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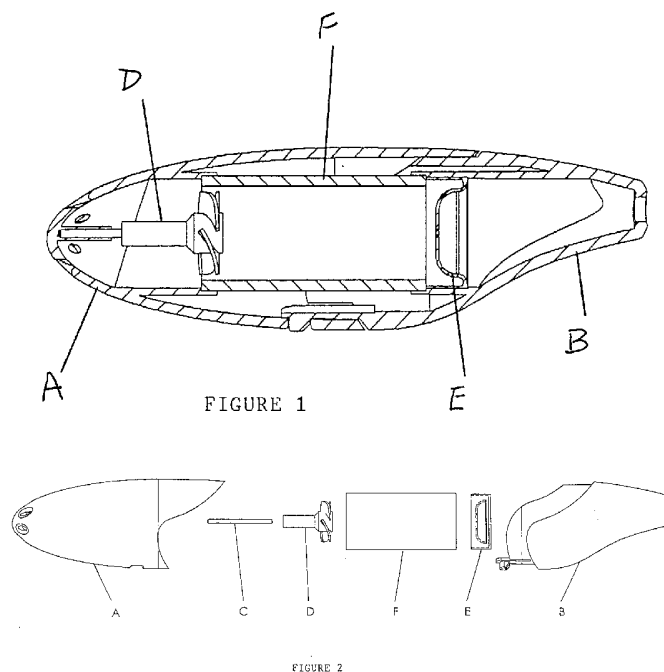
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(56) Documents Cited:
GB 2224567 A **GB 2024628 A**
EP 0997168 A1 **JP 2004275708 A**
US 0940735 A **US 20030209247 A1**
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(58) Field of Search:
UK CL (Edition X) **A5K, A5T**
INT CL **A61B, A63B**
Other: **EPODOC, WPI.**

(54) Abstract Title: **A lung exercise device with a rotor and a resistance means**

(57) A lung exercising device has a chamber F which contains a rotor D, a mouthpiece B through which a user may breath to effect rotation of the rotor D, and means E providing resistance to the passage of air into the chamber F. The resistance means E may be a one-way valve and it may be adjustable to vary the degree of resistance provided, it may also be reversible. The rotor D may have a plurality of turbine blades. The lung exercising device may also have means to show the rate of rotation of the rotor D which may include an electronic measuring device.



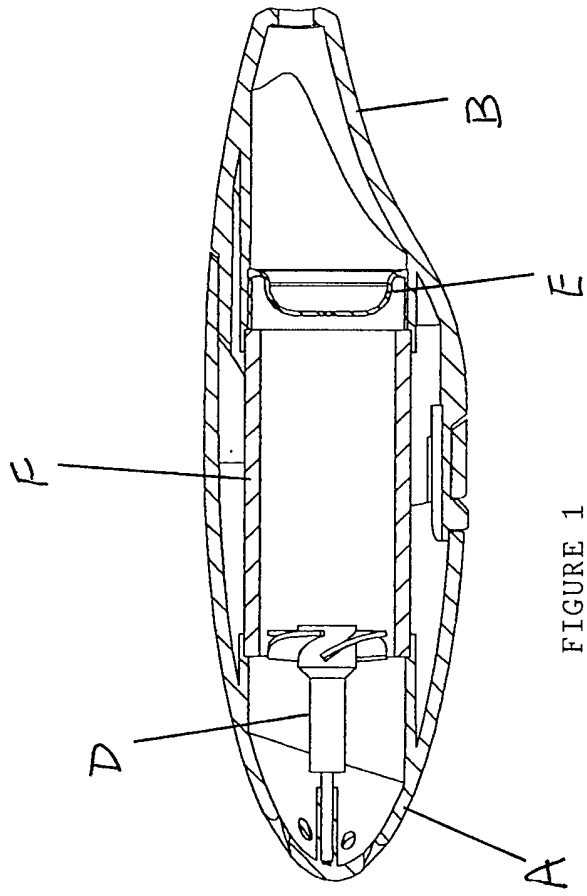


FIGURE 1

2025

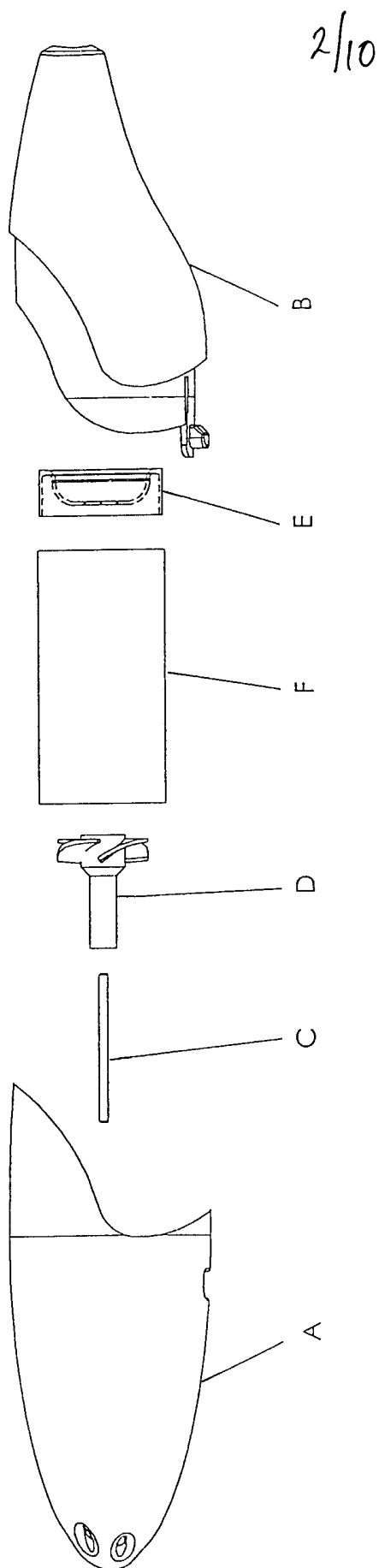


FIGURE 2

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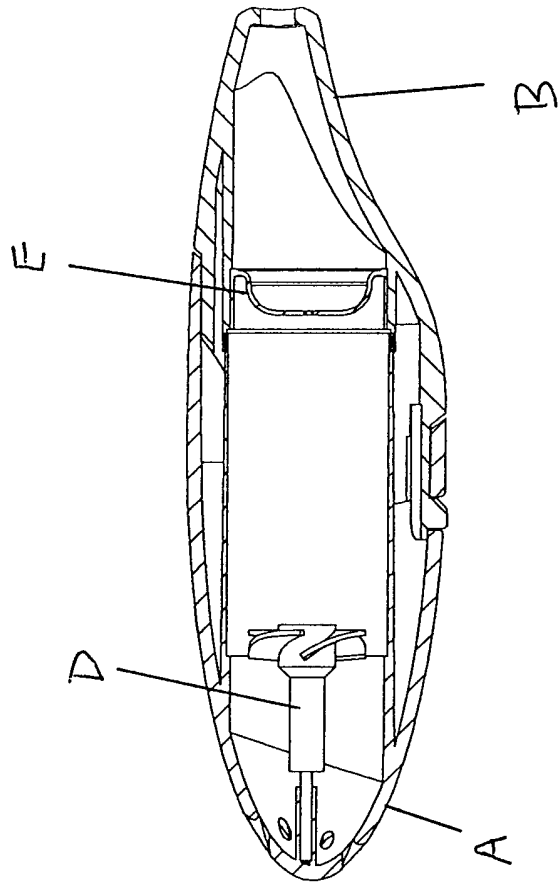


FIGURE 3

02 03 04 05

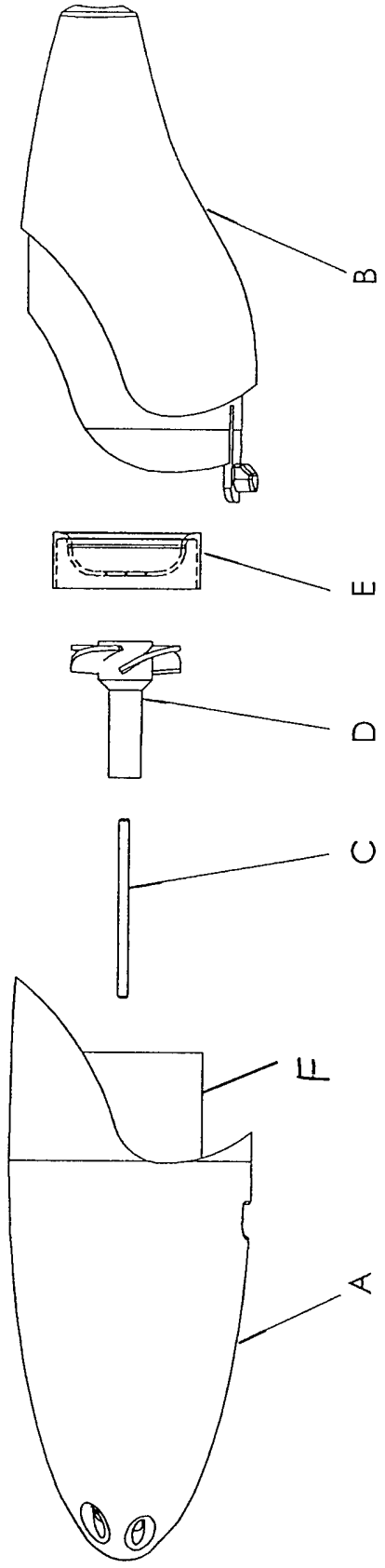


FIGURE 4

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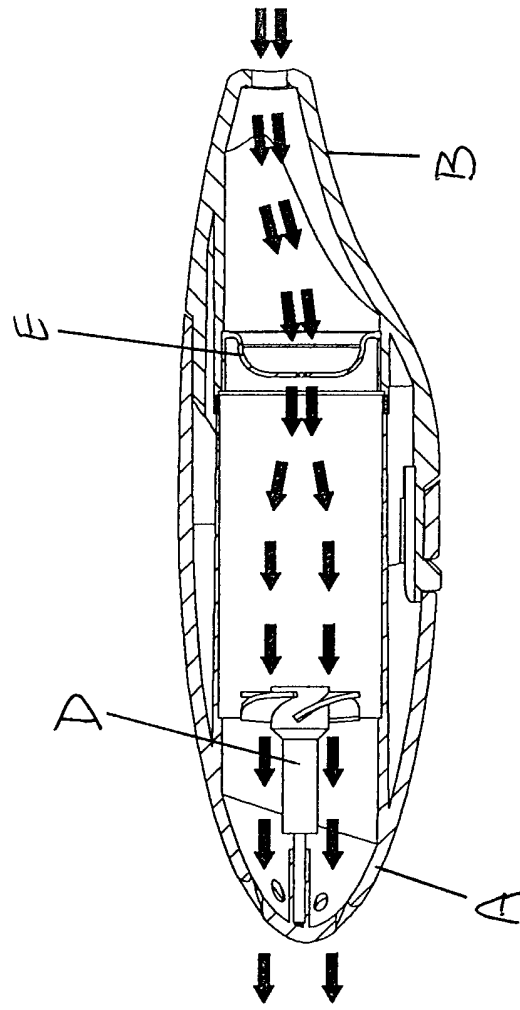
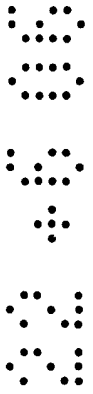


FIGURE 5



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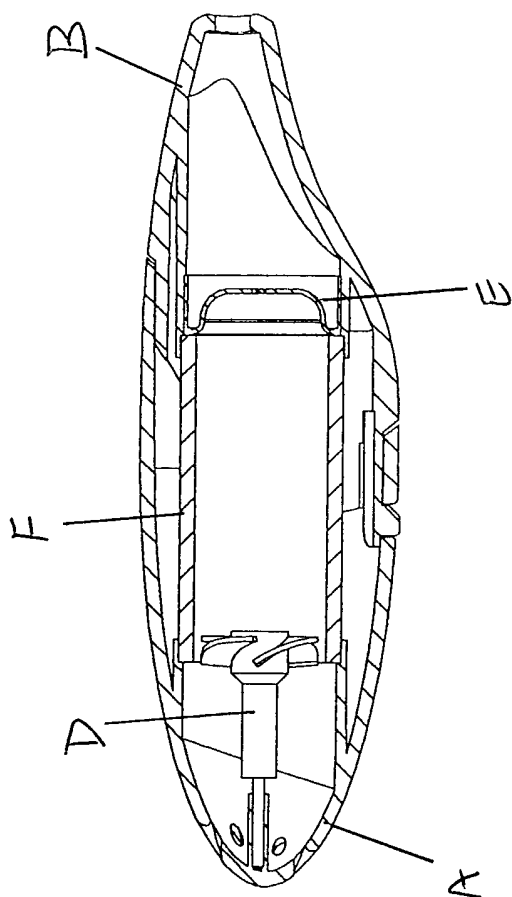


FIGURE 6

02 45 05

22 43 88

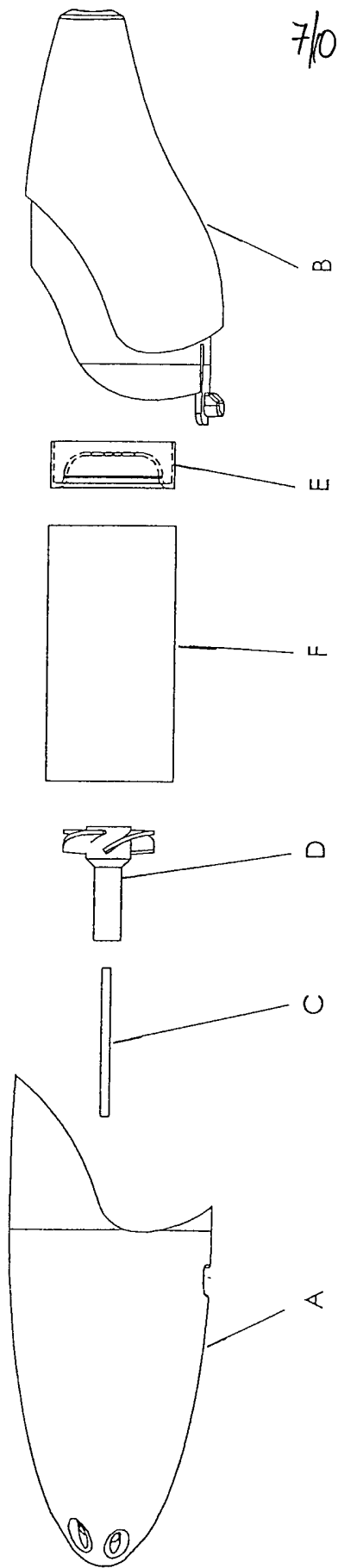


FIGURE 7

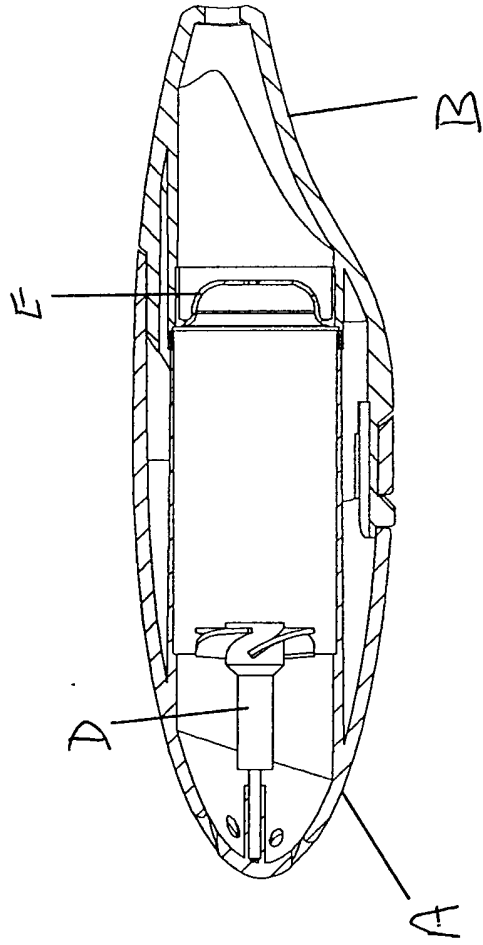
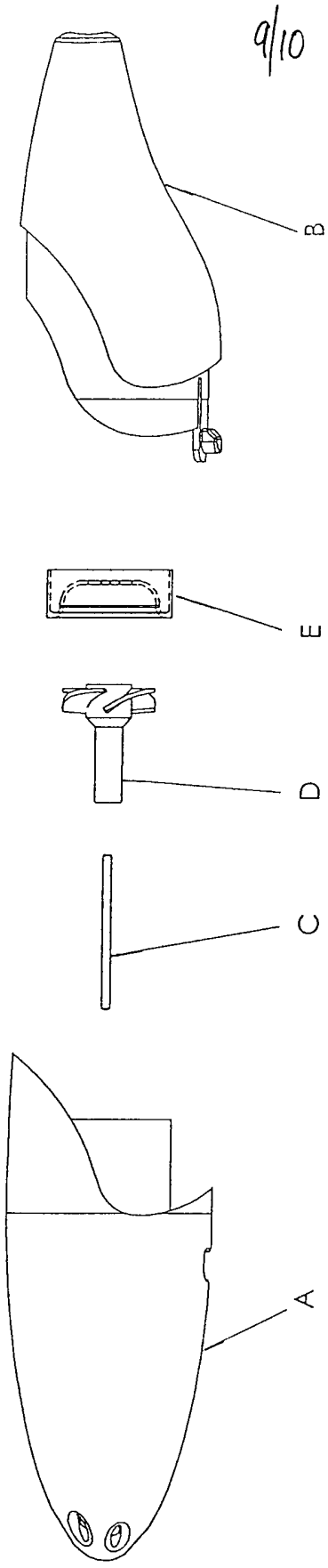


FIGURE 8

02 45 05

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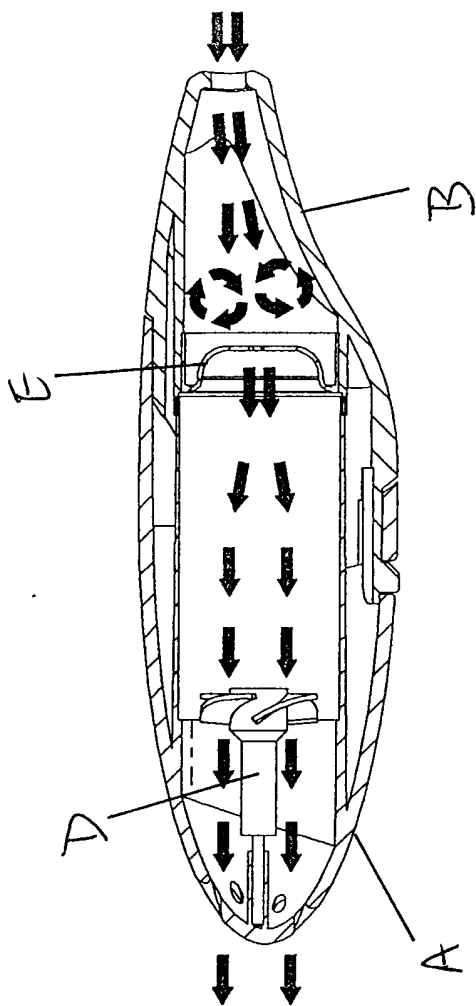
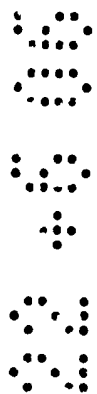


FIGURE 10



AN EXERCISE DEVICE

Field of the Invention

This invention relates to an exercise device.

Background to the Invention

There is described, in Patent Specification No. 2 249 726, a device for exercising and stimulating the lungs comprising a mouthpiece and an elastomeric balloon, the mouthpiece having a tubular body one end of which is adapted for sealing engagement with the lips of the user while the other end is adapted for sealing engagement with the mouth of the balloon, and the balloon having a restricted aperture in addition to its mouth.

As stated in Patent Specification No. 2 249 726, use of the device can be of benefit to old and infirm people confined to home, chair or bed, children (with the encouragement of seeing the balloon inflated), and even athletes, by enabling exercising of the lungs without need of energetic movement of other parts of the body or limbs.

It is an object of the present invention to provide a device which can be used in a similar manner to the device of Patent Specification No. 2 249 726, but which can be produced in such manner as to facilitate the

application of strict quality control procedures and which has a number of benefits as compared to the device of British Patent Specification No. 2 249 726.

It is also an object of the present invention to provide an improved exercise device that can be used for a variety of purposes, as described below.

Summary of the Invention

According to the present invention there is provided an exercise device that includes a chamber containing a rotor, a mouthpiece through which a user can blow into the chamber to effect rotation of the rotor, and means providing a resistance to the passage of air into the chamber.

The resistance means may be a valve, particularly a one-way valve, and means may be provided for selecting and/or adjusting the degree of resistance afforded by the valve in dependence on the characteristics of the user.

The rotor preferably comprises a shaft mounted in spaced bearings and a plurality of turbine blades projecting radially from the shaft, the blades being so shaped that the entry of air into the chamber, or the egress of air from the chamber, serves to produce rotation of the rotor. There is preferably no significant restraint to the exit of air from the chamber though, if desired, a closure cap may be provided for closing the

exit when the device is not in use. The mouthpiece may be detachable from the chamber and the valve may be located at the junction between the mouthpiece and the chamber. Detachment of the mouthpiece from the chamber will accordingly be effected when it is desired to replace a valve providing one degree of resistance by another valve providing a different, normally greater, degree of resistance.

Means may be provided for providing an indication of the rate of rotation of the rotor and hence of the rate at which air is being blown into the chamber. The measuring means is preferably a micro-electronic device that is contained within a housing that can be connected to, or disconnected from, the chamber, as required. The micro-electronic device may be linked to a display that provides an indication of, for example, the rate at which the user is blowing into the chamber.

The numbers of rotations of the rotor may be counted optically using an infra-red beam interfaced to the micro-electronic device. The method of exercising may thus include obtaining and recording a reading from the micro-electronic device.

Twice daily use of the device (mornings and evenings for a continuous period of ten to fifteen minutes if possible) will exercise and stimulate respiratory function. Use of the device is of benefit for, for example, sufferers from chronic obstructive pulmonary disease.

It is generally beneficial to introduce the user to the lowest level resistance during an induction period, followed (dependant on age and body size) by a higher, optimal level of resistance once the user has successfully developed a smooth breathing-in, blowing-out routine, preferably breathing in via the nose and then blowing out via the device.

The resistance afforded by the valve may be such that the pressure required to open the valve may be within the range of from 2 to 5 p.s.i. (0.136 to 0.340 atmospheres), for example, 3.5 or 4 p.s.i. (0.238 or 0.272 atmospheres). The device may thus be provided with a number of valves providing differing degrees of resistance and the user will replace a valve with one providing an increased degree of resistance when he or she so wishes.

Many people, particularly smokers and asthma sufferers, tend to be shallow mouth breathers, and this tendency seems to be more prevalent for those who live or work in centrally heated premises. Use of the device tends to clear the nasal passages, thus facilitating and encouraging breathing through the nose. The nose tends to act as a venturi, thereby increasing the general efficiency of oxygen inhalation. Moreover, the oxygen that the user inhales while blowing repeatedly into the device has a stimulating effect on the user, thereby counteracting the desire for nicotine. Use of the device can thus be of significant assistance to anyone wishing to stop smoking.

The device should be used on a regular basis, i.e. at least daily, so that the user's lungs will be exercised, the capacity of the lungs during breathing will be increased, any mucus within the lungs will be dislodged and removed by the positive air pressure of up to 5 p.s.i. (0.340 atmospheres), the alveoli will be expanded from within and the intercostal muscles will be strengthened. The advantages will become particularly apparent if, for example, the user has at least two sessions of repeated blowing each day, with each session lasting of the order of five to ten minutes.

A few minutes of regular blowing into the exercise device will clear out the pollutants resulting from a day spent in a polluted atmosphere. The user will, as far as possible, choose to operate the method in an area that is comparatively free from atmospheric pollution, for example, within the home. Use of the device is thus particularly recommended for police, traffic wardens or others who spend substantial periods outside in urban areas, such as young children whose playgrounds are in polluted areas or whose walk to school takes them along roads with heavy traffic use.

A person's lungs are in constant contact with the environment. As a result, pollutants tend to collect in the lungs and in the person's airways, and can be cleared by use of the device. A daily routine involving regular use of the device (just like the regular use of a toothbrush to clean the teeth) will help to free the lungs' self-cleaning mechanisms, the "cilia", to avoid clogging by mucus and help to maintain the health of the lungs.

At the same time, because the user is blowing into a chamber within the exercise device at a pressure such as to effect opening of the one-way valve, the pressure within the user's lungs and airways will be increased and the airways will be expanded. This increase in pressure and expansion of the airways will promote movement of air within the airways so as to expel mucus and other debris.

Regular blowing into the exercise device can be effected at the end of the day, on the way home from work, sitting in a car, or even lying in bed, so that the user's lungs are exercised even if no other physical exercise is possible. Blowing into the chamber of the exercise device is, however, preferably carried out when the user is standing up, since this gives the maximum benefit for adult users.

Some people may think that they will look silly sitting or standing in public blowing into the device. If, however, a group of people are all engaged in blowing, this negative effect can be avoided. The group of people may be, for example, a class of young children or a group of occupants in a retirement home. Children will tend to regard blowing as a fun activity and, because of the increased flexibility of their lungs and muscles, will tend to experience an improvement in their physical condition more rapidly than adults.

The chamber may be an integral part of the housing, or it may be formed as a separate component fitted within the housing.

The valve and its mounting within the housing may be so formed that the valve can be mounted either facing forwards or with its position reversed so as to obtain a different pattern of airflow through the housing.

Brief Description of the Drawings

Figure 1 is a sectional view of an exercise device having a separate chamber and with the valve facing forwards,

Figure 2 is an exploded side view of the exercise device of Figure 1,

Figure 3 is a sectional view of an exercise device having a built-in chamber and with the valve facing forwards,

Figure 4 is an exploded side view of the exercise device of Figure 3,

Figure 5 is a sectional side view of the exercise device of Figure 3 showing a typical airflow obtained during use of the device,

Figure 6 is a sectional view of an exercise device having a separate chamber and with the valve reversed,

Figure 7 is an exploded side view of the exercise device of Figure 6,

Figure 8 is a sectional view of an exercise device having a built-in chamber and with the valve reversed,

Figure 9 is an exploded side view of the exercise device of Figure 8, and

Figure 10 is a sectional side view of the exercise device of Figure 8 showing a typical airflow obtained during use of the device,

Description of the Preferred Embodiments

The exercise device shown in Figures 1 and 2 includes a housing comprising a nose cone A and a mouthpiece B, both formed as plastic mouldings and designed so that they can readily connected to one another and readily separated from one another. The mouthpiece B has an opening into which a user can blow and, at the forward end of the nose cone A, there is an internal socket that receives a spindle C on which a rotor D is mounted so that the rotor D can rotate within the nose cone A. The nose cone A is formed, as can be seen in Figure 2, with a number of exit openings for the discharge of air from the interior of the housing.

Before the nose cone A and the mouthpiece B are connected together, a cylindrical plastic member defining a chamber F and a valve E are placed between the nose cone A and the mouthpiece B such that interconnection of the nose cone A and the mouthpiece B serves to locate the chamber F and the valve E within the housing of the exercise device, as shown in Figure 1. As can be seen from Figure 1, the valve E is located at the junction between the nose cone A and the mouthpiece B.

The arrangement is thus such that, when a user blows into the mouthpiece B, the flow of air into the chamber F will be restricted by the valve E to an extent determined by the design of the valve E. The resistance afforded by the valve E can be such that the pressure required to open the valve E is within the range of from 2 to 5 p.s.i. (0.136 to 0.340 atmospheres), for example, 3.5 or 4 p.s.i. (0.238 or 0.272 atmospheres). The device may be provided with a number of valves providing differing degrees of resistance and the user will replace a valve with one providing a different degree of resistance when he or she so wishes.

As the user blows into the mouthpiece B, there will be a flow of air through the valve E into the chamber F and the flow of air through the chamber F will produce rotation of the rotor D, the rotor D being formed as an impeller so that it responds to the flow of air into the chamber F and out through the exit openings formed in the nose cone A.

A measuring device (not shown) may be provided for providing an indication of the rate of rotation of the rotor D and hence of the rate at which air is being blown into the chamber D. The measuring device may be a micro-electronic device that is contained within a housing that can be connected to, or disconnected from, the chamber F, as required. The micro-electronic device may be linked to a display (also not shown) that provides an indication of, for example, the rate at which the user is blowing into the chamber F.

The numbers of rotations of the rotor D may be counted optically using an infra-red beam interfaced to the micro-electronic device. The method of exercising may thus include obtaining and recording a reading from the micro-electronic device.

The exercise device shown in Figures 3 and 4 differs from that shown in Figures 1 and 2 only in that the chamber F is an integral part of the nose cone A.

Figure 5 shows a typical pattern of airflow obtained using the exercising device of Figures 1 and 2 and, as can be seen, there is a relatively smooth flow of air, i.e. an absence of eddy currents, as the air flows through the exercise device.

The valve E is reversible and Figures 6 and 7 show the exercise device of Figures 1 and 2 with the valve E reversed, while Figures 8 and 9 show the exercise device of Figures 3 and 4 with the valve E reversed. As can be seen from Figure 10, reversing the valve E affects the pattern of flow of air through the device and produces eddy currents.

As an alternative to having a reversible valve, it is possible to have a one-way valve and the exercise device may again be provided with a plurality of valves offering different degrees of resistance that can be placed in position within the housing.

Claims:-

1. An exercise device that includes a chamber containing a rotor, a mouthpiece through which a user can blow into the chamber to effect rotation of the rotor, and means providing a resistance to the passage of air into the chamber.
2. An exercise device as claimed in Claim 1, in which the resistance means is a valve.
3. An exercise device as claimed in Claim 2, in which the valve is a one-way valve.
4. An exercise device as claimed in Claim 2 or Claim 3, in which means are provided for selecting and/or adjusting the degree of resistance afforded by the valve.
5. An exercise device as claimed in any one of the preceding claims, in which the rotor comprises a shaft mounted in spaced bearings and a plurality of turbine blades projecting radially from the shaft, the blades being so shaped that the entry of air into the chamber, or the egress of air from the chamber, serves to produce rotation of the rotor.
6. An exercise device as claimed in any one of the preceding claims, in which the mouthpiece is detachable from the chamber and the valve means is located at the junction between the mouthpiece and the chamber.

7. An exercise device as claimed in any one of the preceding claims, which includes a housing of which the chamber forms part.

8. An exercise device as claimed in any one of Claims 1 to 6, in which the chamber is contained within a separately formed housing.

9. An exercise device as claimed in Claim 2 or Claim 3, in which the valve is reversible.

10. An exercise device as claimed in Claim 1, in which means are provided for providing an indication of the rate of rotation of the rotor and hence of the rate at which air is being blown into the chamber.

11. An exercise device as claimed in Claim 10, in which the measuring means is a micro-electronic device that is contained within a housing that can be connected to, or disconnected from, the chamber.

12. An exercise device as claimed in Claim 11, in which the micro-electronic device is linked to a display that provides an indication of the rate at which the user is blowing into the chamber.

13. An exercise device substantially as hereinbefore described with reference to and as shown in the accompanying drawings.



For Innovation

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Application No: GB0607570.9

Examiner: Mr Alex Robinson

Claims searched: 1 to 12

Date of search: 22 August 2006

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X,Y	X: 1 to 5, 7, 8, Y: 10, 11, 12	EP 0997168 A1 (IMT Technologies) Whole document.
Y	10, 11, 12	GB 2024628 A (Scitec) Whole document.
Y	10, 11, 12	GB 2224567 A (Micro Medical) Whole document.
Y	1 to 5, 7, 8, 10, 11, 12	JP 2004275708 A (Yukio) Figures and abstracts, WPI abstract accession no.: 2004-712459.
Y	1 to 5, 7, 8, 10, 11, 12,	GB 1905-16015 (Renvoize) Whole document.
Y	1 to 5, 7, 8, 10, 11, 12	GB 1907-17471 (Garratt) Whole document
Y	1 to 5, 7, 8, 10, 11, 12	US 2003/0209247 A1 (O'Rourke) Whole document.
Y	1 to 5, 7, 8, 10, 11, 12	US 940735 A (Schaeffer) Whole document.

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category	P	Document published on or after the declared priority date but before the filing date of this invention
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X :



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A5K; A5T

Worldwide search of patent documents classified in the following areas of the IPC

A61B; A63B

The following online and other databases have been used in the preparation of this search report

EPODOC, WPI.