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UNITED STATES PATENT OFFICE.

EDWARD MELCHIOR, OF CHICAGO, ILLINOIS.

HYDRAULIC CHAIR.

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To all whom it may concern:

Be it known that I, EDWARD MELCHIOR, a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Hydraulic Chairs, of which the following is a full, clear, and exact description.

The invention relates to hydraulic chairs and more particularly to that type in which the pumping mechanism for raising and lowering the chair and the reclining mechanism are controlled or operated by a single lever. In this class of chairs, provision is usually made for revolving the seat in the base, by revolvably mounting a hollow plunger in the fluid cylinder, and it is desired at times, to secure the seat against rotation, wherefore locking-mechanism is provided for securing the plunger in the cylinder, this locking-mechanism being operated by the pump-piston.

The present invention designs to provide improved locking-mechanism for securing the plunger in the cylinder, and which is operated by the pump-piston, but which permits the latter to be shifted in the plunger when the latter is secured against movement by the locking-means.

The present invention also designs to provide an improved hydraulic chair in which the pumping and reclining mechanisms and the plunger-lock are all operated by a common lever, and in which, a non-yielding or permanent connection is employed between the lever and the pump-piston, and in which, provision is made for permitting the piston and lever to be shifted to operate the clamp for the reclining mechanism, while the chair is secured against rotation.

The invention consists in the several novel features hereinafter set forth and more particularly defined by claims at the conclusion hereof.

In the drawings: Figure 1 is a central section of the operating mechanism of a chair embodying the invention. Fig. 2 is a horizontal section on line 2—2 of Fig. 1. Fig. 4 is a section on line 4—4 of Fig. 1. Fig. 3 is a plan view thereof and Fig. 5 is a section on line 5—5 of Fig. 3.

A cylinder A is rigidly secured to the base or legs of the chair (not shown) and fixed therein. A seat-bottom is fixed to rest upon a flange b' at the upper end of a hollow plunger B which fits in and is adapt-

ed to travel vertically, and rotate in, a cylinder A, so that the chair-seat may be raised or lowered to the desired elevation and rotated. The cylinder and hollow plunger are adapted to contain a suitable liquid, such as oil, which is adapted to be pumped into the cylinder-chamber beneath the hollow plunger to elevate the chair supported thereby.

A piston C is adapted to travel in the hollow plunger B, to force liquid beneath the plunger-head b^3 , and is provided with a port b^4 , which is normally closed by a spring-pressed check-valve b^5 guided in the opening and which permits the liquid to be forced into the chamber below the plunger-head. Piston C is hollow and its head c is provided with a port c' which is normally closed by a check-valve c^2 . This valve opens automatically during the upstroke of the piston to permit the liquid to pass into the chamber in the hollow plunger B and beneath the piston-head c and closes automatically during the down stroke of the piston to force the liquid through the bottom of the plunger-head. The piston is operatively connected to a lever F' by means of a pitman g which has its lower end pivoted to the piston, and its upper end pivoted to a crank f which is secured to a shaft F of the lever F' , the shaft being journaled in a housing formed on the upper end of the plunger B. Ports c^7 are formed in the piston to communicate with by-pass channels b^{11} formed in the wall of the hollow plunger to permit the piston to move freely without pumping the liquid during a part of its stroke, so that the piston will be free to be operated without raising or lowering the chair, while the lever for operating the piston is being moved to operate the reclining mechanism and while the plunger is locked against rotation. Resultantly, the piston will be free, during the upper part of its stroke, to move vertically in the plunger, the liquid being by-passed through ports c^7 during the initial downward movement until the piston-head c closes the by-pass channels b^{11} , so that further downward movement of the piston will cause the liquid confined in the closed chamber between the piston-head and plunger-head to be forced through the port b^4 in the plunger-head and elevate the chair carried by the plunger. Immediately above the plunger-head, the bore with the plunger is enlarged, as at b^{13} , so that when

the piston is lowered below its normal working stroke, the head of check-valve c^2 in the piston will engage the stem of the check-valve b^5 in the plunger-head and open it to permit the liquid to pass through port b^4 and port c^7 in the piston to the chamber in and above the piston and such passage of the liquid will cause the chair to be lowered.

H denotes a reclining-bar which is suitably connected to the chair-back and foot-rest (not shown) in manner well understood in the art, and by locking or securing this bar against longitudinal movement, these parts will be secured in the desired position. The reclining-mechanism is also controlled by the lever F' which operates the pump. The reclining-bar is slidably mounted in the upper portion of the plunger B, and extends through a clamp I which comprises a pair of members or jaws i, i' , each of which is pivoted at its lower end on a rod i^2 , to swing laterally and these members are normally pressed together by springs i^3 on bolts i^4 which are secured to one of the clamp-jaws and extend through the other, so that the pressure of the springs will be applied to cause the clamp-members to frictionally hold the reclining-bar. Each clamp-member is recessed, or cam-shaped, as at i^5 to receive said bar. Each jaw is provided with an abutment i^6 projecting upwardly from the body thereof and the upper portions of these abutments are tapered, so that they may be spread apart by an arm f^4 which is secured on shaft F and is disposed to move transversely to the direction of movement of the jaws. Resultantly, when the lever F' is swung laterally in one direction (left) from its normal position, arm f^4 will pass between the tapered jaws of the clamp and force them apart against the force of springs i^3 to release the reclining-bar. This release of the reclining-mechanism is effected during that part of the piston-stroke when the piston is free to move vertically and is inoperative to pump liquid.

When the operating handle is in normal position and during the operation of the reclining-mechanism, it is desirable that the chair should be secured against rotation. For this purpose, dogs E are mounted in the wall of the plunger B so that their outer faces may be jammed against the wall of the cylinder to prevent rotation of the plunger and seat carried thereby. The piston carries a slightly yielding cam-strip e for each dog. Each strip is provided with a straight upper portion e^1 , a straight lower portion e^2 and an inclined or cam-shaped intermediate portion e^3 . The dogs in the plunger and the cam-strips in the piston are relatively disposed, so that the dogs will be engaged by the straight portion immediately below the cam-portions when the hand-lever and connected parts are in normal position, and

resultantly, just before the lever passes into such position during the up-stroke and free movement of the piston, the cam-portions will force the dogs into engagement with the cylinder during the down-stroke of the piston. The cam-surfaces on the strips will release the dogs, so that the plunger will be free to move vertically in the cylinder during the pumping operation. The straight lower portion of each cam-strip is extended to permit the piston to travel upwardly above its normal position or the point where the plunger is locked, so that the pump-operating lever and piston will be free to move, to permit the reclining-mechanism to be released, while the plunger remains locked against rotation during the operation of the reclining mechanism. In practice, it occurs that the contact surface of the dogs become worn and to render this locking-means effective despite a slight wear and further, for the purpose of insuring a sufficient pressure on the dogs to hold the plunger during the operation of the reclining-mechanism by the hand-lever, the cam-strips are formed of slightly yielding material, so that the dogs will be pressed against the cylinder with sufficient force to hold the plunger against rotation. These yielding cam-strips provide means for operating the dogs, which permit the piston to be moved in the plunger when the dogs are in position or operated to secure the plunger in the cylinder. These cam-strips are firmly secured to the piston at their lower ends by screw c^5 and adjustably held at their upper ends by adjustable screws c^6 , whereby the strips may be set to insure the timely operation of the dogs, while avoiding excessive friction between the dogs and the strips on the piston. Resultantly, this improved locking-means provides a device which make possible the employment of a permanent or non-yielding connection between the operating-handle and the piston and permits the same handle to be used for controlling the reclining-mechanism.

The operation of the mechanism will be as follows: When the parts are in the position illustrated in Fig. 1 and the cylinder and plunger are charged with liquid, the plunger B and the seat carried thereby will be secured against vertical movement by the liquid confined in the cylinder and below the plunger-head c^3 ; and the plunger and seat carried thereby will also be secured by the dogs E and cam-strips e ; the spring pressed jaws for the reclining-bar will be operative to hold the bar against longitudinal movement, so that the back and foot rest of the chair will be locked. If it is desired to raise the chair, the lever F' will be operated to the right and initially such shift of the lever will lower the piston and cam-strips e to release the dogs E, and dur-

ing that portion of the piston-stroke, the piston will be operated without pumping by reason of the by-pass channels c^8 and ports c^7 . Further downward movement to the right of hand-lever F' will bring the plunger-head below the by-pass channels c^8 and cause the piston to force the liquid through ports b^4 into the cylinder-chamber beneath the plunger-head and correspondingly lift the chair. This operation of the lever may be repeated until the chair has been raised to the desired elevation, the lever being oscillated between the two positions indicated by dotted lines x and y . If it is desired to lower the chair, the lever will be depressed somewhat lower than the position indicated at y to cause the check-valve in the piston to engage the check-valve in the plunger-head and at such time the liquid will pass out of the cylinder-chamber and permit the plunger to pass downwardly in the cylinder. After a raising or lowering operation, the lever is usually restored to normal position indicated by full lines in Fig. 1 to lock the plunger in the cylinder. When it is desired to adjust the reclining-mechanism, the handle will be swung to the left as indicated by dotted lines at z , which will cause the arm f^4 to pass between the jaws of the clamp i and spread them to release the reclining bar H . When the lever is restored to its normal position, the clamp will again become operative to insure the operating mechanism in assigned position. When the lever is in normal position, the dogs E will be firmly forced and held against the cylinder by the lower portions e^2 of the cam-strips as shown in Fig. 1. If the lever is operated to the right to raise or lower the chair, the initial downward movement of the piston will bring the upper portions e' into position to release the dogs. When the lever is shifted to the left to operate the reclining-mechanism, the straight lower portions of the cam-strips which engage and press the dogs outwardly, will permit the piston to be shifted by the lever without releasing the plunger. The invention thus provides an improved piston-operated securing-means for the plunger, which makes it possible to employ a non-yielding connection between the piston and the pumping-lever and to utilize the latter for controlling the clamp for the reclining-mechanism.

The invention is not to be understood as restricted to the details shown and described, since these may be modified within the scope of the appended claims without departing from the spirit and scope of the invention.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a hydraulic chair, the combination of a cylinder, a plunger movable therein, a

pump-station operating in the plunger, a lever connected to said piston, dogs in the plunger for securing the plunger in the cylinder, and means on the piston for operating the dogs, said means being formed to permit the piston to be moved in the plunger when the dogs are in position to secure the plunger.

2. In a hydraulic chair, the combination of a cylinder, a plunger movable therein, a pump-piston operating in the plunger, a lever connected to said piston, dogs in the plunger for securing the plunger in the cylinder, and yielding-means on the piston, for operating the dogs, and whereby the piston may be operated in the plunger when the latter is held by the dogs.

3. In a hydraulic chair, the combination of a cylinder, a plunger movable therein, a pump-piston operating in the plunger, a lever connected to said piston, dogs in the plunger for securing the plunger in the cylinder, and cams on the piston for operating the dogs to engage the cylinder and secure the plunger, and means below the cam, formed to permit the piston to move in the plunger when the latter is secured in the cylinder by the dogs.

4. In a hydraulic chair, the combination of a cylinder, a plunger movable therein, a pump-piston operating in the plunger, a lever connected to said piston, dogs in the plunger for securing the plunger in the cylinder, and yielding strips on the piston for shifting said dogs, formed to permit the piston to move in the plunger when the latter is secured in the cylinder by the dogs.

5. In a hydraulic chair, the combination of a cylinder, a plunger movable therein, a pump-piston operating in the plunger, a lever connected to said piston, dogs in the plunger for securing the plunger in the cylinder, and yielding strips on the piston having cam-portions for shifting the dogs to secure the plunger in the cylinder, and surfaces which permit the piston to move in the plunger when the latter is held by the dogs.

6. In a hydraulic chair, the combination of a cylinder, a plunger in the cylinder, a pump-piston in the plunger, a lever, a crank and a rigid pitman connecting the lever and the piston, dogs in the plunger and yielding-means on the piston for operating the dogs, and whereby the piston will be permitted to move in the plunger when the latter is secured by the dogs.

7. In a hydraulic chair, the combination of a cylinder, a plunger movable therein, a pump-piston, a lever connected to operate said piston, reclining-mechanism controlled by said lever, means for securing the plunger against movement in the cylinder, and means operated by the piston, for operating said securing-means, said means being formed to permit the piston to be shifted

in the plunger when the latter is secured against movement in the cylinder by said securing-means.

8. In a hydraulic chair, the combination
5 of a cylinder, a plunger movable therein, a pump-piston operating in the plunger, a lever connected to said piston, reclining-mechanism controlled by said lever, dogs in the plunger for securing the plunger in the
10 cylinder, and yielding-means on the piston, for operating the dogs, and whereby the piston may be operated in the plunger when the latter is held by the dogs.

9. In a hydraulic chair, the combination
15 of a cylinder, a plunger movable therein, a pump-piston operating in the plunger, a lever connected to said piston, reclining-mechanism controlled by said lever, dogs in the plunger for securing the plunger in the
20 cylinder, and cams on the piston for operating the dogs to engage the cylinder and secure the plunger, and means below the cam, formed to permit the piston to move in the
25 plunger when the latter is secured in the cylinder by the dogs.

10. In a hydraulic chair, the combination
of a cylinder, a plunger movable therein, a pump-piston operating in the plunger, a lever connected to said piston, reclining-
30 mechanism controlled by said lever, dogs in the plunger for securing the plunger in the

cylinder, and yielding strips on the piston for shifting said dogs, formed to permit the piston to move in the plunger when the latter is secured in the cylinder by the dogs. 35

11. In a hydraulic chair, the combination
of a cylinder, a plunger movable therein, a pump-piston operating in the plunger, a lever connected to said piston, reclining-
40 mechanism controlled by said lever, dogs in the plunger for securing the plunger in the cylinder, and yielding strips on the piston having cam-portions for shifting the dogs to secure the plunger in the cylinder and
45 surfaces which permit the piston to move in the plunger when the latter is held by the dogs.

12. In a hydraulic chair, the combination
of a cylinder, a plunger in the cylinder, a pump-piston in the plunger, a lever, a
50 crank and a rigid pitman connecting the lever and the piston, reclining-mechanism controlled by said lever, dogs in the plunger, and yielding-means on the piston for
55 operating the dogs, and whereby the piston will be permitted to move in the plunger when the latter is secured by the dogs.

EDWARD MELCHIOR.

Witnesses:

FRED. GARLAND,
HILDUR C. PETERSEN.