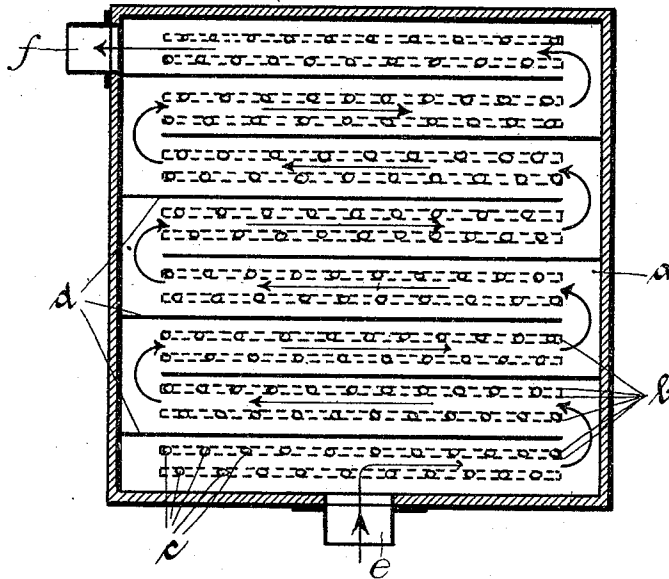


C. CHRISTIANSEN.
APPARATUS FOR ABSORBING CARBONIC ACID FROM AIR.
APPLICATION FILED MAY 29, 1911.

1,052,216.

Patented Feb. 4, 1913.



Witnesses:
B. Rommers
Elizabeth Leckert.

Inventor:
Charles Christiansen
By *Henry Orth* atty

UNITED STATES PATENT OFFICE.

CHARLES CHRISTIANSEN, OF GELSENKIRCHEN, GERMANY.

APPARATUS FOR ABSORBING CARBONIC ACID FROM AIR.

1,052,216.

Specification of Letters Patent.

Patented Feb. 4, 1913.

Application filed May 29, 1911. Serial No. 630,208.

To all whom it may concern:

Be it known that I, CHARLES CHRISTIANSEN, a citizen of the German Empire, residing at Gelsenkirchen, in the Kingdom of Prussia, German Empire, have invented new and useful Improvements in Apparatus for Absorbing Carbonic Acid from Air, of which the following is a specification.

My invention relates to improvements in apparatus for absorbing carbonic acid from air, and more particularly to apparatus to be used in connection with miners' respiration apparatus which for removing the carbonic acid from the air are filled with a substance or substances which are adapted to absorb or otherwise remove carbonic acid. In apparatus of this class, such as are now in use, the absorbing medium, such for example as caustic potash, is arranged in superposed layers providing a filter for the air, or it is disposed in flat pockets and between permeable sieves and impermeable plates in which case the air designed for respiration is admitted to and removed from the caustic potash through the sieves. Respirators of the construction first referred to are objectionable, because the granules of caustic potash are baked together as soon as reaction begins, whereby the passage of air is more or less impaired, because the resistance of the latter within the apparatus is increased. Apparatus of the second class are objectionable, because the granules are not located entirely independent either, but are disposed on an impermeable bottom. Therefore the air has no access to the sides of the granules which are in contact with the bottom, and the said granules bake together with the bottom, so that their action on the air is more or less impaired.

The object of the improvements is to provide an apparatus of the character referred to which is free of the objections of the apparatus now in use, and which combines the advantages of both constructions.

With this object in view my invention consists in constructing the absorbing apparatus of flat pockets formed at both sides of permeable material and arranging a plurality of such pockets within chambers which are successively traversed by the air, and away from the walls of said chambers, so that the air has free access to the individual granules from all sides thereof.

For the purpose of explaining the inven-

tion more in detail an example embodying the same has been shown in the accompanying drawing in which a diagrammatical section of the apparatus is shown.

Referring to the example illustrated in the drawing, *a* is a casing or receptacle which is adapted to receive the pockets containing the caustic potash. Within the said receptacle partitions *d, d* are provided which extend successively at opposite ends to a point away from the side wall, so that a passage is formed through which the air has a serpentine path. The air is admitted through an inlet stud *e* and it escapes through an outlet stud *f*. Within each section of the passage formed by the partitions *d, d* the layers of caustic potash are located. As shown each of the said pockets consists of two adjacent fabrics *b, b* between which the caustic potash is so located that none of the granules is in contact with the adjacent one, so that interstices are formed between the adjacent layers of the grains as well as between adjacent grains. The said pockets are disposed within the sections of the passage provided within the casing or receptacle *a* and substantially parallel to and at a distance from the partitions. The air flows through the passages formed within the casing *a* in the direction of the arrow shown and it traverses all the fabrics and flows between the granules of caustic potash. Therefore each granule comes in contact with the air to be regenerated. By reason of their independent location the granules can not bake together. The air is conducted along thin layers of caustic potash. Thereby the granules are utilized in a better way, than in known constructions, because they can not bake together or onto surfaces impermeable to air, as metal plates. Furthermore, my improved construction is advantageous, because grains of small size can be used. As the air is free to escape at both sides of the pockets, a finer fabric may be used to inclose the granules of caustic potash, than in such cases in which the granules are located on an impermeable bottom and are covered by a sieve of wire or the like. In such cases a comparatively coarse fabric must be used to permit a free access of the air to the granules. In my improved construction the air has access to the granules from both sides thereof, so that a fine fabric is not objectionable.

To secure the granules in place between

the fabrics the latter may be sewed between the granules, so that a displacement of the latter is impossible. The fabrics may be made of wire or of material which is adapted to absorb liquids. Also the partitions *d*, *d'* may be made of a fabric which is adapted to absorb liquids.

I claim herein as my invention:

1. In an apparatus of the class described, the combination with a casing and means to circulate air to be purified through the casing, of a layer of air purifying substance inclosed between two opposite layers of material permeable to air, said layers of material maintained out of contact with the walls of the circulating passage, thereby permitting the passage of air to be purified on all sides thereof, and through the same in contact with said substance.

2. In an apparatus of the class described, the combination with a casing having means for directing a current of air therethrough; of two opposed layers of material permeable to air and a granular air purifying substance held between said layers, separate

granules of which are maintained by said layers out of contact with one another and said layers supported distant from the walls of the casing and current directing means.

3. In an apparatus of the class described, the combination with a casing having partitions spaced from one another and extending alternately from one side toward the other to form a serpentine circulating passage for the air to be purified, of a plurality of purifying elements between each two partitions, each element comprising two opposed layers of material permeable to air and inclosing between them a granulated air purifying substance, said elements being maintained out of contact with the walls of the casing and the partitions under all conditions of operation.

In witness whereof I have hereunto set my hand in presence of two witnesses.

CHARLES CHRISTIANSEN.

Witnesses:

BESSIE T. DUNLAP,
M. KNAPPERS.