby, a clutch casing loosely 105 mounted on the main shaft, the outer portion of the casing constituting a driving pulley, pulleys loosely mounted on said counter-shaft, said pulleys connected with said casing to be oppositely driven thereby, a slide on said frame, a screw connected with 110 said slide, a bevel gear connection between said screw and counter-shaft, means for connecting to the counter-shaft, at will, either of the pulleys thereon, and means adapted to coact with the first means for automatically 115 freeing said pulleys from connection with the counter-shaft when the slide is near the upper or lower limits of its travel on the frame.

9. In a power hammer, the combination 120 with a frame, of a counter-shaft carried thereon, oppositely driven clutch pulleys loosely mounted on said counter-shaft, a slide on said frame, a screw connected with 125 said slide, a bevel gear connection between said counter-shaft and screw, a clutch crab

adapted to connect said pulleys with said counter-shaft, shifter mechanism associated with said clutch-crab, said mechanism including a lever, a rib having a depression  
5 therein on said frame for retaining said lever in neutral position, and projections on said frame for moving said lever into said depression when the slide is near either the upper or lower limits of its travel.  
10 In testimony whereof we have signed our

names to this specification in the presence of two subscribing witnesses at Los Angeles county of Los Angeles, State of California, this 17th day of May A. D. 1909.

JAMES A. BROWN.  
FRED E. SUTHERLAND.

Witnesses:

CHARLES RIXON, Jr.,  
EDGAR RIXON.