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(54) BIOLOGICAL TISSUE STRENGTHENING DEVICE

(71) I, AN-CHUAN WU, residing at 2F, No. 217, Chien Kuo South Road, Taipei, Taiwan, a citizen of Taiwan, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:

The present invention relates to a tissue strengthening device for strengthening human breast tissue.

The strengthening or building up of biological tissue in the female human breast is a well-known problem in physiotherapy. One medical approach uses surgical techniques, such as breast implant operations, while non-surgical techniques include the use of external creams or internal hormone preparations. The surgical technique is a relatively expensive medical operation and requires an extended hospital stay; the non-surgical techniques have been found to be either substantially ineffective or to cause harmful side effects.

Another medical approach has included hydrotherapy, wherein jets of pulsating water are directed to impinge upon the breast tissue. This approach has the disadvantage that the breast tissue is rather delicate and is easily damaged by such pulsating jets.

Conventional biological tissue strengthening devices comprise a rigid cup adapted to be placed over human breast tissue with clearance so as to define an interior space therewith, and means for evacuating air from the space and for drawing the breast tissue further into said cup, thereby exercising the breast tissue.

The said conventional devices have various disadvantages, such as, the cup has rim which is substantially flat (i.e. planar) and circular so that inconvenience and/or ineffective operation is encountered, and an evacuating air outlet is eccentrically disposed on the surface of the said cup so that a uniform exercising action to the breast tissue cannot be expected, and deformation of the breast tissue may even be caused. Further, the most critical point is that a vacuum-releasing means is not always provided therein, so that the vacuum will be only released by spontaneous gradual air leakage so that when the breast tissue is over-exercised, the problem of blood extravasation may arise.

According to the present invention I provide a device for strengthening the tissue of the female human breast, comprising a substantially rigid dome-shaped open cup formed of transparent material to enclose the breast; the cup having a single aperture comprising an air outlet opening at the apex of the dome connected via a flexible conduit to the air inlet of a pumping element; the cup having at its rim an outwardly extending lip, the configuration of which is generally circular when viewed along the general axis of symmetry of the cup but which has opposed portions thereof curved towards said apex out of a plane perpendicular to said axis; the pumping element being provided with means for admitting ambient air to release an internal vacuum condition in the cup. The rigidity of the cup assures that the biological tissue will be firmly and adequately drawn the interior space. The means for admitting ambient air is preferably adjustable.

A preferred embodiment is provided with a cup of transparent synthetic plastics material provided with means, such as gradations, indicating the relative distance through which the breast is drawn into the cup. This data is useful for charting the progress and growth of the biological tissue as well as for serving as a guide for its safe operation so that the pressure developed by the pumping element will not cause excessive physical stress on the tissue.

Preferably, unions are provided on the air outlet opening of the cup and on the air inlet side of the pumping element to provide a friction grip for the conduit, for example flanged or ridged male sections. The conduit is connected intermediate the cup and the pumping element. The unions assure that the ends of the flexible conduit will not become disengaged during the build-up and release of vacuum by the pumping element.

A feature of one embodiment of the invention is to provide two cooperating valve means on a resilient pumping element, each valve means containing a movable obstruction member mounted in an air flow passage. By squeezing opposite wall portions of the pumping element towards each other, a pressure condition will be created which urges the obstruction members mounted in air flow passages provided in the resilient element outwardly of each other. Thus expelling air from the free end of the pumping element. Release of the wall portions allows air to flow from the cup into the pumping element. Thus a user may regulate and control the amount of air being evacuated, as desired.

A further feature of the invention generally is to provide means for adjustably admitting ambient air into the interior space and for releasing the vacuum condition therein.

A preferred embodiment of the invention is provided with means for continuously evacuating air from the interior space just by pressing a button, as soon as the said button is released the ambient air being immediately admitted into the interior.

The invention, both as to its construction and its method of operation will be further understood from the following description of specific embodiments shown in the accompanying drawings.

Fig. 1 is a diagrammatic side view of an apparatus according to an embodiment of the present invention;

Fig. 2 is a sectional view of the rigid cup;

Fig. 3 is an enlarged schematic sectional view showing a detail of the apparatus at one phase of the operational cycle;

Fig. 4 is an enlarged schematic sectional view showing a detail of the apparatus at another phase of the operational cycle; and

Fig. 5 is an enlarged fragmentary schematic sectional view of the air-evacuation means according to another embodiment of the present invention.

Discussing the apparatus which has been illustrated in an exemplary embodiment in Figs. 1 to 4, it will be seen that reference numeral 10 indicates a rigid dome-shaped cup of a size and shape for accommodating a human female breast with clearance. The cup 70 is formed of any suitable rigid material which is transparent, for example, clear synthetic plastics material, glass or any glass-like thermoplastic resin material. Indicating means 11 is provided on the transparent cup for indicating the distance through which the breast is drawn into the cup, as will be described herein.

The cup 10 further comprises a lip portion which encircles the base of the breast. One of the characteristics of the present invention is that the said lip portion is formed so that it is generally circular when viewed along the general axis of symmetry of the cup but has opposed portions thereof 12 curved towards the apex of the dome out of a plane perpendicular to said axis, so that it fits the breast more closely. The lip portion may be covered with a resilient sealing material 13, such as flexible rubber, for comfort when in contact with the skin and improved sealing of the interior space from the ambient atmosphere.

A resilient pumping element 20, which has opposite wall portions which define an interior region, evacuates air from the interior space. An inlet valve 21 and an outlet valve 22 are provided on the resilient pumping element 20.

The cup 10 is provided with an outlet 14 disposed at the apex of the dome, having a passage which is in constant communication with the aforementioned interior space defined by the cup 10. The inlet valve 21 has an air-inlet nipple 23 comprising a passage 24 which communicates with the above-mentioned interior region of the pumping element 20 depending upon the operation of the inlet valve 21 hereinafter described.

A hollow tubular element or conduit 25 has one of its ends connected to the outlet 14 and the other of its ends connected to the nipple 23. Friction is provided by annular flanges or ridges 16 and 26 on the outlet 14 and the nipple 23 to retaining the ends of the tubular conduit 25. The tubular conduit 25 is made of flexible material, such as rubber and/or plastics hosing, and may be pushed over the flanges etc. 16 and 26. Outlet 24 has a tapered portion 15 tapered to ease and facilitate the mounting of the conduit 25.

Inlet valve 21 and outlet valve 22 are provided with air flow passages and obstruction members or balls 27, 27^1 respectively which are movably mounted so as to admit or prevent air from flowing in the air flow passages. The obstruction members 27, 27^1 are normally urged by biasing means, such as springs or the like (not illustrated for purpose of clarity), into a first position in which the respective obstruction members 27, 27^1 are urged inwardly towards each other, as shown in Fig. 3. Obstruction member 27^1 is urged to seat in its valve seat 28; whereas, obstruction member 27 is urged off of its valve seat 29. In this first position, the air in the interior space defined by the cup 10 is in direct communication with the interior region defined by the pumping element 20 since the obstruction member 27 does not block the passage 24. Moreover, in the first position, the air within the pumping element 20 cannot escape to the ambient atmosphere, because the obstruction member 27^1 prevents such passage.

By displacing the wall portions of the re-

silient pumping element 20 towards each other, in the direction of the arrows as illustrated in Fig. 4, pressure will develop in the interior of the element 20 and the obstruction members 27, 27¹ will be urged outwardly away from each other. In this second air-evacuated position, obstruction member 27 is urged into its valve seat 29; and obstruction member 27¹ is urged off its valve seat 28.

In this second position, the air within the pumping element 20 is in direct communication with the ambient atmosphere since the obstruction member 27¹ no longer blocks the passage. Moreover, in this second position, the air within the pumping element 20 cannot escape or be ejected back towards the cup 10, since the obstruction member 27 effectively blocks the passage 24 and prevents such passage.

Air-inlet nipple 23 is connected to conduit 25 intermediate said interior space defined by the cup 10 and the pumping element 20. An adjustable element, such as a screw 30, is movably mounted in a bypass leading to the primary passage 24. Upon raising the screw 30, air from the ambient atmosphere is admitted into the primary passage 24. This action releases the vacuum condition created within the cup 10.

The screw 30 preferably has a tapered cross section at its leading end so that the amount of air entering from the ambient atmosphere can be regulated.

Upon lowering the screw 30, such air flow from the ambient atmosphere is prevented.

It is believed that the operation of the breast tissue strengthening device will be clear from the above description. By repeatedly displacing the wall portions of the resilient pumping element 20, an increasing vacuum condition is created between the breast tissue and the cup 10. I have found that maintaining the vacuum condition at a level sufficient for the breast to be drawn by about 2 cm into the cup is satisfactory for most applications. By alternately repeating the operations of the screw 30 of the air-inlet nipple 23 with the pumping element, the breast tissue will be exercised in a cycle. The breast will be drawn into the cup 10 during the operation of the pumping element; and the breast will return to its original position due to its own muscular tension during the operation of the screw 30.

I have found it to be particularly advantageous if the above-mentioned cycle is repeated for 15 minutes, twice a day, preferably once in the morning and once in the evening.

Another preferred embodiment of a pumping element of use in a device according to the present invention will now be described with reference to Fig. 5. The pumping element or device 40 comprises a miniature motor 41, a fan 42 with a plurality of radially extending blades 43, the fan 42 being coaxially mounted on the driving shaft of the motor 41 and driven thereby, a pair of dry cells 44 as the power source and a push button 45. The device 40 may be formed as a cylinder with an air-inlet nipple 23 on its base, the nipple having a construction and function similar to that shown in Fig. 3, but with screw 30 omitted. The nipple 23 can be connected either to above-mentioned conduit 25 or, suitably modified, directly to the outlet 14 of the cup 10.

A partition 46 is formed within the cylindrical device 40 to serve as the support for the motor 41. The partition 46 is provided with a plurality of openings 47 to allow air to pass freely therethrough. The electrical connection system which may be employed therein will be apparent to a reader with common knowledge in the art, so that the description is omitted.

In operation, the motor 41 will be energized so long as the button 45 is pressed to make it contact both conductive and metal members 48 and 48¹, so that the fan 42 will be driven thereby. As the fan is driven, the air defined within the interior space of of the cup 10 is evacuated through the nipple 23, and openings 47 to the atmosphere. When the breast has been drawn in to a sufficient degree, the button 45 is released, the motor 41 de-energized and the fan 42 is stopped. Ambient air then flows back through the same passage into the interior space of the cup 10 to release the vacuum condition therein.

While I do not wish to be bound by theory, it is well known that the pituitary gland governs the secretion of the endocrine glands and regulates the amount of hormones, such as estrogen and progesterone, in the blood stream. These hormones, amongst other factors, induce the growth of breast tissue. Since the breast has many estrogen-progesterone secreting glands, it is closely linked with the pituitary gland. By exercising the breast tissue, I believe that the pituitary gland will be, in turn, stimulated and pituitary will then secrete more hormones, thus strengthening and forming the breast tissue.

WHAT I CLAIM IS:—

1. A device for strengthening the tissue of the female human breast, comprising a substantially rigid dome-shaped open cup formed of transparent material to enclose the breast; the cup having a single aperture comprising an air outlet opening at the apex of the dome connected via a flexible conduit to the air inlet of a pumping ele-

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silient pumping element 20 towards each other, in the direction of the arrows as illustrated in Fig. 4, pressure will develop in the interior of the element 20 and the obstruction members 27, 27¹ will be urged outwardly away from each other. In this second air-evacuated position, obstruction member 27 is urged into its valve seat 29; and obstruction member 27¹ is urged off its valve seat 28.

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ment; the cup having at its rim an outwardly extending lip, the configuration of which is generally circular when viewed along the general axis of symmetry of the cup but which has opposed portions thereof curved towards said apex out of a plane perpendicular to said axis; the pumping element being provided with means for admitting ambient air to release an internal vacuum condition in the cup.

2. A device as claimed in Claim 1, wherein said cup is provided with indicating means thereon for indicating the distance through which the breast is drawn into said cup.

3. A device as claimed in Claim 1 or Claim 2 wherein said cup is formed of a synthetic plastics material.

4. A device as claimed in any of Claims 1 to 3, wherein the said lip is covered with a resilient sealing material.

5. A device as claimed in any of Claims 1 to 4, wherein said pumping element comprises a resilient hollow element provided with air inlet and outlet valves.

6. A device as claimed in Claim 5 in which said air inlet valve and said air outlet opening are provided with unions for said conduit adapted to provide a friction grip.

7. A device as claimed in Claim 5 or Claim 6, wherein said valves comprise air flow passages and obstruction members movably mounted in said passages, so that when the resilient wall portions are flexed the valves can adopt a first position in which said respective obstruction members are urged inwardly of each other and a second position in which said respective obstruction members are urged outwardly of each other.

8. A device as claimed in any of the preceding claims, in which the means for admitting ambient air is adjustable.

9. A device as claimed in any of Claims 1 to 4, wherein the pumping element contains a miniature electric fan operated on one or more dry cells and controlled by a push button, said fan being mounted in an air-containing vessel connected to said conduit, the fan serving to evacuate air from said vessel.

10. A device substantially as herein described with reference to, and as shown in, the accompanying drawings.

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Chartered Patent Agents,
57—60 Lincoln's Inn Fields,
London, WC2A 3LS.
Agents for the Applicant.

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