J. ERIKSSON & P. M. ARVIDSSON.

RESPIRATOR AND THE LIKE.

APPLICATION FILED MAR. 24, 1909.

950,816.

Patented Mar. 1, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

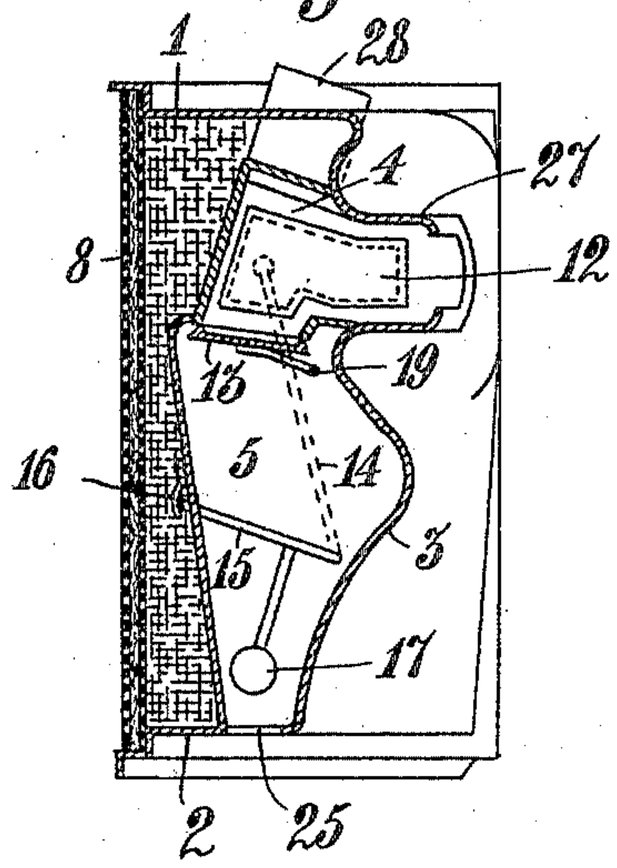
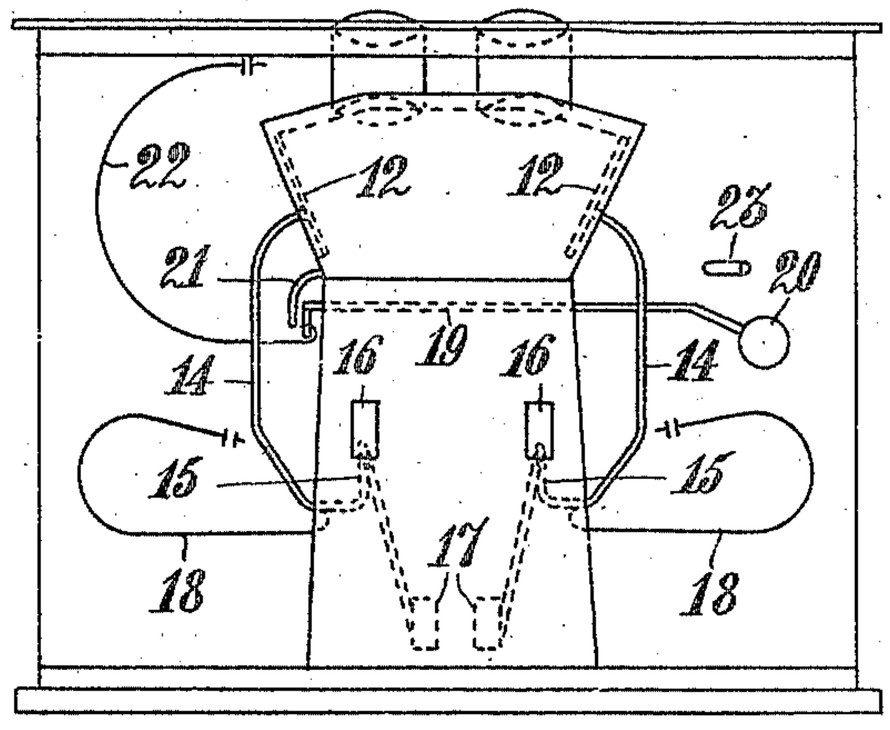


Fig. 2.



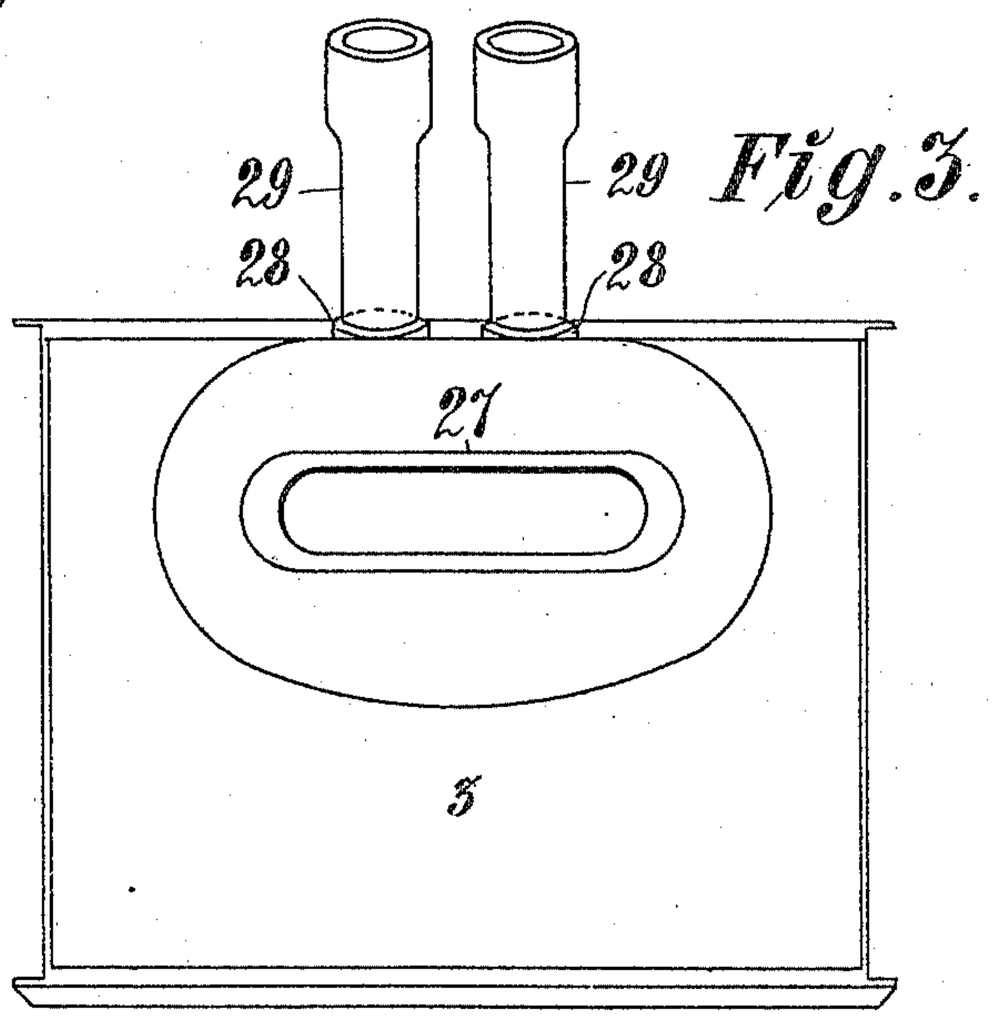


Fig. 3.

Witnesses

P. Lundqvist

Henrik Hägberg

Inventors

John Eriksson

Per Martin Arvidsson

J. ERIKSSON & P. M. ARVIDSSON.

RESPIRATOR AND THE LIKE.

APPLICATION FILED MAR. 24, 1909.

950,816.

Patented Mar. 1, 1910.

2 SHEETS—SHEET 2.

Fig. 4.

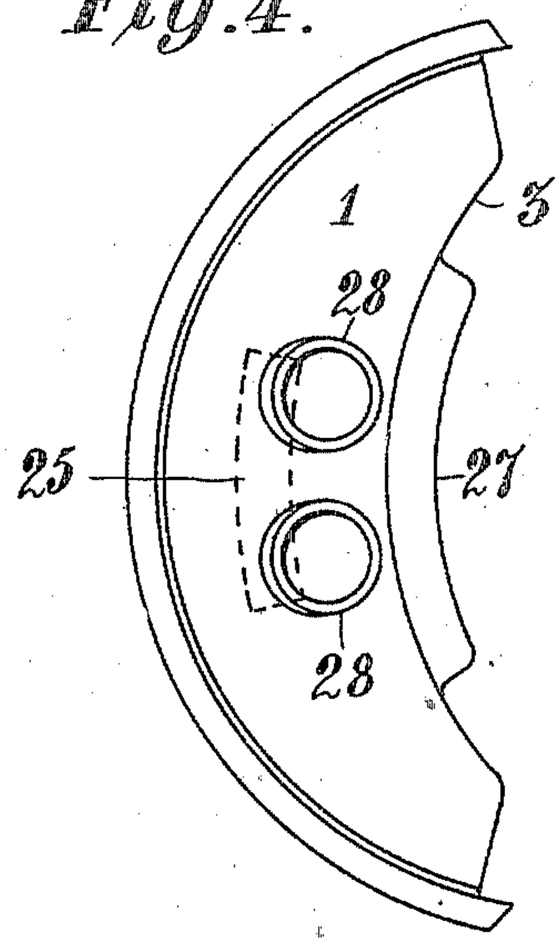


Fig. 5.

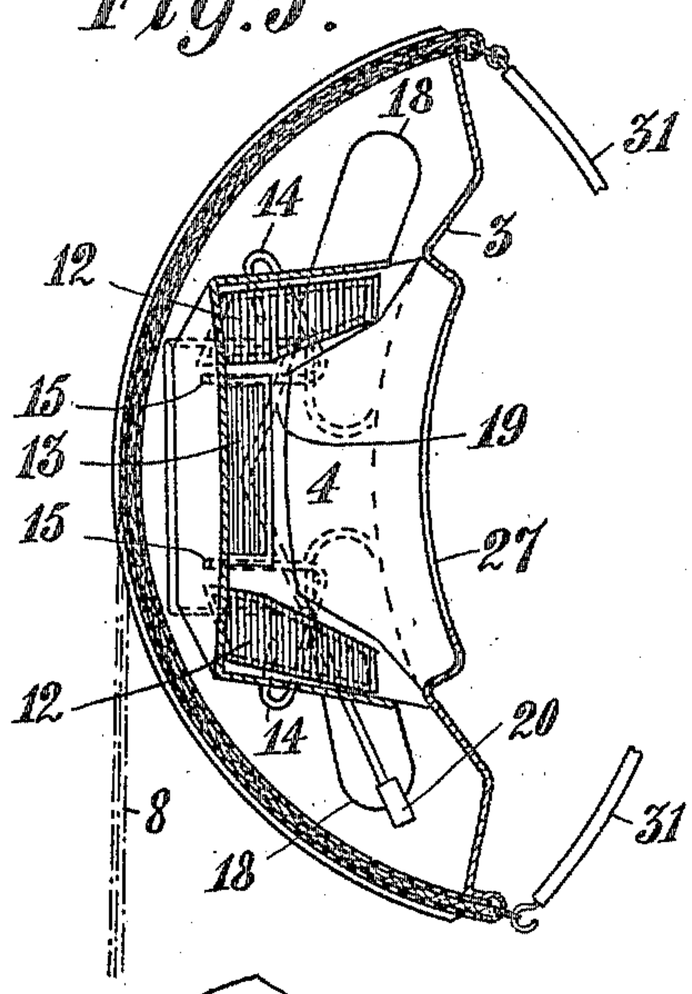
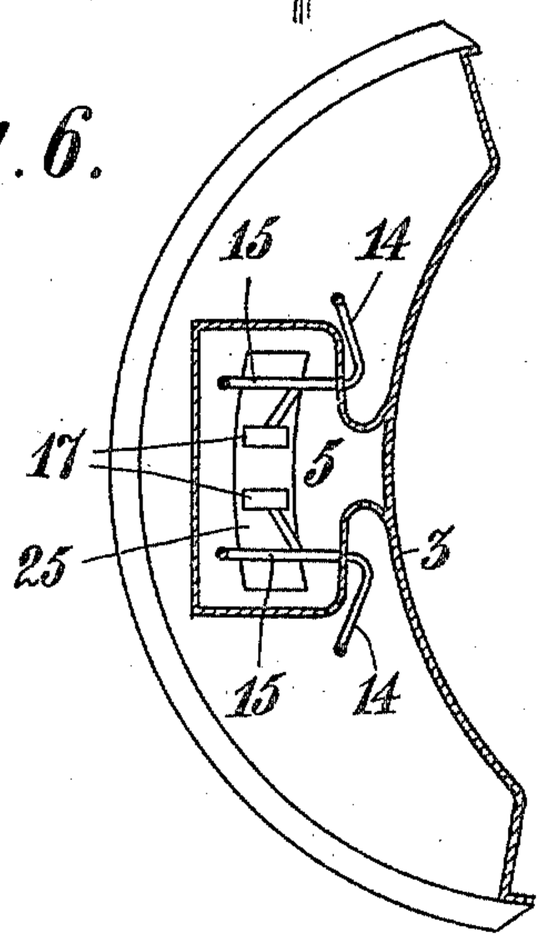


Fig. 6.



Witnesses

O. Lundquist

Henrik Hagberg

Inventors

John Eriksson

Per Martin Arvidsson

UNITED STATES PATENT OFFICE.

JOHN ERIKSSON AND PER MARTIN ARVIDSSON, OF SOLLEFTEÅ, SWEDEN.

RESPIRATOR AND THE LIKE.

950,816. Specification of Letters Patent. Patented Mar. 1, 1910.

Application filed March 24, 1909. Serial No. 485,462.

To all whom it may concern:

Be it known that we, JOHN ERIKSSON and PER MARTIN ARVIDSSON, subjects of the King of Sweden, residing in Sollefteå, in the Kingdom of Sweden, have invented new and useful Improvements in Respirators and the Like, of which the following is a specification, reference being had to the drawings accompanying and forming a part hereof.

This invention relates to respirators, inhalers and similar apparatus of the kind provided with inlet and exhaust valves turning, in opening and closing, on axles or pins.

The object of the invention is to so arrange the said valves that they will easily open and close and work satisfactorily and reliably in any position of the apparatus.

The invention consists in certain novel constructions and combinations of parts as will be hereinafter described and claimed.

In the drawings, Figure 1 is a vertical section of a respirator embodying the invention. Fig. 2 is a front view of the same apparatus with the filter removed. Fig. 3 is a rear view of the apparatus. Fig. 4 is a plan view thereof. Fig. 5 is a plan view of the apparatus with the top cover removed to show the inner parts. Fig. 6 is a horizontal section of the apparatus below the valve casing.

Referring to the drawings, the sheet metal structure 1, 2, 3 of the respirator is provided with a mouthpiece 27 adapted to be inserted between the lips and also with sleeves 28 adapted to receive rubber tubes 29 the upper ends of which may be inserted into the nostrils of the wearer. Placed inside the structure and connected to the mouthpiece 27 and to the rubber tubes 29 is the valve casing 4 having at the sides inlet valves 12 opening into the valve chamber and at the bottom an exhaust or outlet valve 13 opening downwardly. Situated below the exhaust valve is the downwardly extending exhalation chamber 5 conducting the exhaled air from the exhaust valve down through the exhalation opening 25 at the lower side of the sheet metal structure 1, 2, 3.

The inlet valves are connected to the filter, preferably cotton or wadding, by means of an inhalation chamber formed by the sheet-metal structure 1, 2, 3, on the outer edges of which the filter is bearing.

For retaining the respirator onto the face of the wearer, we, preferably, use a rubber tape 31 or the like attached to the outer edges and adapted to be placed behind the neck.

The inlet valves 12 are carried by long lever arms 14 suitably extending through the inhalation chamber and through the walls of the exhalation chamber, as shown in Figs. 2 and 6. The turning axle 15 of each lever arm 14 is suitably made integral with the said arm and formed by simply bending the latter. The ends of the axles 15 projecting through the anterior wall of the exhalation chamber bear on plates 16 or the like attached to the outer side of the said wall. Attached to the axles 15 are weights 17 balancing the valves 12 in such a manner that the center of gravity of each turning system coincides with the axis of oscillation thereof. The closing of the valves is performed by preferably bent springs 18 placed between the valve rods and the adjacent part of the structure. The exhaust valve 13 is attached to an axle 19 journaled in the side walls of the exhalation chamber, said axle being bent, with the part thereof inside the exhalation chamber, in the form of a U extending beneath the valve, with the closed end next to the anterior wall of the exhalation chamber, and carrying at one end, outside the exhalation chamber, a counterweight 20. The other end of the axle projecting through the wall of the exhalation chamber bears, like the axles 15, on a plate 21 or the like. The latter end of the axle is further connected to a spring 22 tending to close the valve. In order that the valve, in opening, shall not move beyond a certain position, a stop-pin 23 is placed in the structure above the part of the axle 19 carrying the weight 20.

All the valves are attached to their axles and carried by the same in such a manner that the axles are as far as possible at the side of the corresponding valve, in order that the opening and closing of the valves may require but a little turning of the axles, by which the friction is reduced and the valves are rendered more easily movable, the movement of the valves approaching at the same time a rectilinear parallel motion, which admits a more convenient form of the valve casing and requires but a little space.

As shown in the drawings, the counterweights 17 for the inlet valves are placed within the exhalation chamber and the counterweight 20 for the exhaust valve within

the inhalation chamber, which is made possible by the axles passing through and turning in the walls of the exhalation chamber. By this means a favorable placing of the exhalation chamber as well as of the valve axles and counterweights is obtained. The springs 18 and 22 which tend to close the valves are preferably placed within the inhalation chamber protected by the filter. By this means the springs are protected from dust and other impurities which may enter through the exhalation opening 25, the mouthpiece 27 or the rubber tubes into the other parts of the respirator.

The hereinbefore described improvement in respirators, inhalers and the like may be employed, if desired, without the valves being balanced by counterweights, provided the valves are supported and closed by suitable springs, but its greatest importance is in connection with such counterweights. Obviously, the balancing of the valves by counterweights is independent of whether the valve axles are at a distance from or near the valves. It may also be employed in valves moving parallel to themselves.

The invention may be employed in all respirators and the like provided with valves and also in apparatus of the said kind in which the filter is replaced by a hose or tube for supplying fresh air or gaseous medicines or other substances to be inhaled.

We claim:

1. In a respirator, the combination of valves, each adapted to swing about an axis, weights for balancing the said valves in such a manner that the center of gravity of each turning system coincides with the axis of oscillation of the said system, and springs for closing the said valves.

2. In a respirator, the combination of an inlet valve, adapted to swing about an axis, and to open under the influence of vacuum created by inhalation, a weight for balancing the said valve in such a manner that the center of gravity of the turning system coincides with the axis of oscillation of the said system, and a spring for closing the said valve.

3. In a respirator, the combination of an inhalation chamber, rocking axles placed within the said chamber, arms extending from the said axles, valves carried by the said arms in positions to open from the said inhalation chamber, under the influence of vacuum created by inhalation, weights for balancing the said valves in such a manner that the center of gravity of each turning system coincides with the axis of oscillation of the said system, and springs for closing the said valves.

4. In a respirator, the combination of valves, each adapted to swing about an axis at a comparatively great lateral distance from the corresponding valve, weights balancing the said valves in such a manner that the center of gravity of each turning system coincides with the axis of oscillation of the said system, and springs for closing the said valves.

5. In a respirator, the combination of rocking axles, inlet valves carried by the said axles, at a comparatively great distance therefrom, and adapted to open under the influence of vacuum created by inhalation, weights balancing the said valves in such a manner that the center of gravity of each turning system coincides with the axis of oscillation of the said system, and springs for closing the said valves.

6. In a respirator, the combination of a valve casing, an inhalation chamber, an exhalation chamber, axles turning in the walls between the said chambers, arms extending from the said axles, valves carried by the said arms, weights for balancing the said valves in such a manner that the center of gravity of each turning system coincides with the axis of oscillation of the said system, and valve-closing springs placed within the inhalation chamber.

7. In a respirator, the combination of a valve casing, an inhalation chamber, an exhalation chamber, axles turning in the walls between the said chambers, arms extending from the said axles, valves carried by the said arms in positions to open from the said inhalation chamber, under the influence of vacuum created by inhalation, weights for balancing the said valves in such a manner that the center of gravity of each turning system coincides with the axis of oscillation of the said system, and valve-closing springs placed within the inhalation chamber.

8. In a respirator, the combination of an inhalation chamber, an exhalation chamber, axles turning in the walls of the said exhalation chamber, arms extending from the said axles through the inhalation chamber, valves carried by the said arms in positions to open from the said inhalation chamber, weights for balancing the said valves carried by the axles, within the exhalation chamber, and exhaust valves opening toward the said exhalation chamber.

9. In a respirator, the combination of an inhalation chamber, an exhalation chamber, valves opening from the said inhalation chamber, an axle turning in the walls of the exhalation chamber, an exhaust valve carried by the said axle, an arm extending from the said axle within the inhalation chamber, and a weight for balancing the exhaust valve carried by the said arm.

10. In a respirator, the combination of a valve casing, an inhalation chamber, an exhalation chamber, axles turning in the walls of the said exhalation chamber, arms extending from the said axles through the inhalation chamber, inlet valves carried by the said

arms in positions to open from the said inhalation chamber into the valve casing, weights for balancing the said valves carried by the said axles, within the exhalation chamber, a further axle turning in the walls of the exhalation chamber, an exhaust valve carried by the said axle, an arm extending from the said axle within the inhalation chamber, and a weight for balancing the exhaust valve carried by the said arm.

11. In a respirator, the combination of a valve casing, an inhalation chamber, an exhalation chamber, axles turning in the walls of the said exhalation chamber, arms extending from the said axles through the inhalation chamber, inlet valves carried by the said arms in positions to open from the said inhalation chamber into the valve casing, weights for balancing the said valves carried by the said axles, within the exhalation chamber, a further axle turning in the walls of the exhalation chamber, an exhaust valve carried by the said axle, an arm extending from the said axle within the inhalation chamber, a weight for balancing the exhaust valve carried by the said arm, and valve closing springs placed within the inhalation chamber.

JOHN ERIKSSON.
PER MARTIN ARVIDSSON.

Witnesses:
E. A. LUNDQUIST,
HENRIK HÄGBERG.