April 19, 1932. M. PAVLOV 1,855,114

APPARATUS FOR HYDRAULIC MASSAGE

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Fig.1

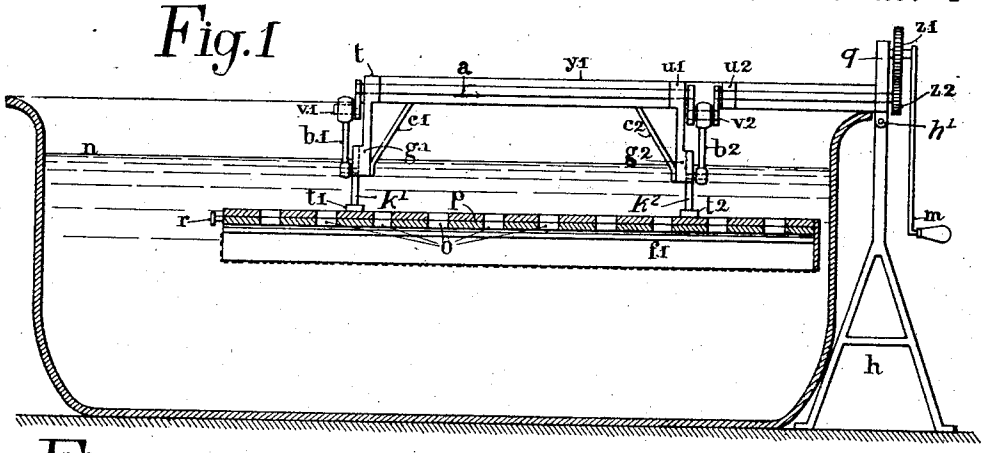


Fig.3

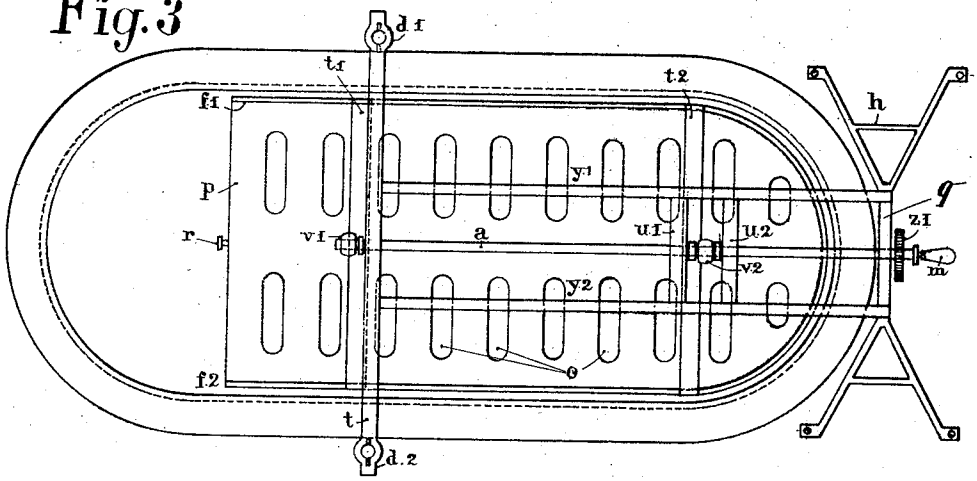


Fig.5

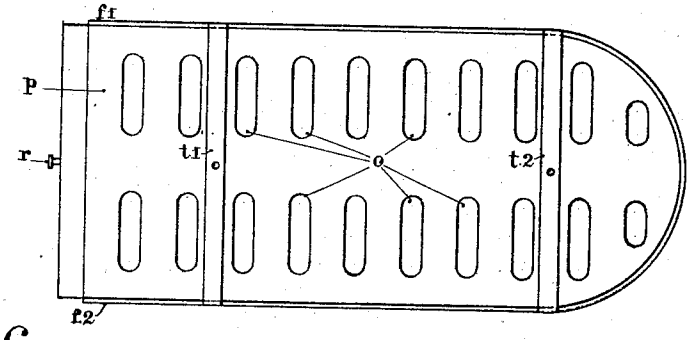
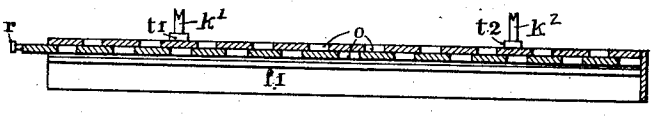


Fig.6



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APPARATUS FOR HYDRAULIC MASSAGE

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Fig. 2

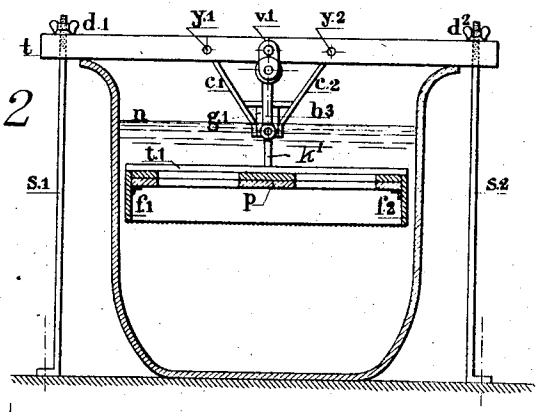


Fig. 4

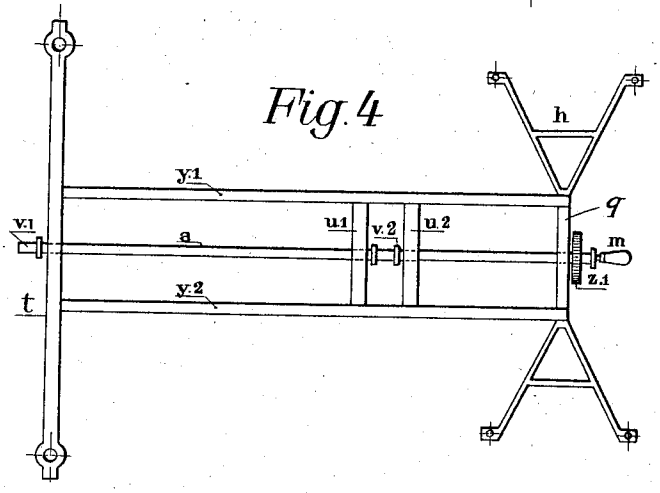


Fig. 8

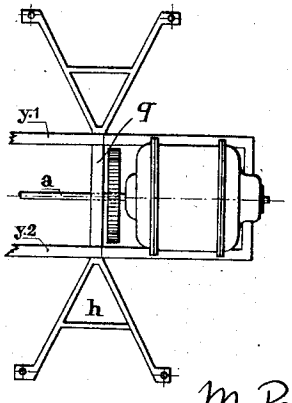
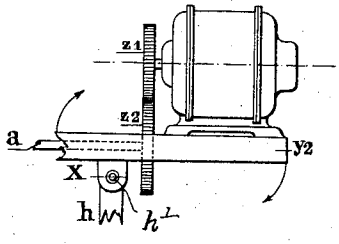


Fig. 7



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APPARATUS FOR HYDRAULIC MASSAGE

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Fig. 9

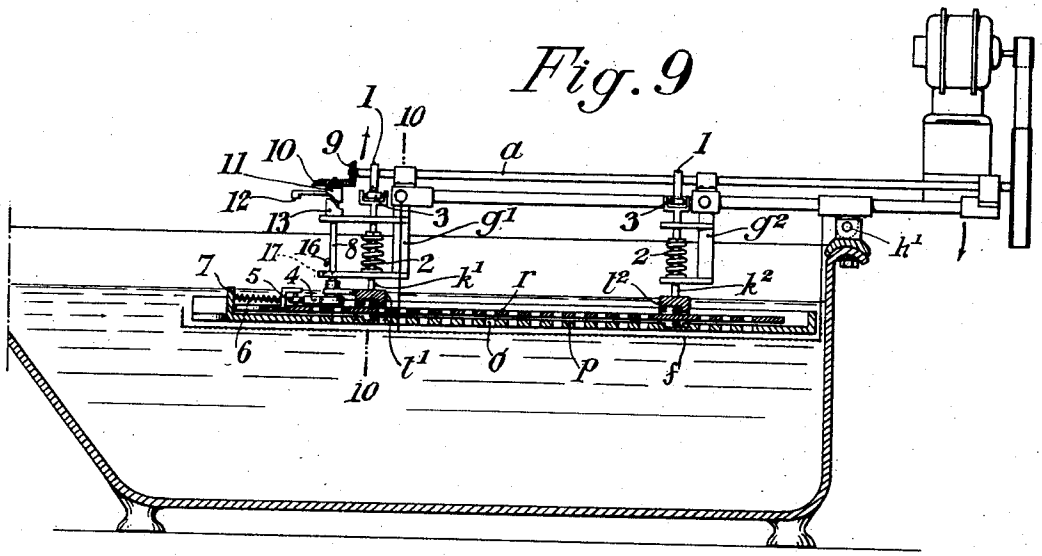


Fig. 10

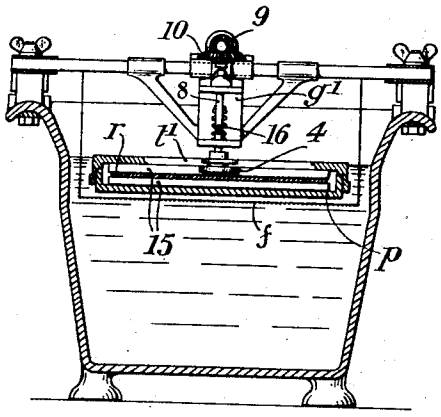


Fig. 11

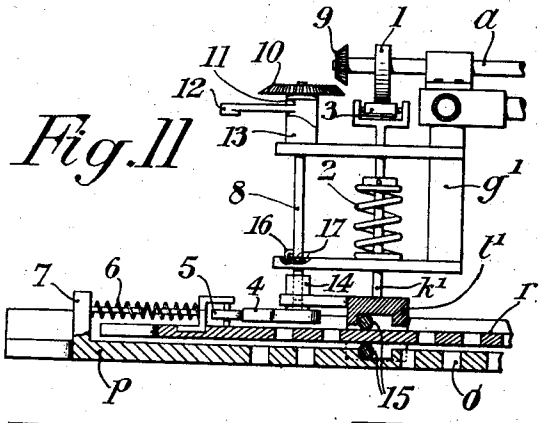
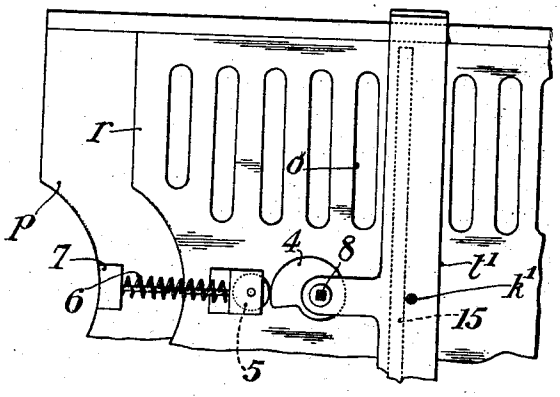


Fig. 12



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Patented Apr. 19, 1932 1,855,114

UNITED STATES PATENT OFFICE

MICHEL PAVLOV, OF PARIS, FRANCE

APPARATUS FOR HYDRAULIC MASSAGE

Application filed January 23, 1930, Serial No. 422,912, and in France February 12, 1929.

The present invention has for object a process and an apparatus for massage, which comprises a tank adapted to contain a liquid and to receive in the midst of this liquid, the patient or the parts of the patient's body to be massaged. This process consists in that the pressure of this liquid is caused to be varied in a rhythmic manner, either in its entire mass, or at least in the portion of this liquid in contact with the parts of the patient's body to be massaged.

As one of the simplest means for producing these variations of pressure, use can be made for instance of plane or like surfaces, apertured or not, immersed in the liquid in proximity to the body, and to which is imparted a reciprocating displacement in a direction approximately perpendicular to their surface, by any mechanical means, actuated by hand or by a motor, according to a predetermined rhythm.

The vessel used can be of any kind, the liquid can be ordinary water, mineral water, sea water, or all kinds of mixtures or solutions.

The accompanying drawings illustrate, by way of example, two forms of carrying out the subject-matter of the invention for the massage of a patient lying in a kind of bath.

Fig. 1 is a longitudinal section of the apparatus.

Fig. 2 is a cross section thereof.

Fig. 3 is a plan view of the same.

Fig. 4 is a plan view of the control mechanism apart.

Fig. 5 is a plan view of the massaging plate.

Fig. 6 is a longitudinal section thereof.

Figs. 7 and 8 are partial views showing respectively in elevation and plan view a driving motor.

Fig. 9 is a longitudinal section of the second form of the invention.

Fig. 10 is a cross section thereof, made according to line 10—10 of Fig. 9.

Fig. 11 shows, on an enlarged scale, a portion of Fig. 9.

Fig. 12 is a partial plan view of the plate having an up and down movement serving to periodically vary the pressure of the liquid.

In Figs. 9 and 11, the section is made partly according to the axis of the apparatus and partly through the perforated portions of the plate.

The vessel used in these examples is a bath tub, of ordinary dimensions or slightly larger.

The surface in movement is a horizontal board p immersed in the upper layers of the liquid. This board receives, either by hand, or by means of a motor, vertical reciprocating displacements.

According to Figs. 1 to 6, this board is integral with two cross members t_1, t_2, provided with rods k_1, k_2 which can slide in guides g_1 and g_2 held by diagonal stays c_1, c_2 on a horizontal frame arranged above the bath tub.

This frame has a cross member t held by two tie-rods s_1 and s_2 with nuts d_1, d_2 and a cross member q resting on two legs h. These cross members are connected by rods y_1 and y_2 provided with cross bars u_1 and u_2. In these cross members and cross-bars is journalled a crank shaft a, the crank pins v_1 and v_2 of which are connected by connecting rods b_1 and b_2 to the rods k_1, k_2.

The shaft a can be caused to rotate by means of a crank m through the medium of gears z_1 and z_2 ensuring a higher speed.

The board p thus receives an up and down reciprocating movement in the liquid, so that the patient lying under this board is subjected to rhythmic variations of pressure which effect the required massage.

This board is perforated with orifices o and against it is placed a slide valve r provided with corresponding orifices.

By moving this slide valve, it is possible to control the sections of passage of the liquid through the board and to thus modify the intensity of the variations of pressure to which the patient is subjected.

The board p is preferably provided with a resilient network f arranged at a certain distance under this board, in order to avoid the shocks of the latter against the patient's body. This network can be stretched on a ledge extending on the contour of the board except on the side of the head, and which also serves to increase the pressure produced in the down movement of the board.

In order that the patient may easily enter the bath, the nuts d_1, d_2 are unscrewed and the board and the entire mechanism is raised by rotation about a hinge h_1 carried by the legs h.

The hand drive can be advantageously replaced by a motor drive; for instance, as shown in Figs. 7 and 8, an electric motor can actuate the gear z_1.

In the second form of construction (Figs. 9 to 12), the mechanism for actuating the board p is slightly different; the shaft a carries, instead of cranks, cams 1 and the rods k_1, k_2 which support the board are subjected to the action of springs 2 which tend to lift them, and they each carry a roller 3 pressed against the underside of the corresponding cam 1. Upon each revolution of the shaft a, the board p is thus lowered one or several times, according to the shape of the cams, and it is raised each time by the action of the springs 2.

On the other hand, the slide valve r, instead of being adjustably secured to the board p, is connected to the latter by a mechanism which compels it to take a to-and-fro movement relatively to the board, this movement being combined with the up and down movement of this board, so as to vary the section of free passage through the openings o during each vertical stroke of the board. For that purpose, a cam 4 is mounted on a lug integral with the cross member t_1 and acts against a roller 5 mounted on the slide valve r, so as to push this slide valve in opposition to the action of a spring 6 which bears against a projection 7 of the board. This cam is caused to rotate by a vertical shaft 8 mounted in the frame g_1 when this shaft is coupled with the shaft a by bevelled pinions 9 and 10.

For allowing the unclutching of this driving mechanism, on the shaft 8 is provided a ring 11, having an incline and which may be caused to rotate by means of a handle 12 presented by another ring 13 carried by the frame g_1, so that the shaft 8 with its pinion 10 can be raised and lowered at will for engaging this pinion 10 with the pinion 9 disengaging it therefrom. The shaft 8 can, for that purpose, slide in the hub 14 of the cam 4, and it drives the latter in its rotation through the medium of a key or of a polygonal portion.

The ratio of the pinions 9, 10 can vary; if it is a fraction of the unit, the slide valve effects a single horizontal to-and-fro movement during several vertical to-and-fro movements of the board, so that the pressure generated in the bath will be subjected during each revolution of the shaft a to alternate pressures P_1,—P_2, P_3,—P_4, P_5,—P_6, the absolute value of which will be decreasing. The number of these pressures in each period and their values depend on the shape of the cams, on the ratio of the gears on the relative position of the cams on their shafts, on the widths of the perforated parts and on the intermediate solid parts, etc., so that it is possible at will, to vary the succession of the pressures according to any desired law.

Antifriction rollers 15 are provided for facilitating the displacement of the slide valve r between the board p and the cross members t_1 t_2. On the other hand, a stop device is provided for holding the slide valve stationary in any desired position relatively to the board when the drive is disengaged; for instance, a finger 16 can be secured on the shaft 8, so as to enter any of the holes 17 provided in the frame g_1 when this shaft is lowered (Fig. 11).

A protecting network f is again arranged under the board p, but it is hung from the frame, instead of being secured to the board as in the preceding case.

It will be understood that the shape and dimensions of the vessel used can vary according to circumstances and according to the position to be given to the pateitnt; the latter can be lying down, standing or seated.

What is claimed is:—

1. Apparatus for massage comprising a vessel adapted to contain a liquid and the body to be massaged, a plate movable in this vessel, this plate having openings therein, adjustable means for obstructing more or less the said openings, and driving means adapted to alternately move this plate towards the said body and in reverse direction.

2. Apparatus for massage comprising a vessel adapted to contain a liquid and the body to be massaged, a plate movable in this vessel, this plate having openings therein, adjustable means for obstructing more or less the said openings, and driving means adapted to alternately move this plate towards the said body and in reverse direction, the said plate comprising adjustable elements adapted to increase or to diminish the thrust it exerts on the liquid when it is set in movement.

3. Apparatus for massage comprising a vessel adapted to contain a liquid and the body to be massaged, a board movable in this vessel and having openings, a slide valve on this board and adapted to modify the free section of the said openings, driving means for alternately displacing the said board towards the body to be massaged and in reverse direction, and adjusting means for displacing the said slide valve on the board, the said adjusting means being adapted to periodically move the slide valve in accordance with each series of several successive movements of the board.

4. Apparatus for massage comprising a vessel adapted to contain a liquid and the body to be massaged, a plate movable in this vessel, and driving means adapted to alternately move this plate towards the said body and in reverse direction and a soft network

stretched at a small distance from the said plate and movable with the latter, this network being adapted to avoid the shocks of the plate against the body to be massaged.

5. Massage apparatus comprising a receptacle adapted to contain a liquid and the body to be massaged, a perforated plate, adapted to be horizontally placed in the liquid above the body to be massaged, adjustable means for obstructing more or less the openings of the said plate, and driving means adapted to move this plate alternately upwardly and downwardly.

6. Massage apparatus comprising a receptacle adapted to contain a liquid and the body to be massaged, an apertured plate adapted to be horizontally placed in the liquid above the body to be massaged, and driving means adapted to move this plate alternately upwardly and downwardly, the said plate comprising adjustable elements adapted to modify the thrust it exerts on the liquid when it is set in motion.

7. Massage apparatus comprising a receptacle adapted to contain a liquid and the body to be massaged and extending in a substantially horizontal position, an apertured element in the upper part of the receptacle, the lower surface of this element being substantially horizontal and located at a small distance above the body to be massaged, and means for alternately moving this element upwardly and downwardly.

In testimony whereof I have hereunto affixed my signature.

MICHEL PAVLOV.