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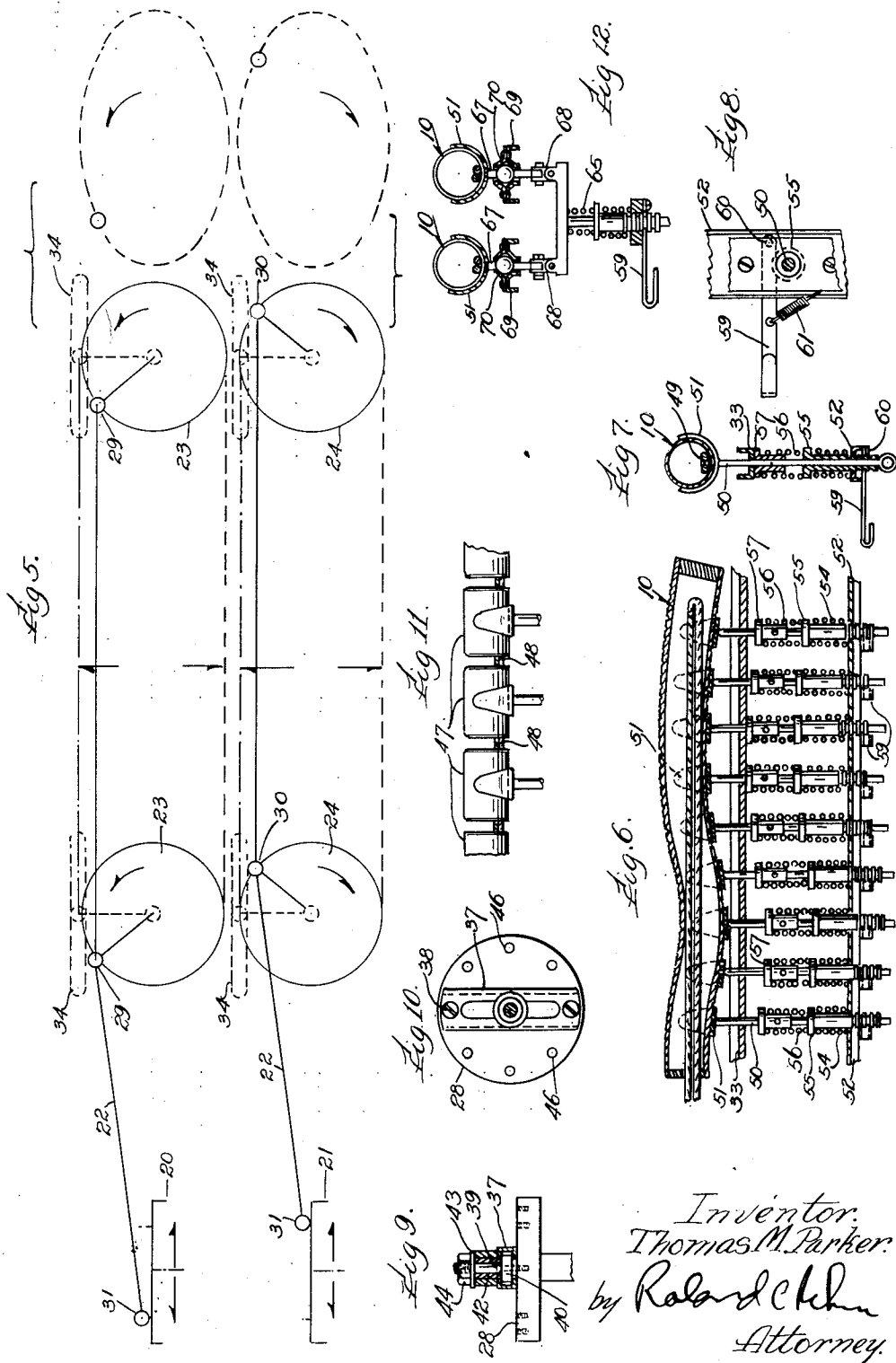
T. M. PARKER

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SPINAL MASSAGE APPARATUS

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Inventor:
Thomas M. Parker.
by *Roland E. Kuhn*
Attorney.

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SPINAL MASSAGE APPARATUS

Thomas M. Parker, Evanston, Ill.

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1

This invention relates to a physiotherapy device for spinal massage.

The invention is characterized by longitudinally and laterally oscillating or vibrating spinal applicators, preferably heated, and adjustable in amplitude and phase of oscillation and to the contour of the back or spine of the patient undergoing treatment. The apparatus applies pressure, heat and agitation to the deep muscles of the back; the heat to dilate the blood vessels; the pressure to facilitate draining of the tissues; and the agitation to facilitate elimination of the end products of metabolism which tend to accumulate in the muscles and cause constriction.

Further details and the nature of the invention may be readily understood by reference to one illustrative apparatus embodying the invention and shown in the accompanying drawings.

In said drawings:

Fig. 1 is a plan view of the apparatus;

Fig. 2 is a vertical longitudinal section thereof taken on the plane 2—2 of Fig. 1;

Fig. 3 is a transverse vertical section taken on the plane 3—3 of Fig. 2;

Fig. 4 is an enlarged elevation showing details of the applicator oscillating mechanism located approximately in the plane 4—4 of Fig. 2;

Fig. 5 is a plan diagram illustrating one phase relation of the longitudinally and laterally oscillating oscillators;

Fig. 6 is a fragmentary detailed longitudinal vertical sectional view on an enlarged scale of a continuous tubular applicator and means for adjusting the applicators to the spinal contour;

Fig. 7 is a cross section of the contour adjusting mechanism;

Fig. 8 is a plan view partly in section showing a locking device for the contour adjusting means;

Fig. 9 is a detail elevation of a device for adjusting the amplitude of oscillation of the applicators;

Fig. 10 is a plan view of the details of Fig. 9, showing a means for adjusting the phase of oscillation;

Fig. 11 is a fragmentary elevation similar to Fig. 6 illustrating an applicator comprising a series of coordinated sections; and

Fig. 12 is a transverse sectional elevation showing a different construction for supporting the applicators.

The term "spinal applicators" designates the back massaging elements which are here represented by a pair of spaced flexible tubular members 10 adapted to engage the patient's back on opposite sides of the spine in the regions of the

2

spinal or back muscles. Their form may vary considerably, but their function is to engage the back generally throughout its length and preferably on opposite sides of the spine in the region of the back muscles. They may comprise a series of separate sections (Fig. 11), or, as here shown, elongated spaced flexible tubular members 10. Whatever their form, the applicators are adjustable vertically to the contour of the back to engage the back with substantially uniform pressure at all points regardless of its contour. The applicators are supported in a generally horizontal position with their upper faces about level with the upper surface of the massage table 11, and lying in the space 12 between the spaced table elements 13. The latter are preferably lightly padded for comfort. A flexible fabric sheet 14 which may also be lightly padded, extends over the applicators and bridges the space between the table elements 13 and conceals the applicators and their operating mechanism.

The latter mechanism reciprocates each applicator both longitudinally as well as laterally, so that each point on an applicator travels approximately in a circle or ellipse whose respective axes are determined by the amplitude of the respective longitudinal and lateral oscillations. Thus each point on the applicator exerts an elliptical or circular massaging movement on the back of the patient. For convenience the term "elliptical" will be used hereinafter in a generic sense to include an ellipse (i. e., a circle) wherein the major and minor axes are equal. Preferably the longitudinal oscillation of one applicator is about 180° out of phase with that of the other to minimize longitudinal bodily movement of the patient. The lateral oscillation of the applicators is, on the other hand, preferably in phase or only slightly out of phase, to minimize lateral stretching of the skin of the back, which would occur if both applicators moved outwardly at the same time. In the illustrative apparatus both the amplitude and the phase of the oscillations may be adjusted independently.

In this instance the applicators are oscillated longitudinally by means separate from the lateral oscillators to permit adjustment in the amplitude of longitudinal oscillation independently of the amplitude of lateral oscillation. Such mechanism is here shown in the form of a pair of cranks 20 and 21 and connecting rods 22 for longitudinally oscillating the respective applicators 10, and two pairs of cranks 23 and 24 for bodily laterally oscillating the respective applicators. The latter pair of cranks operate about vertical

3

axes and, in the illustration given, the pairs of cranks for each applicator rotate in phase so that the applicator oscillates laterally bodily parallel to itself. Also, in this illustration, cranks 23 rotate in a direction opposite to that of cranks 24, but approximately in phase, so that the applicators oscillate laterally substantially in phase though as regards longitudinal oscillation they are approximately 180° out of phase. It will be understood that the phase relationship may be altered if desired, as presently explained (see Figs. 9 and 10). In cases where independent adjustment of longitudinal and lateral oscillation is unnecessary, the cranks 23 and 24 may be employed to provide both lateral and longitudinal oscillation of the applicators.

The cranks 20 to 24 are here shown in the form of disks 28 having crank pins 29 and 30 projecting therefrom. Pins 29 and 30 advantageously have a ball and socket connection 31 with their respective connecting rods 22 to permit the latter to move laterally with the lateral oscillating applicators as well as to reciprocate the same longitudinally. For the same purpose the opposite ends of the connecting rods are provided with ball and socket connections, with the applicator operating member 33. Crank pins 29 and 30 project into longitudinal slots 34 in the members 33, thereby imparting lateral oscillation to the applicators. Slots 34 are advantageously longer than the maximum amplitude of travel of crank pins 29 and 30, so that the latter pins cannot interfere with the longitudinal oscillation of the applicators provided by cranks 20 and 21, thereby making it possible to adjust the throw of the latter independently of that of cranks 23 and 24. In the event cranks 23 and 24 are employed for both longitudinal and lateral oscillations, connecting rods 22, cranks 20, 21 and slots 34, and their operating mechanism may then be omitted.

Various devices for adjusting the amplitude of oscillation may be employed. One satisfactory device is illustrated in Fig. 9 wherein the crank pin lies in a radial T-shaped slot in the crank disk and may be shifted in or out radially and locked in adjusted position. The slot is here shown provided by an inverted channel 37 radially mounted on the crank disk 23 with screws 38 and having its base slotted as at 39 to provide a T-shaped space in which the head 40 of the crank pin 41 is adapted to slide. A bearing bushing 42 lies between flanges 33 and the collar 43 and assumes the clamping force exerted by nut 44 on the crank pin. Bushing 42 is sufficiently deeper than the thickness of member 33 within which the bushing operates, to prevent transmission of clamping pressure to member 33. By loosening nut 44 the crank pin may be shifted radially to adjust the crank throw. The applicators are here shown in the form of a continuous flexible tube, such as spirally seamed flexible metal tubing, in this case about two inches in diameter. Rubber or other tubing may be employed instead. It should be sufficiently flexible to conform to the back contours but should be firm enough to transmit adequate massaging pressure to the back muscles. While the illustrative applicators are shown as of circular section, they may be formed with rectangular or other sections. The phase relation of the cranks and the applicators may be adjusted by changing the angular position of the crank pins 41 on the disk 28. In the present instance this is accomplished by shifting the angular position of the channel 37 on the disks. The chan-

4

nel is attached by screws 38 to the disk. A series of angularly separated threaded screw holes 46 are formed in the disk to attach the channel 37 in the desired angular position.

Heating means, such as electric resistor heating elements or wires 49 (Fig. 7) are advantageously enclosed within the tubing to supply heat during the massaging operation. Heat prevents bruising and irritation of the tissues by the massaging motion of the applicators. The heat should preferably be as high as the tissues will tolerate.

The applicators are here shown adjustably supported at a plurality of points along their length. The supporting means is here shown in the form of a series of spaced vertically slidable rods 50 (Figs. 2 and 6) attached to the applicators at their upper end by yokes or saddles 51 embracing the applicators. If desired, the applicators may comprise a series of short aligned sections 47 each supported on one or more rods 50 and yokes 51, and collectively constituting the applicator (see Fig. 11). Heating means 48 for the several sections may comprise electric heating elements or wires inside each section and connected together. The rods pass through holes in the applicator operating members 33 which are here shown in the form of rigid channels. The lower ends of the rods are similarly positioned and guided by passing through holes in bar 52 supported rigidly from member 33 by depending brackets 53.

Resilient means is provided to cause the applicators automatically to conform to back contours. Such means is here represented by a series of springs 54 around the respective rods and confined between the collared bushings 55 and bar 52. After a patient lies on the table and the applicators are depressed by the patient's back to assume the contour of the back, the applicators are advantageously locked in their vertically adjusted position to prevent further deflection of springs 54 and thereby to maintain a contour which fits that of the patient's back. The applicators are thus able to apply firm massaging pressure uniformly to all points along the patient's back regardless of the peculiarities of contour. In the case of metal or other fairly hard or firm applicators, a limited cushioning thereof is advantageously provided to relieve the harshness of the pressure of a hard member against the back. This limited cushioning is here provided by the second set of springs 56 around rods 50 and lying between the collared bushings 54 and the upper collars 57 (here shown in the form of collared bushings) fastened to the respective rods 50. Bushings 55 which project through bar 52, are provided with locking means to hold springs 54 against further deflection after the applicators have assumed their proper contour, thereby leaving only springs 56 free to deflect. The rods are still free to slide through bushings 55 as springs 56 deflect. While the latter springs cushion the applicators to eliminate harsh unyielding pressure, they nevertheless maintain the firmness of applicator pressure necessary for effective massage. The aforesaid locking means is here shown in the form of square notches 58 in bushings 55. A locking blade 59 pivoted at 60 to bar 52, is provided for each bushing 55 and adapted to enter the notch in registry therewith when the applicator has assumed its back conforming contour (Figs. 6 to 8). A spring 61 tends to hold the blade in operative engagement with bushing 55.

In Fig. 12 is illustrated a different construction

5

wherein a single series of rods 65 and yokes 66 support both applicator assemblies. In this case individual applicator supporting rods 67 intermediate the applicators and yokes 66 are universally pivoted at 68 on the latter to permit both longitudinal and lateral oscillation. The applicator operating carrier 69 corresponding to the member 33 is provided with ball and socket connections 70 with the several rods 67. Operating member 69 may be oscillated longitudinally and laterally by mechanism similar to that illustrated in Figs. 1 to 4.

Any appropriate applicator driving mechanism may be employed. That here illustrated comprises an electric driving motor 75 provided with speed reducing means in the form of small and large pulleys 76 and 77, the latter mounted on main shaft 78. Cranks 20 to 24 are advantageously driven in synchronism (i. e. at substantially the same frequency) by sprocket chain 79 from sprocket 80 on the main shaft. Chain 79 passes around sprocket 81 on shaft 82 carrying cranks 20 and 21, and also over sprockets 80 and 84 for driving the cranks 23 and 24, as next described. Thus all cranks are driven synchronously and once adjusted their phase relationship or timing is maintained. The latter pairs of cranks are mounted on pairs of vertical shafts 85 and 86 connected with driving sprocket shaft 87 through beveled pinions 88 and 89 (Figs. 3 and 4). Chain 79 passes over idlers 90 and 91 which guide the chain and maintain operative engagement thereof with sprockets 80 and 83 (Fig. 2).

The illustrative apparatus is advantageously equipped with a neck massaging applicator (Figs. 1 and 2) here shown in the form of an oscillating heated cylindrical member 92 pivotally connected with crank disk 93. The latter may be similar to cranks 20 to 24 as regards capacity for adjustment of crank throw. The cranks are mounted on shaft 94 driven by sprocket chain 95 traveling around sprocket 96 (Fig. 3) and sprocket 97 on shaft 94. One neck applicator is advantageously provided for each side of the neck. Handles 98 to be grasped by the patient are employed to regulate the applicator pressure and to move one or both applicators into and out of operative position about their pivoted connections 99 with their respective cranks. Preferably, the neck applicators are used individually or separately and not together, although simultaneous operation may be employed if desired. The neck applicators may be hollow and enclose electrical or other heating elements.

The back and neck applicator drives are advantageously clutch-controlled so that they may be selectively placed in or out of operation as desired by the patient. For that purpose a toothed or positive clutch 100 is slidably splined to main shaft 78 between driving sprockets 80 and 96, each of which rotate freely about main shaft 78. Clutch 100 is provided with clutch teeth 101 on each face adapted selectively to engage mating teeth 102 and 103 on sprockets 80 and 96 respectively. Clutch shifting lever 104 pivoted at 105 is connected by link 106 with control lever 107 pivoted to the table frame 108 in position for operation by the patient from supine position. Other devices for operating several applicators may be employed.

Obviously the invention is not limited to details of the illustrative apparatus, since these may be variously modified. Moreover, it is not indispensable that all features of the invention

6

be used conjointly, since various features may be used to advantage in different combinations and sub-combinations.

Having described my invention, I claim:

1. Physiotherapy apparatus for spinal massage comprising in combination a pair of spaced elongated spinal applicators adapted to contact with the back of a person undergoing treatment, and mechanism for oscillating each of said applicators bodily both longitudinally and laterally in a substantially elliptical path at substantially the same frequency.

2. Physiotherapy apparatus for spinal massage comprising in combination a pair of flexible elongated spinal applicators adapted to contact with the back of a person undergoing treatment on opposite sides of the spine, means for flexing said applicators to conform to the contour of the back, locking means for maintaining the said contour and mechanism for oscillating said applicators both longitudinally and laterally.

3. Physiotherapy apparatus for spinal massage comprising in combination a pair of spaced elongated tubular spinal applicators extending longitudinally of and adjustable to conform to the contour of the back of a person undergoing treatment, means for heating the applicators so as to transmit heat to the person's back, and mechanism for oscillating said applicators both longitudinally and laterally at substantially the same frequency for longitudinal and lateral oscillations.

4. Physiotherapy apparatus for spinal massage comprising in combination a pair of flexible elongated spinal applicators extending longitudinally of and adjustable to conform to the contour of the back of a person undergoing treatment on opposite sides of the spine, resilient means for yieldingly supporting and flexing the applicators to conform to the contour of the back, and mechanism for oscillating said applicators both longitudinally and laterally at substantially the same frequency.

5. Physiotherapy apparatus for spinal massage comprising in combination a pair of flexible elongated spinal applicators adapted to contact with the back of a person undergoing treatment on opposite sides of the spine, resilient means for supporting the applicators to flex the applicators to conform to the contour of the back, a device for rendering said resilient means inoperative after the applicators have assumed back conforming contour to maintain said contour, thereby to engage the back with a substantially firm pressure, and mechanism for oscillating said applicators both longitudinally and laterally.

6. Physiotherapy apparatus for spinal massage comprising in combination a pair of flexible elongated spinal applicators extending longitudinally of and adapted to contact with the back of a person undergoing treatment on opposite sides of the spine, springs for resiliently supporting the applicators to permit the said applicators to yield to conform to the contour of the back, means for locking said springs against further deflection, and mechanism for oscillating said applicators both longitudinally and laterally.

7. Physiotherapy apparatus for spinal massage comprising in combination a pair of spaced elongated spinal applicators adapted to contact with the back of a person undergoing treatment, mechanism for oscillating said applicators both longitudinally and laterally, and means for varying the phase relationship between the oscillation of one applicator and that of the other.

7

8. Physiotherapy apparatus for spinal massage comprising in combination a pair of spaced elongated spinal applicators formed to conform with the contour of the back of a person undergoing treatment, means for oscillating said applicators bodily both longitudinally and laterally, the longitudinal and lateral oscillations having substantially the same frequency, and means for varying the amplitude of the lateral and longitudinal oscillations.

9. Physiotherapy apparatus for spinal massage comprising in combination a pair of spaced elongated spinal applicators extending longitudinal of and adapted to contact with the back of a person undergoing treatment, mechanism for oscillating said applicators longitudinally, means for varying the amplitude of said longitudinal oscillations, independent mechanism for oscillating said applicators laterally and at substantially the same frequency of the longitudinal oscillator, and means for adjusting the amplitude of lateral oscillation independently of that of the longitudinal oscillations.

8

10. Physiotherapy apparatus comprising in combination a pair of spaced spinal applicators, means for oscillating said applicators longitudinally and laterally, a neck applicator movable into and out of contact with the patient's neck, means for oscillating said neck applicator in the direction of its length, driving means, and control means adapted to be operated by the patient for selectively operatively connecting said spinal and neck applicators with said driving means.

THOMAS M. PARKER.

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