

N° 9185



A.D. 1905

Date of Application, 2nd May, 1905—Accepted, 17th Aug., 1905

COMPLETE SPECIFICATION.

**Improvements in Apparatus for Regenerating Breathed Out Air
for Respiration Purposes.**

We MAX BAMBERGER of 25, Seidlgasse, Vienna, Austria, Professor, FRIEDRICH BÖCK of 16, Heugasse, Vienna, Austria Assistant Professor and FRIEDRICH WANZ of 8, Bennoplatz, Vienna, Austria, Engineer, do hereby declare the nature of this invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement,

Our invention relates to apparatus for regenerating breathed out air for respiration purposes in which the breathed out air is caused to pass through a porous layer of a peroxide or peroxides which on coming into contact with carbonic dioxide or vapour of water are decomposed into the corresponding oxide or oxides and oxygen, the oxide or oxides forming with the carbonic dioxide and the vapours of water the corresponding carbonate or carbonates and hydroxide or hydroxides respectively, whereas the oxygen evolved mingles with the breathed out air rendering it respirable again.

In a former Patent No. 8865 A.D. 1904 we have described an apparatus of this class in which the peroxide or peroxides is or are contained in a hermetically closed chamber in a receptacle provided with means for establishing a connection between the said chamber and the breathing space (*i.e.* a mask or mouthpiece) when the apparatus had to be used.

When the contents of the said chamber had been exhausted the receptacle had to be thrown away.

According to our present invention we fill the peroxide or peroxides in a vessel hermetically closed afterwards and construct the apparatus in such a manner that such vessel or vessels may be readily put into and removed from the same, the means for establishing the communication between the interior of the said vessel or vessels and the breathing space being permanently attached to the apparatus itself, so that after the contents of the said vessel or vessels have been exhausted the vessel or vessels may be exchanged for fresh ones without the necessity of exchanging any other parts of the apparatus. In this way the apparatus is rendered much cheaper in use.

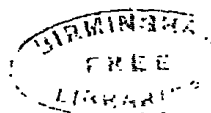
Further objects of our present invention are to simplify the construction of the apparatus and to increase its regenerating capacity.

In the accompanying drawings

Fig. 1 is a side elevation partly in section and Fig. 2 a plan view of one constructional form of our improved apparatus and Fig. 3 is an elevation and Fig. 4 a plan view of a modification.

Referring now to Figs. 1 and 2 C is a vessel filled with the peroxide or peroxides to be used which are contained between two filters E¹ E² in the said vessel. 15 are partitions of wire gauze or perforated sheet metal in the space between the filters for preventing the peroxide or peroxides from settling which would oppose an inconveniently great resistance to the passage of the air through the peroxide layer. 14; 14 are open necks at opposite ends of the vessel and 1 and 3 are discs of soft sheet metal for instance sheet lead soldered or otherwise fixed in the necks for hermetically closing the vessel. 16 and 17 are frames, the former being provided with parallel rods 24 and the latter with parallel guides 25 for such rods, the vessel C being held loosely in the framing or cage formed by,

[Price 8d.]



Apparatus for Regenerating Breathed Out Air for Respiration Purposes.

these rods and guides. Each of the frames 16 and 17 has secured to it a short tube 18 and 19 respectively the outer end of tube 18 is connected to a hose F or the like leading to the mask or mouth piece and the outer end of the tube 19 is connected to a short tube G connected by hose or otherwise to an air tight receptacle, such as a bag H. The inner ends of the tubes 18, 19 which are opposite the necks 14 of the vessel are provided with a sharp toothed crown 20 and 21 respectively, a light coiled spring 22 and 23 respectively within the said crowns and lateral openings between the said crowns and packing rings on the tubes. 26 are pawls pivotted to the frame 17, 27 are springs tending to hold the pawls against the rods 24 and 30 are wires or rods connecting the said pawls with a disc 29 through which screws a thumb screw 28 abutting against some fixed part of the frame 17. The pawls are so proportioned that when their points abut against the rods 24 they are somewhat below the pivots of the pawls as shown in Fig. 1 so that in this position of the parts the frames 16 and 17 cannot be drawn apart in the direction of the arrow but may be pushed the one towards the other. If it is desired to draw apart the frames 16, 17, it is only necessary to screw in the thumb screw 28 so as to turn downwards the pawls 26 and thereby to bring them out of engagement with the rods 24.

We wish it however to be understood that instead of the pawls 26 and annexed parts any releasable locking device may be used that while preventing the frames 16, 17 from being drawn apart will permit them to be pushed the one towards the other.

Assuming now that the frames 16, 17 have been drawn apart then a vessel C may be inserted into one of these frames, say 17 so that the crown 21 enters the neck 14 of the vessel, the spring 23 preventing the plate 3 from being injured by the crown 21. Then the frame 16 is put onto the frame 17 so that the rods 24 enter the guides 25 and the two frames are pushed the one towards the other until the crown 20 has entered the other neck 14 of the vessel as indicated in full lines in Fig. 1 the spring 22 preventing any injury to the plate 1. After loosening the thumb screw 28 to such an extent that the pawls 26 are in engagement with the rods 24 so that the frames 16 and 17 can not separate accidentally the apparatus is ready for use. When it has to be used it is only necessary to push by hand the frames 16, 17 the one towards the other. The crowns 20, 21 will then first cut through the soft sheet metal plates 1 and 3 and finally the packing rings on the tubes 18, 19 will come to rest on the edges of the necks 14, 14 whereby a free communication from the breathing space through hose F the lateral openings in the tube 18, the layer of peroxide or peroxides and the lateral openings in the tube 19 to the bag H is established, so that on breathing by means of this apparatus the breathed out air will be caused to first pass through the peroxide or peroxides and to mingle with oxygen or air in the bag H and then (on breathing in again) to return to the breathing space on the same way.

The breathed out air is thus thoroughly regenerated for respiration purposes and the entrance of any air from the outside into the apparatus is prevented.

No special provision is made in this apparatus for filling the bag H with oxygen before using the same as it has been found in practice that it is quite sufficient to vigorously blow twice or thrice into the apparatus made ready for breathing (without breathing in from the same) to fill the bag H to an extent ensuring free breathing provided that the charge in the vessel C is properly selected.

When the vessel C is exhausted it may be readily exchanged for a fresh one by simply drawing apart the frames 16, 17 as above described, removing the exhausted vessel and inserting a fresh one and putting the apparatus together as already set forth. The apparatus is then ready for use again. As all the parts attached to the frames 16 and 17 remain unaffected in exchanging the vessels and as the construction and handling of the apparatus is very simple it will be seen that the improved apparatus offers many advantages over the previous constructions. If desired the apparatus may be enclosed in a basket or envelope

Apparatus for Regenerating Breathed Out Air for Respiration Purposes.

of any suitable material. Instead of one vessel C as shown in Figs 1 and 2 we may put a plurality of vessels into one apparatus as shown in Figs 3 and 4 in which three vessels C of the construction described with reference to Figs. 1 and 2 are shown enclosed in a basket 32. The tubes 18 are rigidly connected to a
5 common transverse tube 33 communicating with flexible hose F leading to the breathing space.

The tubes 19 are rigidly connected to another, transverse tube 34 communicating by tube G with a closed receptacle such as a bag H. The tubes 18 and 19 are adapted to enter the necks 14 of the vessels C and are likewise of the construction described with reference to Figs 1 and 2. A yoke 35 adapted to be
10 closed and opened holds together the transverse tubes 33 and 34 and the basket 32 containing the vessels C; a thumb screw 36 screws through the yoke 35 and abuts against one of the transverse tubes, say 34. Thus the tubes 33, 34 together with the yoke 35 constitute the framing for holding the vessels C in
15 position.

When the vessels C are exhausted and it is desired to exchange them for fresh ones the thumb screw 36 is loosened, the yoke 35 is opened and then one of the transverse tubes say 33 may be removed the tubes 18 being withdrawn from the necks 14. Then the vessels C are removed and replaced by fresh ones, the necks 14
20 of the latter being slipped onto the tubes 19 whereupon the transverse tube 33 is brought into position so that its tubes 18 enter the other necks 14 of the vessels C and finally the yoke 35 is closed and the thumb screw is screwed in but so far only that the crowns 20, 21 on the tubes 18 and 19 do not injure the soft sheet metal plates 1 and 3. If it is desired to use the apparatus the bag H
25 is filled with oxygen by any suitable means and then the thumb screw 36 is screwed in until the crowns 20, 21 have cut through the plates 1 and 3 and thereby communication has been established between the hose F and the bag H as above described with reference to Figs 1 and 2 when the apparatus is ready
for breathing.

In Figs 3 and 4 we have shown an oscillating valve in the transverse tube 33 such valve being provided with a handle 38 for operating it from the outside. The valve is so constructed that in one position it connects some of the tubes 18 with the interior of the transverse tube 33 (say the two outer ones as shown) shutting off at the same time the remaining tubes 18 (say the central one) from
35 this transverse tube with which the hose F is in permanent communication.

In the position of the parts shown in Fig. 3 the breathed out air passes through the hose F the transverse tube 33 and the two outer vessels C to the bag H and back again thus being fully regenerated, but does not pass through the central vessel C, so that the charge of the outer vessels only serves for regenerating the
40 breathed out air while the contents of the central vessel remains unaffected. When the charge of the two outer vessels is exhausted, the valve may be turned into the other position in which it connects the central vessel with the transverse tube 33 and disconnects therefrom the outer ones. Then the breathed out air will be regenerated only by charge of the central vessel. This arrangement is
45 particularly designed for persons having to perform heavy work in vitiated air, such as rescue crews in case of mine disasters, the charge of the two outer vessels being sufficient for sustaining respiration even with heavy work for a considerable period say about an hour and the charge of the central vessel being sufficient for sustaining respiration during retreat. The user of the apparatus
50 is warned by the exhaustion of the charge of the two outer vessels that he must retreat and then he has only to turn the handle 38 for bringing into action the central vessel the charge of which will sustain the respiration of the person until he has reached some place with fresh air.

The number of vessels C may of course be greater than three if found convenient, the regenerating capacity of the apparatus increasing with the number
55 of vessels, all other things being equal.

We wish it to be understood that our invention is not limited to the exact

Apparatus for Regenerating Breathed Out Air for Respiration Purposes.

constructions herein described and shown and that these may be altered within wide limits without departing from the essence of our invention.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:

- 1.) An apparatus for regenerating breathed out air for respiration purposes characterized by the fact, that the framing holding in position one or more hermetically closed vessels filled with a layer of peroxide or peroxides giving off oxygen on coming into contact with breathed out air consists of two frames, moveable the one relatively to the other, one of such frames carrying a tube or tubes leading to the mouth piece or breathing space and the other carrying a tube or tubes leading to a bag, and both of such frames being provided with means (such as perforating crowns) for opening the said vessel or vessels and connecting its or their interior with the said tubes, on moving the two parts of the framing towards each other. 10
- 2.) A form of execution of the apparatus as per Claim 1 characterized by the fact that the framing carrying a vessel consists of two telescoping frames provided with a pawl mechanism preventing, when in operative position, the two frames from being drawn apart but permitting them to be moved toward each other. 15
- 3.) A modification of the apparatus as per Claim 1 characterized by the fact that the framing carrying the vessel or vessels consists of two transverse tubes one of which is held by a yoke while the other bears against a pushing device (such as a screw) carried by the said yoke. 20
- 4.) A form of execution of the apparatus, as per Claim 1 characterized by the fact that in the transverse tube directly connected to the mouth piece or breathing space a valve is arranged which in one position establishes communication between this transverse tube and one or more of the vessels, but breaks communication between this transverse tube and the remaining vessel or vessels while in another position of the valve it breaks communication between the transverse tube and the first named vessel or vessels and establishes communication between the transverse tube and the remaining vessel or vessels. 25 30

Dr. MAX BAMBERGER,
Professor at the Polytechnical University of Vienna,
Dr. FRIEDRICH BOCK,
Assistant Professor at the Polytechnical University of Vienna,
FRIEDRICH WANZ. 35

[This Drawing is a reproduction of the Original on a reduced scale.]

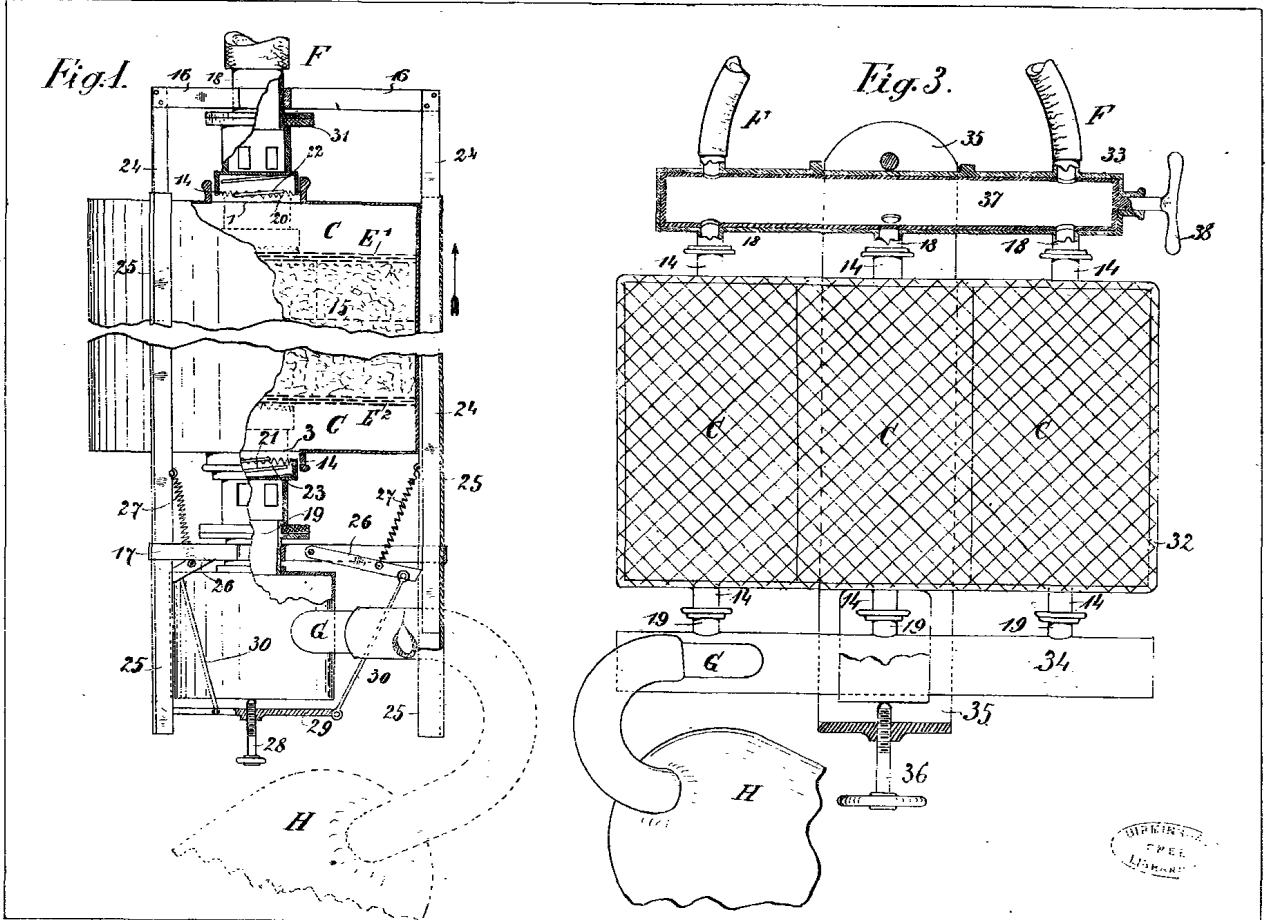
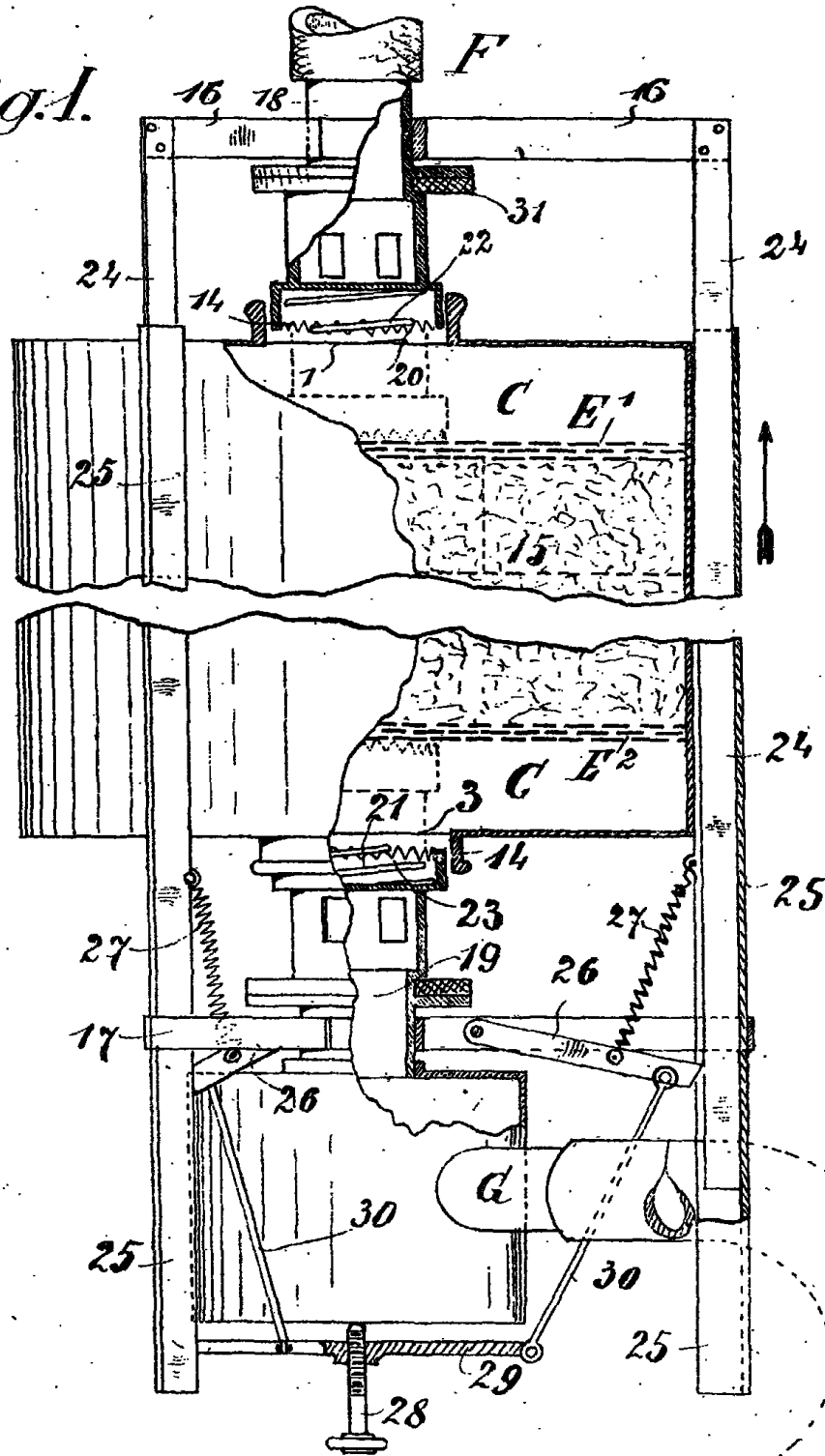
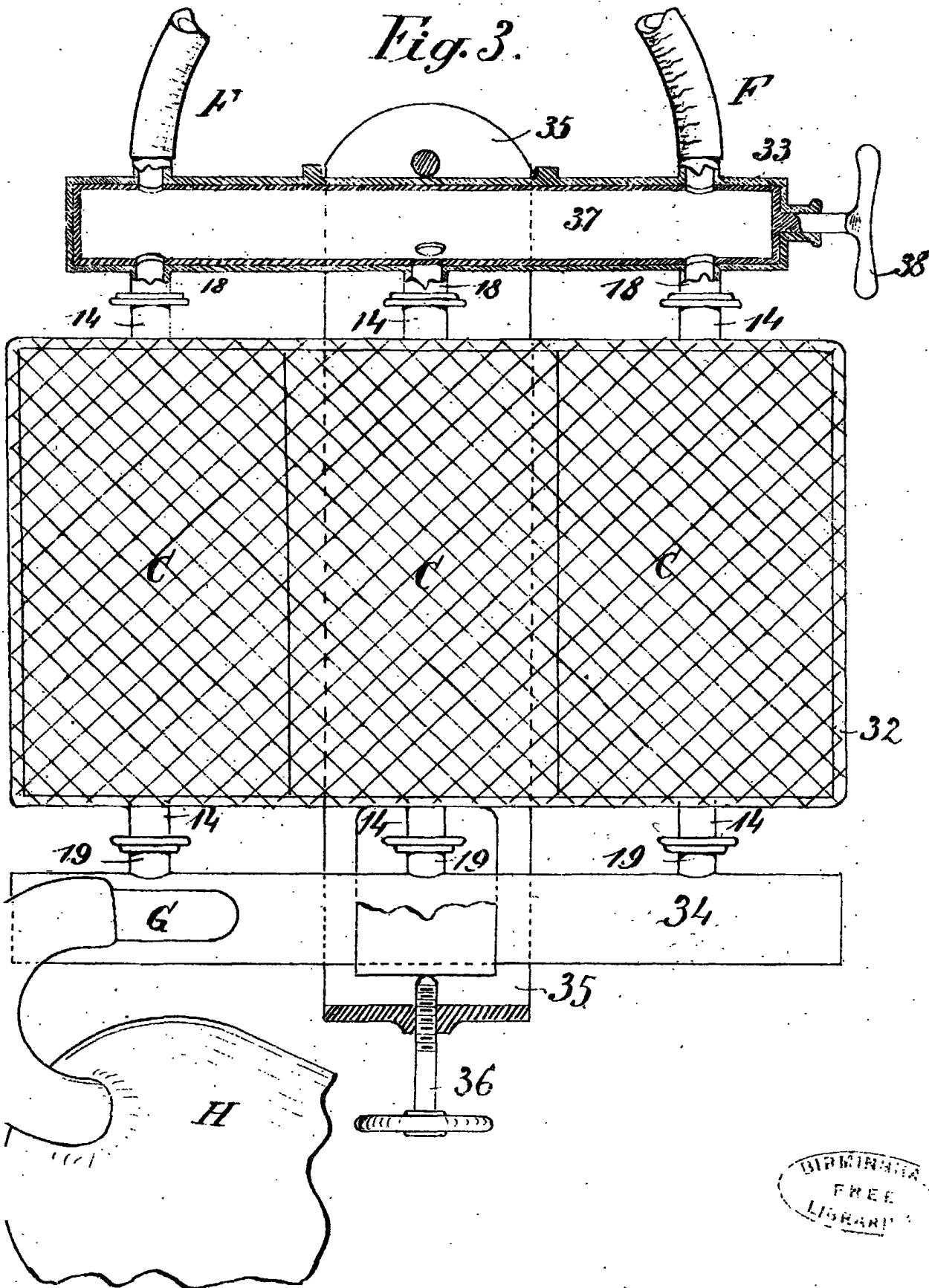


Fig. 1.



[This Drawing is a reproduction of the Original on a reduced scale.]

Fig. 3.



BIRMINGHAM
FREE
LIBRARY

Fig. 2.

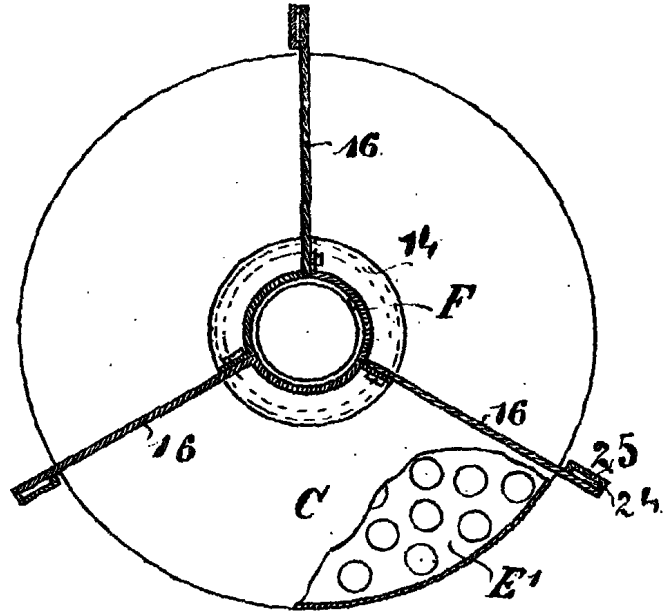
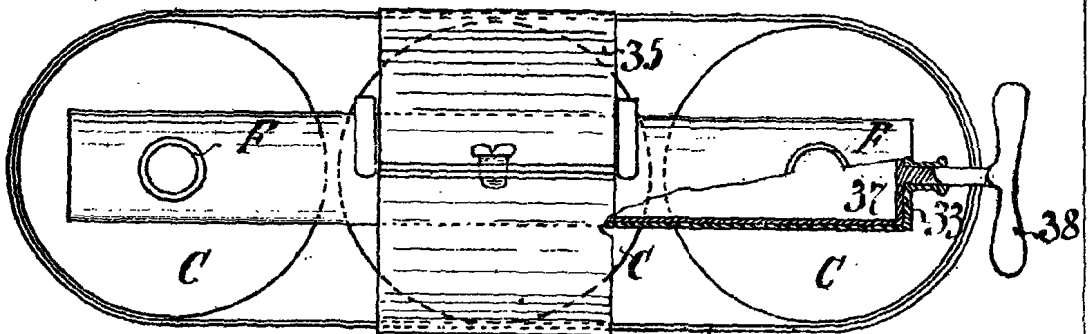


Fig. 4.



[This Drawing is a reproduction of the Original on a reduced scale.]

BIRMINGHAM
FREE
LIBRARY