J. T. RYAN.

REGENERATOR FOR BREATHING APPARATUS.

APPLICATION FILED MAY 31, 1919.

1,328,058. Patented Jan. 13, 1920.

FIG. 1.

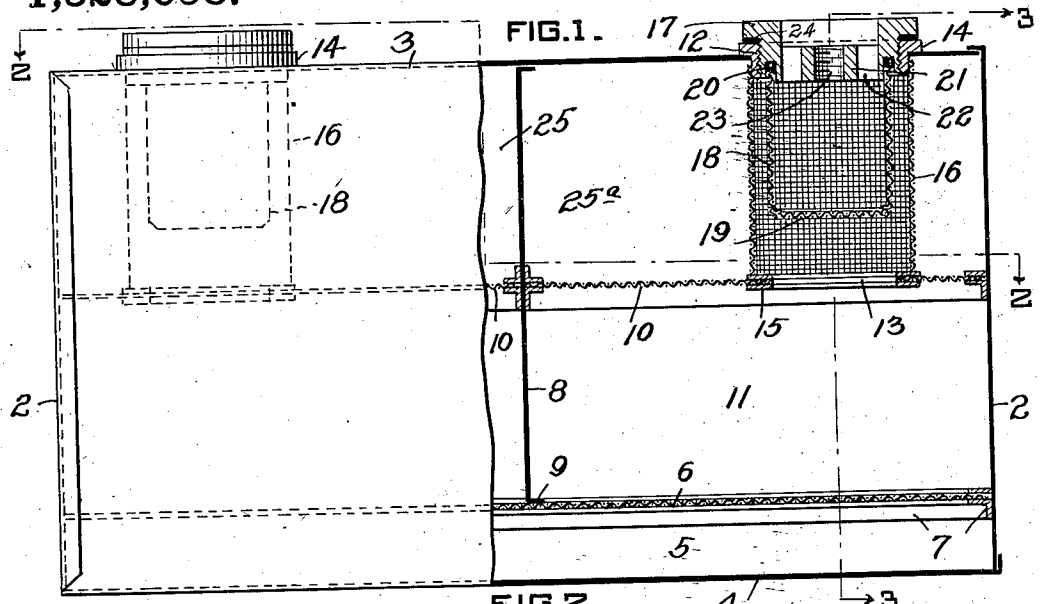


FIG. 2.

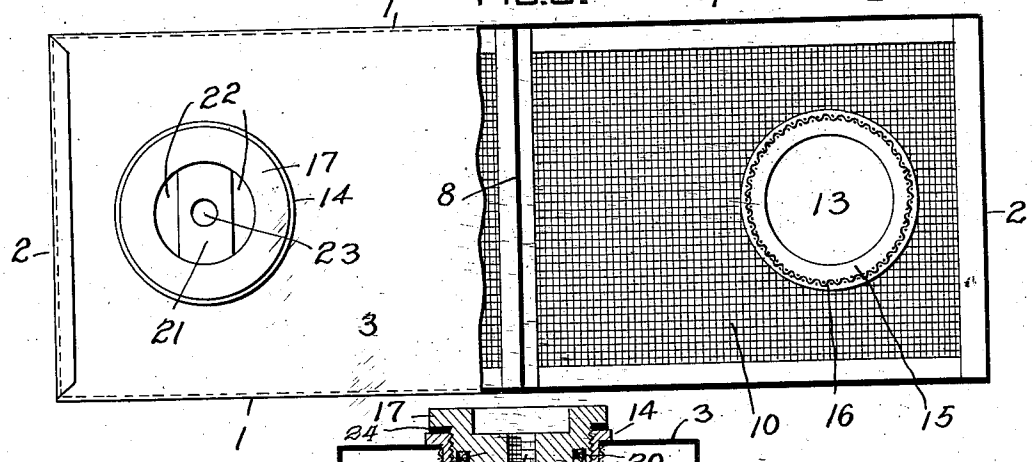
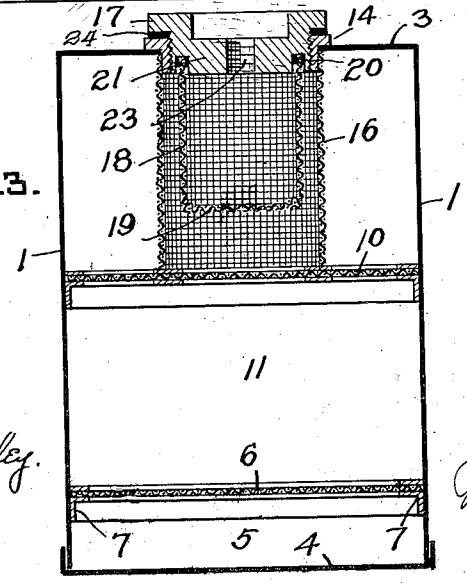


FIG. 3.



WITNESSES

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REGENERATOR FOR BREATHING APPARATUS.

1,328,058. Specification of Letters Patent. Patented Jan. 13, 1920.

Application filed May 31, 1919. Serial No. 300,857.

To all whom it may concern:

Be it known that I, JOHN T. RYAN, resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Regenerators for Breathing Apparatus, of which the following is a specification.

This invention relates to regenerators for so-called "breathing apparatus", that is, apparatus for supplying breathable air to a person surrounded by noxious or poisonous gases or fumes.

Apparatus of the kind described is provided with a so-called regenerator containing a chemical which serves to regenerate the exhaled air, that is, to absorb the carbon dioxid and restore the air to substantially its original condition.

The object of the present invention is to provide a regenerator so constructed that the chemical material can be readily renewed, that the chemical material will not cake or form a hard mass in the device, which provides a body of chemical material of substantially uniform thickness with large exposed surfaces for the passage of the air therethrough and so arranged as to prevent any of the air from short circuiting between the inlet and outlet of the device.

In the accompanying drawing Figure 1 is in part a side elevation and in part a central longitudinal vertical section through the device; Fig. 2 is in part a plan view and in part a horizontal section of the device on the line 2—2, Fig. 1; and Fig. 3 is a vertical transverse section on the line 3—3, Fig. 1.

The improved regenerator comprises a can or canister, preferably formed of suitable non-rusting sheet metal, comprising side walls 1, end walls 2, a top 3 and a bottom 4. This body can be constructed in any suitable way, with the parts united in any of the ways well known in the manufacture of sheet metal cans or vessels, and in a manner so that all of the joints are hermetically sealed.

Located a short distance above the bottom 4, so as to leave at said bottom an unobstructed chamber 5 extending from end to end of the device, is a suitable screen 6, preferably formed of wire gauze of copper or other non-corrosive wire and which screen extends from end to end and from side to side of the chamber in the casing and is suitably secured at its edges to the side and end walls thereof, such as being soldered or similarly secured to angle members 7, which are soldered or similarly secured to the walls of the body. The space above this screen 6 is divided into 2 chambers by means of a vertical transverse partition 8 extending entirely widthwise of the casing and secured to the side and top walls thereof and having the screen 6 secured to its lower edge, as at 9. The chambers formed by the partition 8 are divided by horizontal screens 10, likewise preferably formed of wire gauze, and located a considerable distance above the screen 6, thus providing spaces 11 for containing the chemical regenerating agent. This chemical may be of any of the forms of solid granular compounds now used and will fill the chambers 11 substantially full.

The top 3 of the casing above each of the compartments is provided with an opening 12 and each of the perforated partitions or screens 10 is provided with an opening 13 in alinement with the opening in the top of the casing, which openings are surrounded respectively by internal threaded brass rings 14 in the top openings and plain brass rings 15 soldered or otherwise secured around the openings in the screens 10. These openings are connected by means of perforated cylinders 16 also preferably formed of wire gauze, and securely fastened to the threaded rings 14 at the top and the plain rings 15 at the bottom.

Engaging in each of the threaded rings 14 is a threaded plug 17, to which is secured a perforated cylinder 18 provided with a bottom 19, and which preferably also is formed of wire gauze. These cylinders are secured to the plug in any way to form a secure connection, such as providing the plugs at their lower faces with a groove 20 to receive the upper end of the cylinder, and in which said cylinder is secured by suitable means, such as solder.

Each of these plugs is provided with a transverse bridge 21 with openings 22 at each side thereof, and which bridge is provided with a threaded hole 23 for attaching to the plugs the inhalation and exhalation pipes respectively.

In the use of the apparatus the granular chemical material is filled into the spaces 11

between the bottom screen 6 and top screen 10, through the cylinders 16, until said chambers 11 are substantially full. The plugs 17 are then screwed into the rings 14 until tight joints are made, a suitable gasket 24 preferably being applied around the plugs. The cylinders 18 project down into the cylinder 16, as shown in Fig. 1. The inhalation pipe is then connected to one of the plugs 12, and the exhalation pipe to the other of said plugs, so that in the use of the apparatus air exhaled by the user passes down through one of the cylinders 16, say the left hand cylinder, escaping through the side walls of that cylinder in all directions, into the chamber 25 above the screen 10 on that side, whence it will pass through the screen 10, as well as through the bottom 19 of cylinder 18, and permeates the material in the left hand chamber 11. Thence it passes through the bottom screen 6 into the passage 5, across to the right hand side, and up through the screen 6 and the material in the chamber 11, and up through the screen 10 above said material and into the chamber 25^a, and thence through the right hand cylinder 16 and out through the inhalation pipe.

The construction described provides for large bodies of regenerating chemical of substantially uniform thickness, these two bodies being separated by an imperforate partition with a continuous passage underneath the same. Both of these bodies have their entire top and bottom surfaces exposed through the perforated screens or partitions, and the incoming air is distributed over the entire top of the first body of chemical and passes uniformly through said body throughout its entire area, and likewise the upwardly passing current on the right hand side passes through the other body of chemical throughout its entire area and collects in the outlet chamber 25^a whence it can pass out through the screen cylinder of the inhalation pipe.

By this construction a very uniform distribution of the air throughout the mass of chemical material is insured, and none of the air can short circuit from the exhalation to the inhalation outlet, but all of it is compelled to pass through two bodies of material and therefore will be thoroughly regenerated. None of the fine material of the chemical can pass into the inhalation pipe, the cylinders screening out any fine material which would have a tendency to lift in the current of air. Furthermore on account of the uniform distribution of the air over the entire surface of large bodies of chemical, overheating and caking of the chemical is avoided.

The construction also permits of the ready renewal of the chemical through the large openings above each chamber.

The entire device is simple, and can be readily fabricated to provide air tight joints.

I claim:

1. A regenerator for breathing apparatus comprising a casing, a partition extending from its top nearly to its bottom and dividing the same into two compartments, a horizontal perforated partition located at the lower end of the vertical partition and secured to the side walls of the casing, a pair of perforated horizontal partitions above the first named perforated partition and dividing each compartment into two chambers, the chambers between the upper and lower perforated partitions being adapted to receive a granular regenerating agent, an orifice in the top of the casing above each of the compartments, orifices in the upper horizontal perforated partitions in line with the orifices in the top, tubular perforated members extending from the top wall of the casing to the upper horizontal perforated partitions and surrounding said orifices, and means to connect the inhalation and exhalation tubes to the top orifices.

2. A regenerator for breathing apparatus comprising a casing, a partition extending from its top nearly to its bottom and dividing the same into two compartments, a horizontal perforated partition located at the lower end of the vertical partition and secured to the side walls of the casing, a pair of perforated horizontal partitions above the first named perforated partition and dividing each compartment into two chambers, the chambers between the upper and lower perforated partitions adapted to receive a granular regenerating agent, an orifice in the top of the casing above each of the compartments, orifices in the upper horizontal perforated partitions in line with the orifices in the top, tubular perforated members extending from the top wall of the casing to the upper horizontal perforated partitions and surrounding said orifices, and threaded plugs fitting the orifices in the top wall of the casing and provided with means for attachment of the inhalation and exhalation tubes.

3. A regenerator for breathing apparatus comprising a casing, a partition extending from its top nearly to its bottom and dividing the same into two compartments, a horizontal perforated partition located at the lower end of the vertical partition and secured to the side walls of the casing, a pair of perforated horizontal partitions above the first named perforated partition and dividing each compartment into two chambers, the chambers between the upper and lower perforated partitions adapted to receive a granular regenerating agent, an orifice in the top of the casing above each of the compartments, orifices in

the upper horizontal perforated partitions in line with the orifices in the top, tubular perforated members extending from the top wall of the casing to the upper horizontal perforated partitions and surrounding said orifices, threaded plugs fitting the orifices in the top wall of the casing and provided with means for attachment of the inhalation and exhalation tubes, and perforated cylinders with closed bottoms connected to the plugs and extending down into the perforated stationary cylinders.

In testimony whereof I have hereunto set my hand.

JOHN T. RYAN.

Witnesses:
GEO. H. DUKE,
GEO. C. NELMS.