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APPARATUS FOR THE ARTIFICIAL RESPIRATION

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Fig. 1

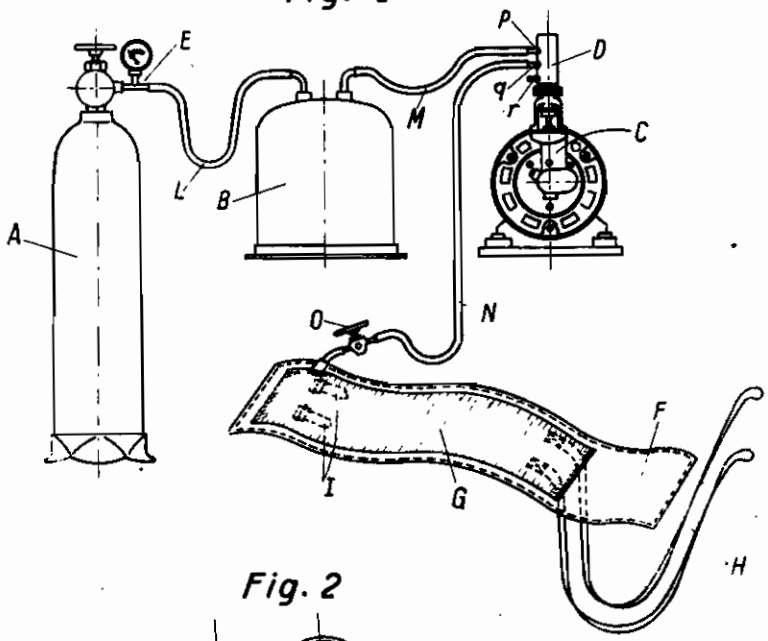


Fig. 2

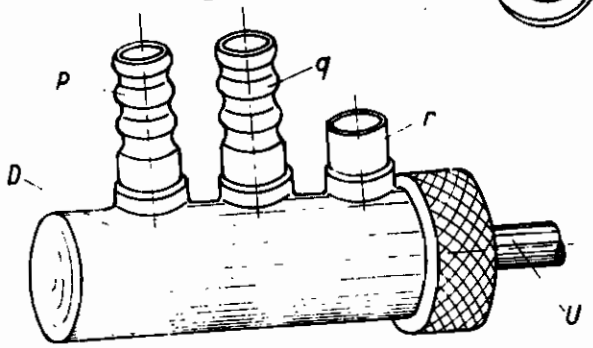
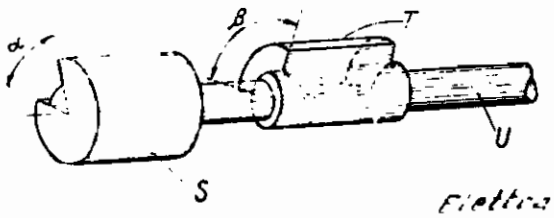


Fig. 3



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ALIEN PROPERTY CUSTODIAN

APPARATUS FOR THE ARTIFICIAL RESPIRATION

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My invention relates to a new type of apparatus for mechanically performing the artificial respiration either on sick persons or persons who have met with accidents.

The importance of applying such a treatment in a great number of cases is well known, and particularly in cases of asphyxy, paresis of respiratory centres, poisoning through toxic gases, etc.

The apparatus of my invention allows of performing the artificial respiration in an entirely automatic manner, avoiding any effort by the operators, whereby the said apparatus promotes, in a similar manner to what happens in the manual practice, rhythmical movements of compression and decompression of patient's chest.

The apparatus makes use of a band to be applied to the chest of the patient, which band incorporates an elastic bag: the band is hereinafter called the "chest's band." The apparatus comprises a source of gas under pressure and a mechanically actuated distributor which controls at suitable intervals the supply of gas under pressure to the chest's band and its discharge therefrom, in such a manner that the periodical compressions and decompressions of the band give rise to corresponding movements of the patient's chest.

The invention will now be described more in detail with reference to a practical embodiment thereof, which is illustrated on the accompanying drawings.

Fig. 1 is a general view of the several parts constituting the apparatus or related thereto, all connected together; and

Figs. 2 and 3 show in perspective views, to a greater scale, the distributor casing and the rotary member mounted therein.

A source of gas under pressure, which in the case illustrated is a bottle A of compressed air, communicates, through a pressure reducer E and a pipe L, with an intermediate chamber B having a capacity of for instance 30 litres, wherein the gas is kept under a pressure less than that of the source A although superior to the atmospheric pressure, such as a pressure of about half an atmosphere. This chamber communicates through another pipe M with one of the connections, p, of the distributor D, which latter is actuated by a motor C. The distributor D is formed with three ports communicating with the exterior, each fitted with a suitable connection for inlet and exhaust of the gas, that is, besides the already cited connection p, a connection q for the pipe leading to the chest's band, and a connection r for the discharge in the atmosphere.

The chest's band consists of a band of inextendible fabric fitted with straps H and buckles I, to which is applied an elastic bag G, made of rubber, extending substantially over the whole breadth of the band but having a somewhat less length. The pipe N communicates with the said bag through a three ways cock O.

Figs. 2 and 3 illustrate the construction of the distributor D. The distributor comprises a revolving shaft U driven through a suitable reducing gear by the motor C (Fig. 1), the said shaft being fitted, in front of the connections p and r respectively, with two cylindrical sectors, or portions of drums, S and T, which fit with their peripheric surfaces air tight against the inner cylindrical surface of the casing of the distributor D, so that upon rotation of the shaft they close and open alternatively the ports in the casing corresponding to the connections p and r. The cylindrical sectors T and S are so dimensioned and arranged as to avoid any possibility of the ports of the connections p and r being simultaneously open. To this end, to the failing portion of each of the sectors there corresponds the complete portion of the other, plus a sufficient lap to avoid even a partial simultaneous opening of the said ports. In fact, the angle α corresponding to the failing portion in the sector S is less than the angle β, corresponding to the amplitude of the sector T. It is understood that the bisecting planes of angles α and β are coincident. The relative dimensions of the sectors S and T are so chosen that the port of the connection p remains open during about one third of each revolution of the shaft U and the port of the connection r during about the remaining two thirds. The rotary speed of the shaft U is invariable and is normally of 18 to 20 revolutions per minute.

For the use, the chest's band F is applied around the patient's chest by means of the straps H and buckles I in such a manner that the inextendible fabric is on the outer side. Upon the motor C being set rotating, the compressed gas in the chamber B flows during a first phase, which lasts during about one third of a complete cycle, through the connection p into the distributor casing and hence through the connection q into the elastic bag G of the chest's band, thus inflating the bag and effecting the compression of the patient's chest. During the subsequent phase, which lasts during about two thirds of a complete cycle, the sector S has closed the port of the connection p, thus interrupting every communi-

cation between the reservoir chamber B and the elastic bag G, whilst the sector T has opened the passage to the connection *r*. The gas in the elastic bag then flows back to the distributor D, through the pipe N and the connection *q*, and escapes in the atmosphere through the connection *r*. The phase of dilatation of the patient's chest takes thus place.

Since the distributor makes from 18 to 20 revolutions per minute, the chest is with the same rhythm compressed and permitted to dilate, which corresponds to the most convenient rhythm for the performance of the artificial respiration. Compression and decompression take place gradually, inasmuch as the sectors S and T close and open slowly the ports of the connections *p* and *r*.

In cases where the artificial respiration must be performed during long periods of time, the source of compressed gas may be, instead of a bottle, a suitable compressor driven by a motor and fitted with a reservoir.

When on the contrary the artificial respiration must be performed during relatively short periods of time, as in cases of accidents from electrical discharges, the use of a compressed air bottle will prove more convenient.

The motor for the drive of the distributor has been described, in this particular case, as an electric motor; it is evident however that it may be of any other type and may also be substituted by a clockwork actuated by a spring or a weight.

In cases of accidents of collective character, such as in case of poisoning from toxic gases, the apparatus may be foreseen for multiple use, inasmuch as by increasing the size of the distributor D and the capacity of the reservoir chamber B, a plurality of patients, each fitted with a chest's band communicating with the distributor, may be treated simultaneously, with the same rhythm.

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