

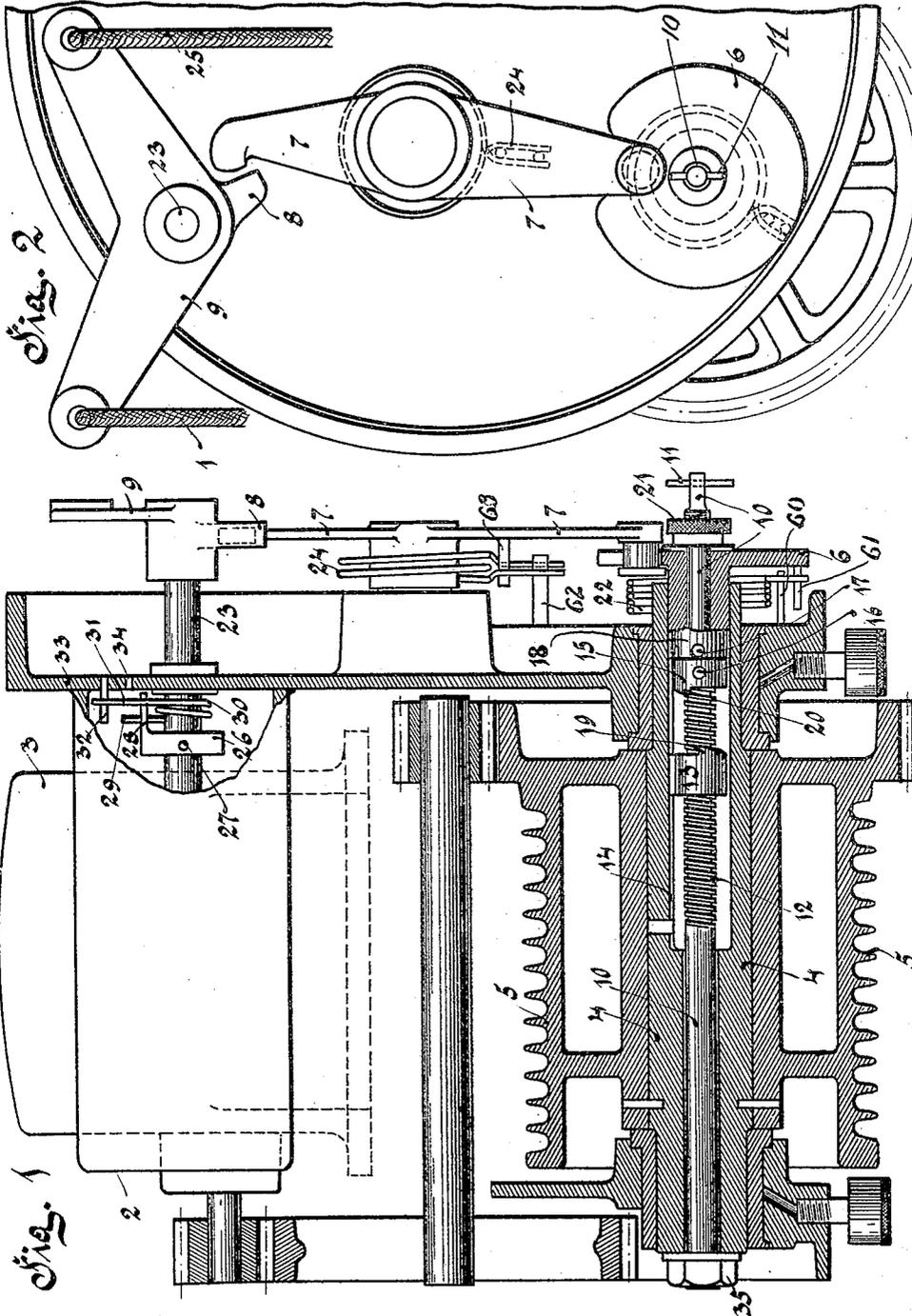
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PATENTED DEC. 26, 1905.

P. J. DARLINGTON.  
HOIST AND SIMILAR APPARATUS.

APPLICATION FILED MAY 11, 1904.

2 SHEETS—SHEET 1.



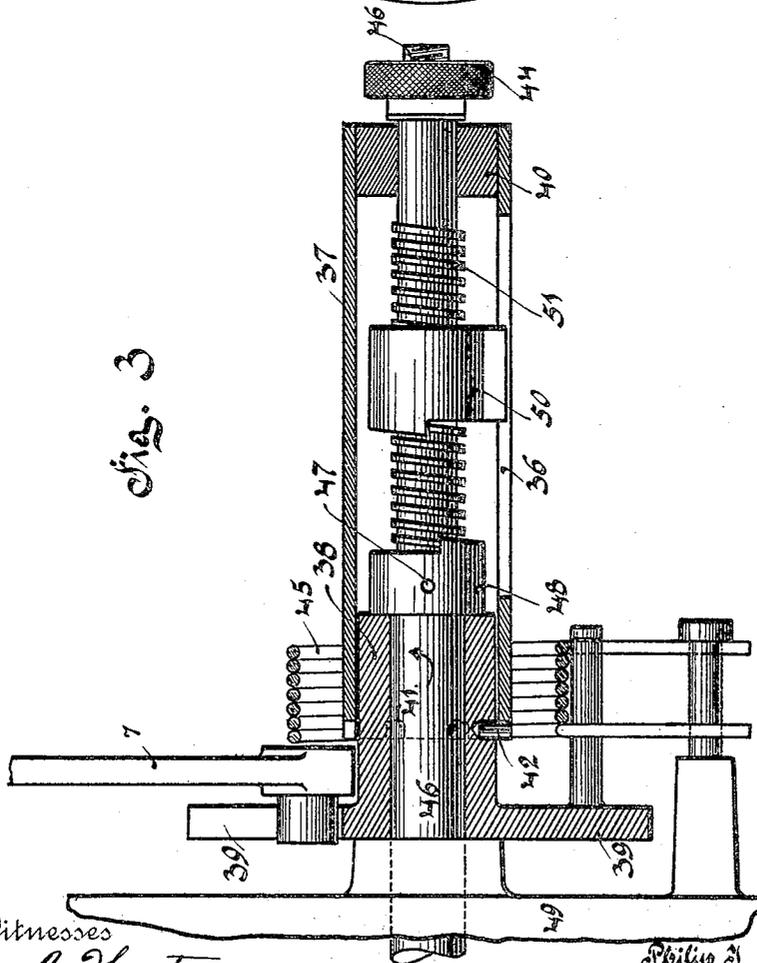
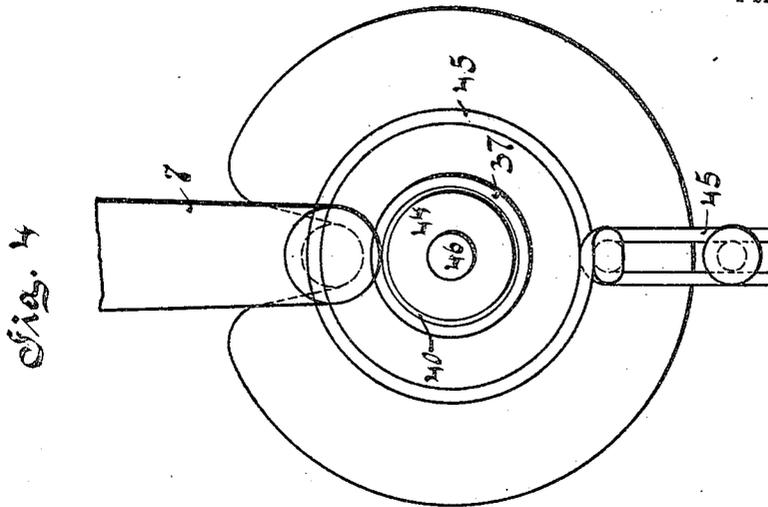
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2 SHEETS—SHEET 2.



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# UNITED STATES PATENT OFFICE.

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## HOIST AND SIMILAR APPARATUS.

No. 80 ,273.

Specification of Letters Patent.

Patented Dec. 26, 1905.

Application filed May 11, 1904. Serial No. 207,373.

*To all whom it may concern.*

Be it known that I, PHILIP J. DARLINGTON, a citizen of the United States, residing at Glenridge, county of Essex, State of New Jersey, have invented certain new and useful Improvements in Hoists and Similar Apparatus, the principles of which are set forth in the following specification and accompanying drawings, which disclose the form of the invention which I now consider to be the best of the various forms in which said principles may be embodied.

This invention relates to improvements in power-hoists and similar apparatus; and it consists of means whereby the operation of such apparatus is made automatic to a degree, being thus much more convenient and not requiring the workman to give his entire attention to such operation, but permitting him to properly attend to the correct positioning of the thing or piece of work hoisted.

Among other objects the invention is intended to serve the following uses. Its construction is such that by means of a very easily made adjustment the operation of the hoist may be made to stop at any desired elevation or declension. This is especially advantageous when the hoist is used to repeat the same operation a great many times—such, for example, as successively lifting large numbers of like articles requiring the same treatment up to the bed of any given machine, such as a boring or planing machine. All that the workman has to do is to secure to the hoist-hook the work or the thing to be hoisted and then turn on the power. Knowing that the work will stop at the right height he need pay no further attention to the hoist and can let go of the power-applying device, and he therefore has both hands free to steady the work and to guide it to a place which is slightly above the proper position on the machine where it is to be treated. The workman saves much time by being able to take hold of the work as soon as he has applied the power. The adjustment of the devices can be so close that the work may be made to stop but a very little distance (as little as one inch or less) above its final position on the machine. This saves more time, because the hoist need not be operated to raise or lower the work the slightest degree

more than is necessary. Furthermore, there is no danger of bruising the work when it is lowered to the machine, and this is because it has been raised but a very short distance above the elevation of its final position on the machine. As soon as the workman has positioned as he desires the work suspended from the hoist he has simply to steady it with one hand, while with the other hand he applies the power for lowering. As soon as he releases the power-lowering device the hoist automatically stops, and he can use both hands to disconnect the work from the hoist-hook. When the machine-work is finished and the work is again attached to the hoist-hook, the application of the power by one hand of the workman causes the work to rise quickly through the short distance to the same height as before, and then it stops automatically. The workman can then use both hands to move the suspended work from the machine and then can apply the power to lower the work, as before, and guide it with one hand to any suitable place upon the floor, it being unnecessary to place it in any particular location, as when the work was raised to the machine.

Of the drawings, Figure 1 is a side elevation, partly in section, of a hoisting apparatus which may be fixed, suspended, or adapted to travel as desired. Fig. 2 is an elevation of the same. Fig. 3 is a side elevation, partly in section, of a modification of the novel features of the apparatus, Figs. 1 and 2; and Fig. 4 is an end elevation of the modification of Fig. 3.

The general operation of the apparatus of Figs. 1 and 2 is as follows, it being assumed that it is desired to lift a piece of work from the floor up to the bed of a machine: The rope 1, Fig. 2, is pulled down to rotate the controller 2, Fig. 1, to close the circuit of the electric motor 3 and cause the motor, acting through the gears, to rotate the hollow shaft 4 of the hoist-drum 5. The workman can immediately let go of the rope 1, because under the described conditions the controller 2 will not return to its off position, owing to a reason to be described hereinafter. The automatic stopping mechanism, also to be described hereinafter and which is connected with the drum-shaft 4, has been previously

adjusted, so that the hoist will stop when the work has reached the desired elevation. The effect of this automatic mechanism when the work has been hoisted the predetermined distance is to rotate the cam 6, Fig. 2 and at the right-hand part of Fig. 1, which cam 6 is provided with a return-spring 22, constructed and arranged to tend to restore the cam 6 to its normal position from either direction. The rotation of the cam 6 oscillates the lever 7, Fig. 2, which is provided with a return-spring 24, constructed and arranged similarly to the return-spring 22 of the cam 6, so that the upper end of the lever 7 abuts against the stop 8 on the controller-lever 9 and rotates said lever back to its off position, from which it was moved by pulling down upon the rope 1. The work is now in a position elevated very slightly above its final position on the machine, being guided to this elevated position by both hands of the workman, who paid no further attention to the hoist after he had pulled and then let go of the rope 1. The workman now pulls the rope 25 to operate the electric motor 3 in the reverse direction in order to lower the work onto the machine. He continues to pull on the rope 25 until the hoist is lowered sufficiently to remove the work from the hook. As soon as he lets go of the rope 25 certain automatic mechanism (to be described hereinafter) on the shaft of the controller 2 returns the controller to its off position and stops the operation of the hoist. The operation of removing the work from the machine will be readily understood, and therefore is not specifically described.

The construction of the mechanism for automatically stopping the raising of the work is as follows: Inside the hollow drum-shaft 4 is a normally non-rotating rod 10, extending throughout the entire length of the apparatus and having a handle 11 fixed to its reduced right-hand end. A nut 35 is provided for the left-hand end of the rod 10. The rod 10 is threaded at its part 12, and engaging this thread is a traveling nut 13, the upper end of which nut engages a keyway 14 in the drum-shaft 4. To the right of the traveling nut 13 is a collar 15, which is fixed to the rod 10 by a pin 16. A second pin 17 extends into the rod 10 and engages one of an annular series of grooves or slots in the projection 18 of the cam 6.

The operation of the above-described mechanism is as follows: As soon as the motor 3 commences to rotate the drum-shaft 4 to operate the hoist to raise the work the nut 13 begins to travel toward the collar 15. At the time when the work has reached the desired elevation the tooth 19 of the nut 13 engages the tooth 20 of the collar 15. This causes the rod 10 and the cam 6 to rotate, thus oscillating the lever 7, which lever turns the con-

troller-lever 9 back to its off position and stops the motor 3 and drum-shaft 4. The rod 10 is held in its normal position by means of the coiled spring 22, the two ends of which engage the pins 60 and 61, and the lever 7 is normally maintained in the position shown in the drawings by the coiled spring 24, the two ends of which engage the pins 62 and 63.

The above-described mechanism can be most easily and quickly adjusted for any desired extent of raising and in the following manner: The jam-nut 21 is first unscrewed, and then the rod 10 is pushed to the left to push the pin 17 out of the groove in the end of the cam projection 18 in order that the rod 10 can be freely rotated by means of the handle 11. The rod 10 is then rotated in either direction, which depends upon whether the wish is to increase or decrease the extent of hoisting. The rotation of the rod 10 moves the nut 13 farther away from or nearer the collar 15. When the proper distance between the nut 13 and collar 15 is determined, which may be estimated or may be by a trial operation of the hoist, the rod 10 is pulled to the right and turned slightly, so that the pin 17 may engage the nearest groove of the annular series of grooves in the left-hand end of the cam projection 18. The jam-nut 21 is then tightened up, thus holding the rod 10 in its normal state of non-rotation. The hoist is now ready for its operation with the many duplicate pieces which it is to successively handle.

The above-detailed description has related only to the means for stopping the raising operation of the hoist. Now will be described the construction and operation of the automatic mechanism for stopping the lowering operation, which mechanism is employed in connection with the other automatic mechanism above described. This lowering stopping mechanism is shown in Fig. 1 near the right-hand end of the controller-shaft 23. A collar 26 is suitably fixed to the shaft 23, as by the pin 27. This collar has a projection 28, which engages the shorter end 29 of a helical spring 30 around the shaft 23. A longer end 31 of the spring 30 engages an adjustable pin 32, inserted in a hole in a suitable support, which in the example shown is a part 33 of the frame of the hoist. This pin 32 is adapted to be adjusted by being inserted in the lower hole 34 of the same part 33 in order that it may engage the short end 29 of the spring 30, as well as the long end 31 thereof, for a purpose to be described. With the arrangement shown the spring 30 will not be put under tension when the rope 1 is pulled to operate the hoist to raise the work, and hence the workman may let go of the rope 1, and yet the lever 9 will stay in position, so that the motor will not be stopped until the traveling nut 13 has reached the collar 15;

but after the lever 9 has been automatically returned to its off position the pulling down of the rope 25 will put the spring 30 under tension, so that as soon as the workman lets go of the rope 25 the spring 30 will return the controller-shaft to its off position. Hence there is no need of pulling the rope 1 to just the right extent to move the shaft 9 to its off position. The arrangement of the spring 30 is such, however, that when it is desired to have the lever 9 and shaft 23 automatically restored to their off positions as soon as either rope 1 or rope 25 is released—as, for example, when the hoist is to be used for miscellaneous service—such end can be readily accomplished as follows: In this case the jam-nut 21 is loosened and the rod 10 is pushed to the left to free the pin 17 from the engagement with the groove in the end of the cam projection 18. The pin 32 is then removed from the upper hole and inserted in the lower hole 34, the pin being placed in front of the short end 29 of the spring 30. Thus when the lever 9 is oscillated anticlockwise the spring 30 will be put under tension and will restore the shaft 23 to its off position as soon as the rope 1 is released, and the spring 30 will act, as before, to restore the shaft 23 to its off position as soon as the rope 25 is released.

A modification of the raising stopping means is shown in Figs. 3 and 4. The drum-shaft instead of being hollow, as shown in Fig. 1, is solid and extends beyond the hoist-drum 49, Fig. 3, at 46 and to the extreme right-hand end of Fig. 3. A pin 47 secures a collar 48 to the shaft extension 46. A nut 50 is adapted to travel on the threaded part 51 of the shaft 46. The lower end of the nut 50 engages a keyway 36 in a tube 37, which tube is mounted on the projection 38 of the cam 39. The cam projection 38 is loosely mounted on the shaft extension 46. A collar 40 loosely surrounds the right-hand end of the shaft extension 46 and is tightly fitted in the end of the tube 37, so as to be substantially integral therewith. The tube 37 is provided at its left-hand end with an annular series of grooves 41, adapted to receive a pin 42, located in the cam projection 38. When the shaft 46 is turned by the motor in the direction indicated by the arrow, the nut 50 travels toward the collar 48, and finally the teeth of the nut 50 and collar 48 engage, so as to rotate the cam 39, and thereby oscillate the lever 7, which rotates the shaft of the motor-controller, Figs. 1 and 2, to turn the controller to its off position. Adjustment of this modified apparatus is readily made by loosening the jam-nut 44, pulling the tube 37 to the right to free it from the pin 42, and then rotating the tube 37 to cause the nut 50 to travel to the desired position with respect to the collar 48. The tube 37 is then pushed

back to the left to cause the nearest of the grooves 41 to engage the pin 42 and the jam-nut 44 is tightened. The return-spring 45 serves to restore the cam 39 to its normal position.

I am aware that it has been proposed to provide hoists with automatically-operating means for preventing the block and tackle from being drawn up around the drum in case the power is not cut off by the workman; but I believe that I am the first to produce the invention set forth in the appended claims.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a hoist, a normally stationary screw-threaded rod, a traveling nut, on said rod driven by said hoist, a member secured to said rod and adapted to be engaged by said nut, a controller for said hoist, and operative connections between said rod and said controller.

2. In a hoist, a normally stationary screw-threaded rod, a traveling nut on said rod driven by said hoist, a member secured to said rod and adapted to be engaged by said nut, a controller for said hoist, operative connections between said rod and said controller, and means for disconnecting said rod from said controller and for rotating said rod to adjust the position of said nut.

3. In a hoist, a normally stationary screw-threaded rod, a traveling nut on said rod driven by said hoist, a member secured to said rod and adapted to be engaged by said nut, a controller for said hoist, operative connections between said rod and said controller, and means for adjusting the position of said nut on said rod.

4. In a hoist, a screw-threaded rod, a spring holding said rod yieldingly in a fixed position, a traveling nut on said rod driven by said hoist, a member secured to said rod and adapted to be engaged by said nut, a controller for said hoist, and operative connections between said rod and said controller.

5. In an apparatus of substantially the character described, the combination with a hollow shaft having a key-seat, of means for moving the shaft, a threaded rod inside the shaft, a traveling nut on the threaded rod and engaging the key-seat in the shaft, and mechanism controlled by the movement of the nut, and constructed and arranged to stop the operation of the shaft-moving means.

6. In an apparatus of substantially the character described, the combination with a hollow key-seated member, of a traveling nut on the threaded member and engaging the key-seat of the hollow member, and a device connected to one of said members, and constructed and arranged to be operated by the nut, said device being removably con-

nected to such member, in order to permit relative movement of said members for the purpose of adjusting the position of the nut with respect to said device.

5 7. In an apparatus of substantially the character described, the combination with a shaft, of a return-spring therefor having a long and a short end, a device arranged to move with the shaft to engage both ends of the spring, a device not moving with the shaft, for engaging the long end of the spring, and means for permitting the last-named device to engage both ends of the spring.

15 8. In an apparatus of substantially the character described, the combination with a member to be returned, of a spring constructed and arranged to return said member, a device carried by said member and arranged to engage the spring, a stationary device arranged to also engage the spring, and means for adjusting one of said devices to cooperate with the spring in either one or both directions of movement of said member, as desired.

25 9. In an apparatus of substantially the character described, the combination with a motor, of a controller therefor, a driven shaft and a cooperating member, one being threaded and the other being hollow and provided with a key-seat, the threaded member being located in the hollow member, a traveling nut on the threaded member and engaging the key-seat of the hollow member, a cam having a connection with one of said members so as to be operated by the nut, which connection is separable, and operating mechanism between the cam and the motor-controller.

40 10. In an apparatus of substantially the character described, the combination with a hollow key-seated member, of a threaded member therein, a traveling nut on the threaded member and engaging the key-seat of the hollow member, and a device having a pin-and-groove connection with one of said members, said device being constructed and arranged to be operated by said nut.

50 11. In an apparatus of substantially the character described, the combination with a hollow key-seated member, a threaded member therein, a traveling nut on the threaded member and engaging the key-seat of the hollow member, a device separably connected with one of said members and constructed and arranged to be operated by said nut, and means for firmly securing said device in such separable connection.

60 12. In an apparatus of substantially the character described, the combination with a hollow key-seated member, of a threaded member therein, a traveling nut on the threaded member and engaging the key-seat of the hollow member, a device fixed to the threaded member to rotate therewith, and

constructed and arranged to cooperate with the traveling nut, and an operating member having a separable connection with one of said members to permit adjustment of the nut.

70 13. In an apparatus of substantially the character described, the combination with a hollow shaft provided with a key-seat, of a threaded rod in said shaft, a traveling nut on the rod, and engaging the key-seat of the shaft, a member secured to the rod and constructed to be engaged by the nut to rotate the rod, and a device separably connected to rotate with the rod.

80 14. In an apparatus of substantially the character described, the combination with a hollow shaft provided with a key-seat, of a threaded rod in the shaft, a traveling nut on the rod and engaging the key-seat of the shaft, a member secured to the rod, and constructed to be engaged by the nut to rotate the rod, a device separably connected to rotate with the rod, and a nut on a threaded part of the rod to hold said device in its connected position and to permit its disconnection from the rod.

90 15. In an apparatus of substantially the character described, the combination with a hollow shaft provided with a key-seat, of a threaded rod in the shaft, a traveling nut on the rod and engaging the key-seat of the shaft, a member secured to the rod and constructed to be engaged by the nut to rotate the rod, a pin or its equivalent in the rod, and a device provided with an annular series of grooves adapted to receive said pin.

100 16. In an apparatus of substantially the character described, the combination with a hollow shaft provided with a key-seat, of a threaded rod in the shaft, a traveling nut on the rod and engaging the key-seat in the shaft, a member secured to the rod and constructed to be engaged by the nut to rotate the rod, a device separably connected to rotate with the rod, and a nut on a threaded part of the rod, to hold said device in its position of connection with the rod.

110 17. In an apparatus of substantially the character described, the combination with a hollow shaft provided with a key-seat, of a threaded rod in the shaft, a traveling nut on the rod and engaging the key-seat in the shaft, a member secured to the rod and constructed to be engaged by the nut to rotate the rod, a device separably connected to rotate with the rod, a cam constructed to turn with said device, and a nut on a threaded part of the rod, to hold said device in its position of connection with the rod.

115 18. In an apparatus of substantially the character described, the combination with a hollow shaft provided with a key-seat, of a threaded rod in the shaft, a traveling nut on the rod and engaging the key-seat in the

shaft, a member fixed on the rod and constructed to be engaged by the nut to rotate the rod, a pin or its equivalent in the rod, a cam having a projection surrounding the rod, 5 which projection has an annular series of grooves to receive said pin, and a nut on the rod arranged to hold the cam in place.

In witness whereof I have hereunto set my hand this 10th day of May, 1904.

PHILIP J. DARLINGTON.

Witnesses:

BENJAMIN B. HULL,  
HELEN ORFORD.