Feb. 13, 1951 E. VILLARREAL 2,541,562

MECHANICAL RESPIRATORY EXERCISER

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Fig. 1.

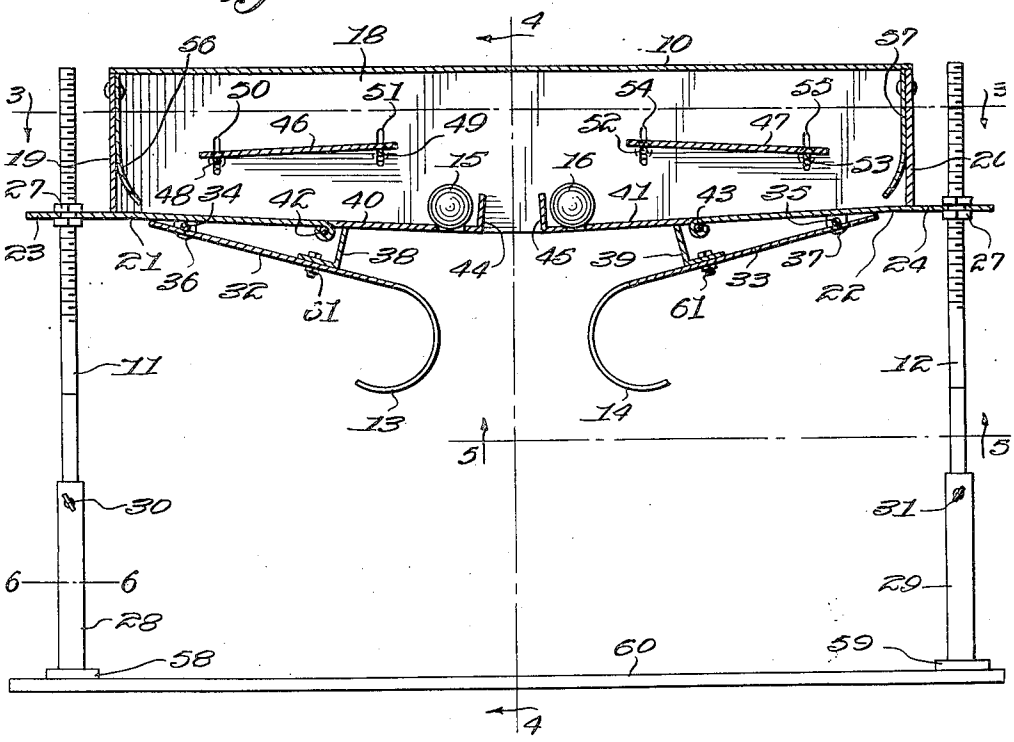
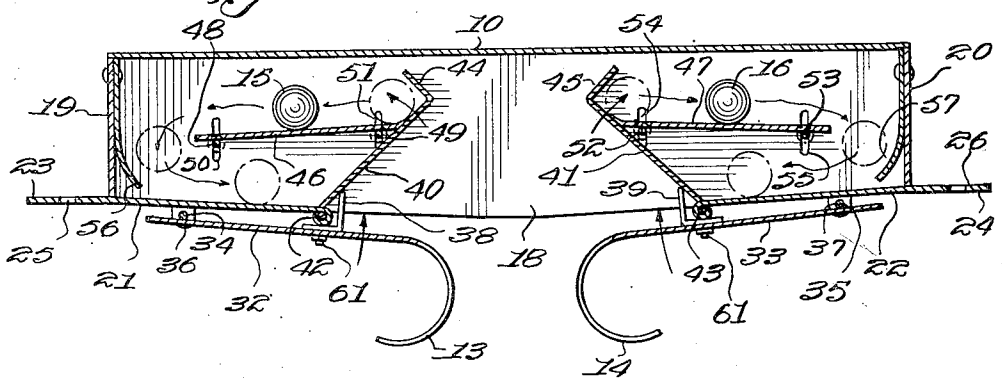


Fig. 2.



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Fig. 3.

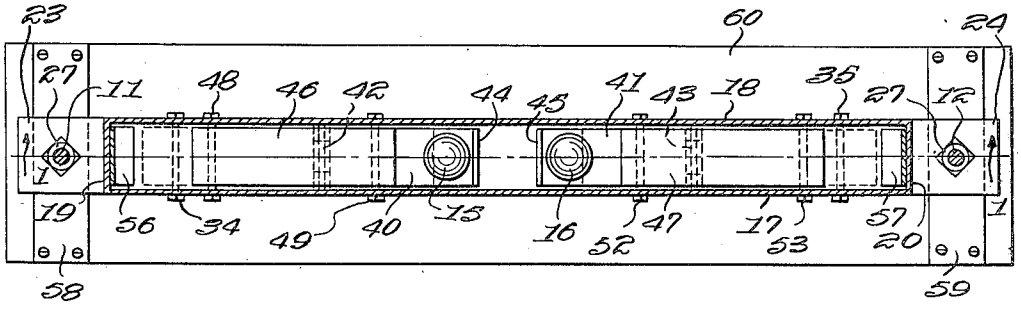


Fig. 4.

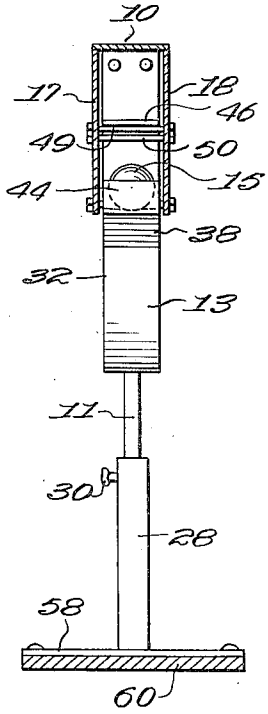


Fig. 5.

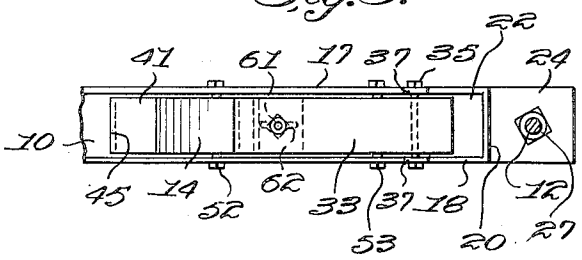
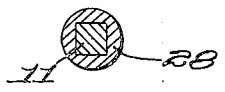


Fig. 6.



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MECHANICAL RESPIRATORY EXERCISER

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Application September 28, 1949, Serial No. 118,378
In Mexico October 14, 1948

4 Claims. (Cl. 128—2.08)

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This invention relates to mechanical respiratory indicating and exercising devices, and in particular to an elongated transparent substantially hollow casing adjustably supported on posts with arcuate fingers extended downwardly therefrom and having balls therein in which with the device positioned over the chest of a patient the expansion of the chest in breathing elevates the balls to positions from which they drop on trays and roll back downwardly to the starting positions with each breath of the patient.

The purpose of this invention is to encourage the breathing and indicate the breathing pulsation to a patient.

Various devices have been provided for testing the expansion of the chest caused by inhaling in breathing but it has been found desirable to provide such a device that operates continuously with each breathing pulsation of a patient. With this thought in mind this invention contemplates a pulsating device adapted to be positioned over the chest of a patient with the patient positioned on his back and in which objects in the device travel through a cycle with each pulsation.

The object of this invention is, therefore, to provide a respiratory device that may readily be adjusted to accommodate patients of different sizes and in which elements therein are actuated by depending fingers to accurately indicate the expansion resulting from breathing of the patient.

Another object of the invention is to provide a mechanical respiratory exerciser having objects traveling through cycles with each pulsation resulting from breathing in which the traveling action of the object is visible to the patient.

A further object of the invention is to provide a respiratory exerciser in which objects travel through cycles with each breathing pulsation which is of a simple and economical construction.

With these and other objects and advantages in view the invention embodies and elongated substantially hollow rectangular shaped casing with ends adjustably supported on telescoping posts, with inclined shelves therein and with balls actuated by depending spring fingers through flanged pivotally mounted plates.

Other features and advantages will appear from the following description taken in connection with the drawings wherein:

Figure 1 is a longitudinal section through the exerciser taken on line 1—1 of Figure 3 with the posts shown in elevation and with the spring fingers, balls and associated parts shown in the lower positions.

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Figure 2 is a similar section illustrating the parts in the elevated positions with the supporting posts omitted.

Figure 3 is a sectional plan through the device taken on line 3—3 of Figure 1.

Figure 4 is a cross section through the exerciser taken on line 4—4 of Figure 1.

Figure 5 is a detail taken on line 5—5 of Figure 1 looking upwardly toward the under side of the casing and showing the mounting of the spring fingers and ball actuating plate.

Figure 6 is a cross section taken on line 6—6 of Figure 1 showing the construction of the supporting posts.

Referring now to the drawings wherein like reference characters denote corresponding parts the mechanical respiratory exerciser of this invention includes a substantially hollow preferably transparent casing 10 supported on posts 11 and 12 and having arcuate contacting fingers 13 and 14 depending therefrom and balls 15 and 16 freely mounted therein.

The casing 10 is provided with side walls 17 and 18, end walls 19 and 20 and base plates 21 and 22, and the base plates slope downwardly toward the center from the ends of the casing. The base plates are provided with extended ends 23 and 24 respectively which have openings 25 and 26 therethrough through which the threaded ends of the posts 11 and 12 extend. The posts are provided with lock nuts 27 by which the casing is adjustably positioned on the posts and the lower ends of the posts are formed with flat sides and slidably mounted in tubular base elements 28 and 29, in which they are secured by thumb screws 30 and 31.

The spring fingers 13 and 14 are formed on the ends of bars 32 and 33 which are pivotally mounted through pins 34 and 35 in ears 36 and 37, respectively, on the base plates 21 and 22 of the casing. The bars 32 and 33 are provided with clip angles 38 and 39, respectively, that are adjustably mounted thereon and which contact the lower surfaces of plates 40 and 41 that are hingedly connected to the ends of the plates 21 and 22 by hinges 42 and 43. The inner ends of the plates 40 and 41 are provided with flanges 44 and 45, respectively, and in the position illustrated in Figure 1 the balls 15 and 16 rest against the flanges whereby, as the plates 40 and 41 are moved upwardly by the clip angles 38 and 39, as the fingers 13 and 14 are elevated, the balls 15 and 16 are carried upwardly as illustrated in Figure 2 and dropped upon shelves 46 and 47 that are supported in inclined positions in the opposite ends of the casing as shown. The shelf 46 is ad-

justably mounted by bolts 48 and 49 in slots 50 and 51 respectively and the shelf 47 is similarly supported by bolts 52 and 53 in slots 54 and 55. The end walls 19 and 20 of the casing may be provided with arcuate spring clips 56 and 57, respectively to guide the balls toward the inner part of the casing as they roll from the ends of the shelves.

The posts 11 and 12 may be provided with square lower ends to correspond with the opening in the base elements 28 and 29, as shown in Figure 6 to prevent rotation of the posts and the lower ends of the base elements 28 and 29 may be provided with flanges 58 and 59 through which the posts are mounted on a supporting cross bar 60.

The operation of the ball supporting plates 40 and 41 may be controlled by adjusting the positions of the clip angles 38 and 39, the clip angles being adjustably connected to the bars 32 and 33, respectively, by bolts 61 which extend through slots 62, as illustrated in Figure 5.

With the parts arranged in this manner the respiratory indicating device is positioned over a patient in a reclined position and the parts are adjusted whereby the fingers 13 and 14 contact the upper surface of the chest, and as the patient inhales or expands his chest the fingers are moved upwardly from the position shown in Figure 1 to that shown in Figure 2 wherein the balls 15 and 16 are elevated and placed upon the shelves 46 and 47 from which they roll downwardly and drop upon the lower plates 21 and 22 of the casing, and as the fingers 13 and 14 drop downwardly by gravity with the contraction of the chest the balls roll downwardly returning the plates 40 and 41 and resting against the flanges 44 and 45 at the ends thereof.

With the casing transparent a patient may follow the travel of the balls with the expansion and contraction of his chest as the balls are actuated by the pulsations resulting from breathing.

With improper breathing the balls are not elevated sufficiently to reach the shelves 46 and 47 and by this means the condition of the patient may readily be determined as defined in the claims in this application.

It will be understood that modifications may be made in the design and arrangement of the parts without departing from the spirit of the invention.

What is claimed is:

1. A mechanical respiratory indicator comprising an elongated substantially hollow casing, arcuate spring fingers extended downwardly from the casing, means adjustably supporting the casing above a patient with the spring fingers contacting the upper surface of the patient, balls freely mounted in the casing and means actuating the balls through cycles by the spring fingers.

2. A mechanical respiratory indicator comprising an elongated substantially hollow casing, arcuate spring fingers extended downwardly from the casing, means adjustably supporting the casing above a patient with the spring fingers contacting the upper surface of the patient, said

casing having a sloping lower surface with the lower surface sloping downwardly toward the center, shelves positioned in the casing and sloping downwardly toward the outer ends thereof, balls freely mounted in the casing, and means elevating the balls by the spring fingers whereby the balls are deposited upon the shelves as a patient over which the device is positioned inhales.

3. A mechanical respiratory indicator comprising an elongated substantially hollow casing, arcuate spring fingers extended downwardly from the casing, means adjustably supporting the casing above a patient with the spring fingers contacting the upper surface of the patient, said casing having a sloping lower surface with the lower surface sloping downwardly toward the center, shelves positioned in the casing and sloping downwardly toward the outer ends thereof, balls freely mounted in the casing, plates with flanged inner ends hingedly mounted in the lower surface of the casing, and means on the spring fingers for engaging the plates with the flanged ends to elevate the balls as the chest of a patient over which the device is positioned expands whereby the balls are deposited upon the shelves and rolled by gravity back to positions on the hinged plates as the chest of the patient contracts.

4. A mechanical respiratory indicator comprising an elongated substantially hollow casing, arcuate spring fingers pivotally mounted on the lower surface of the casing and extended downwardly from the casing, means adjustably supporting the casing above a patient with the spring fingers contacting the upper surface of the patient, said casing having a sloping lower surface with the lower surface sloping downwardly toward the center, shelves positioned in the casing and sloping downwardly toward the outer ends thereof, balls freely mounted in the casing, plates with flanged inner ends hingedly mounted in the lower surface of the casing, and means on the spring fingers for engaging the plates with the flanged ends to elevate the balls as the chest of a patient over which the device is positioned expands whereby the balls are deposited upon the shelves and rolled by gravity back to positions on the hinged plates as the chest of the patient contracts.

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