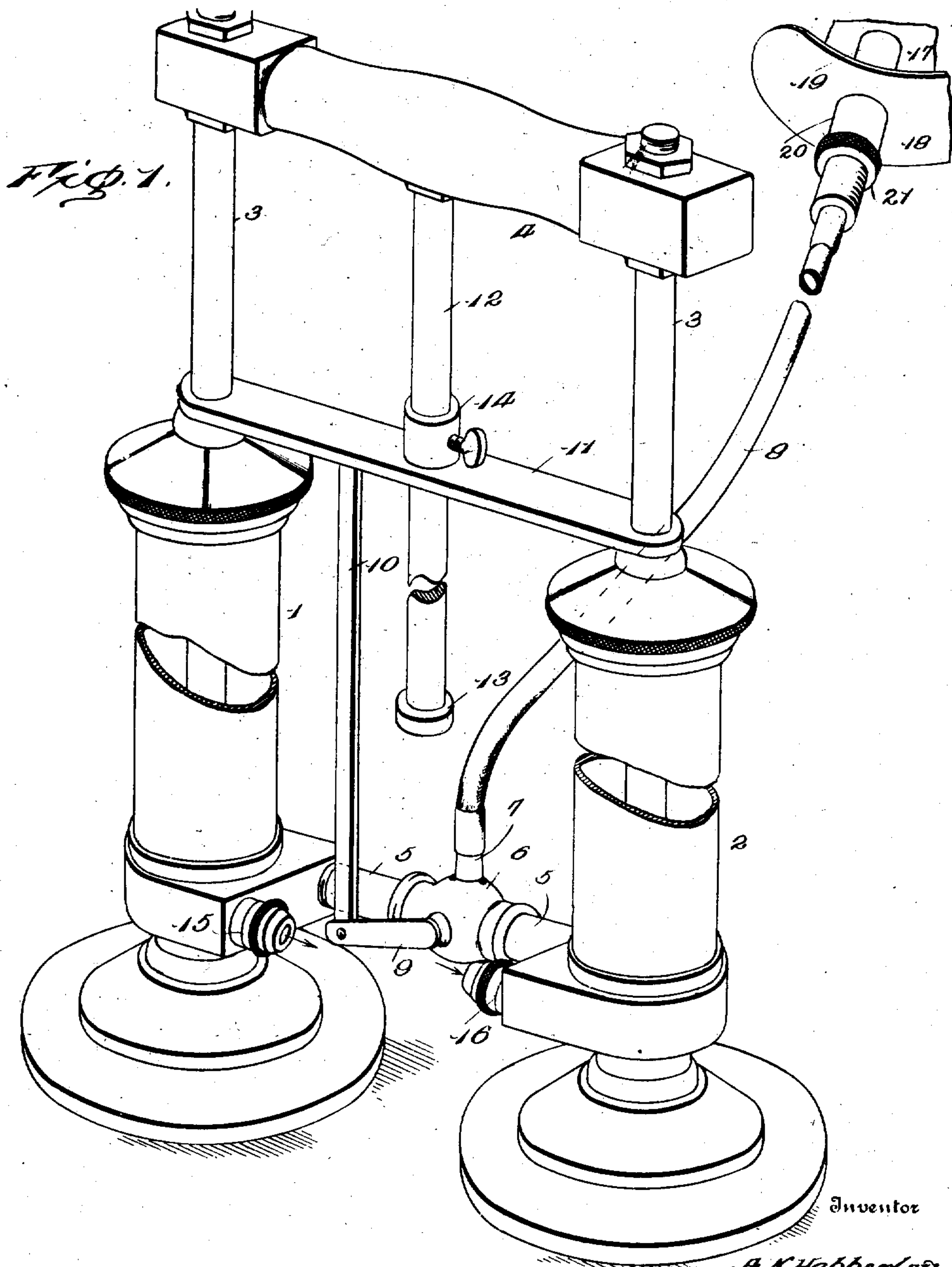


No. 896,824.

A. N. HABBERLEY. PATENTED AUG. 25, 1908.  
MECHANICAL RESPIRATOR.  
APPLICATION FILED JUNE 19, 1907

2 SHEETS—SHEET 1.



Witness

*H. M. Woodson*  
W. I. Woodson

Inventor

*A. N. Habberley*

By

*R. A. M. Racy*

Attorneys

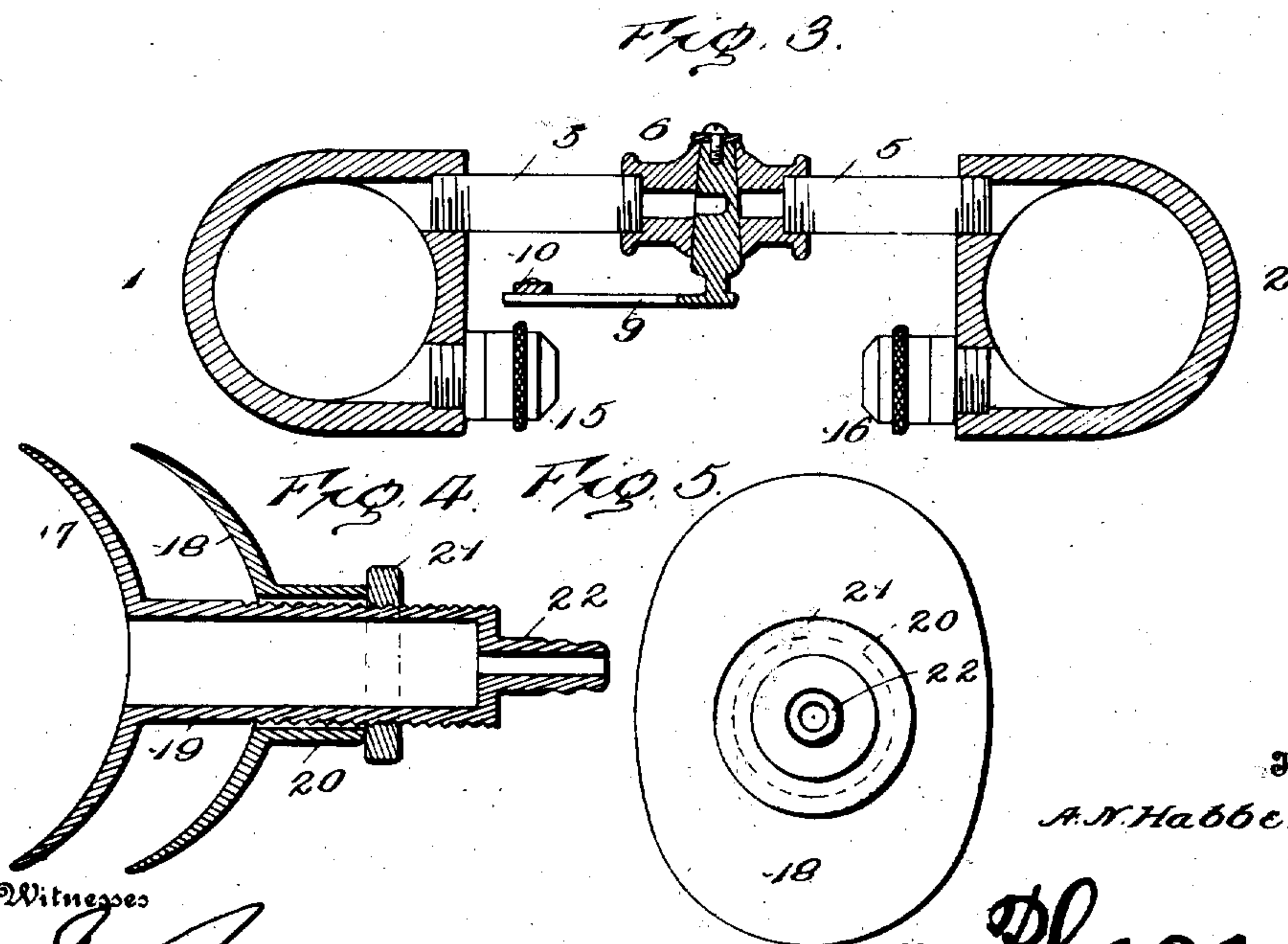
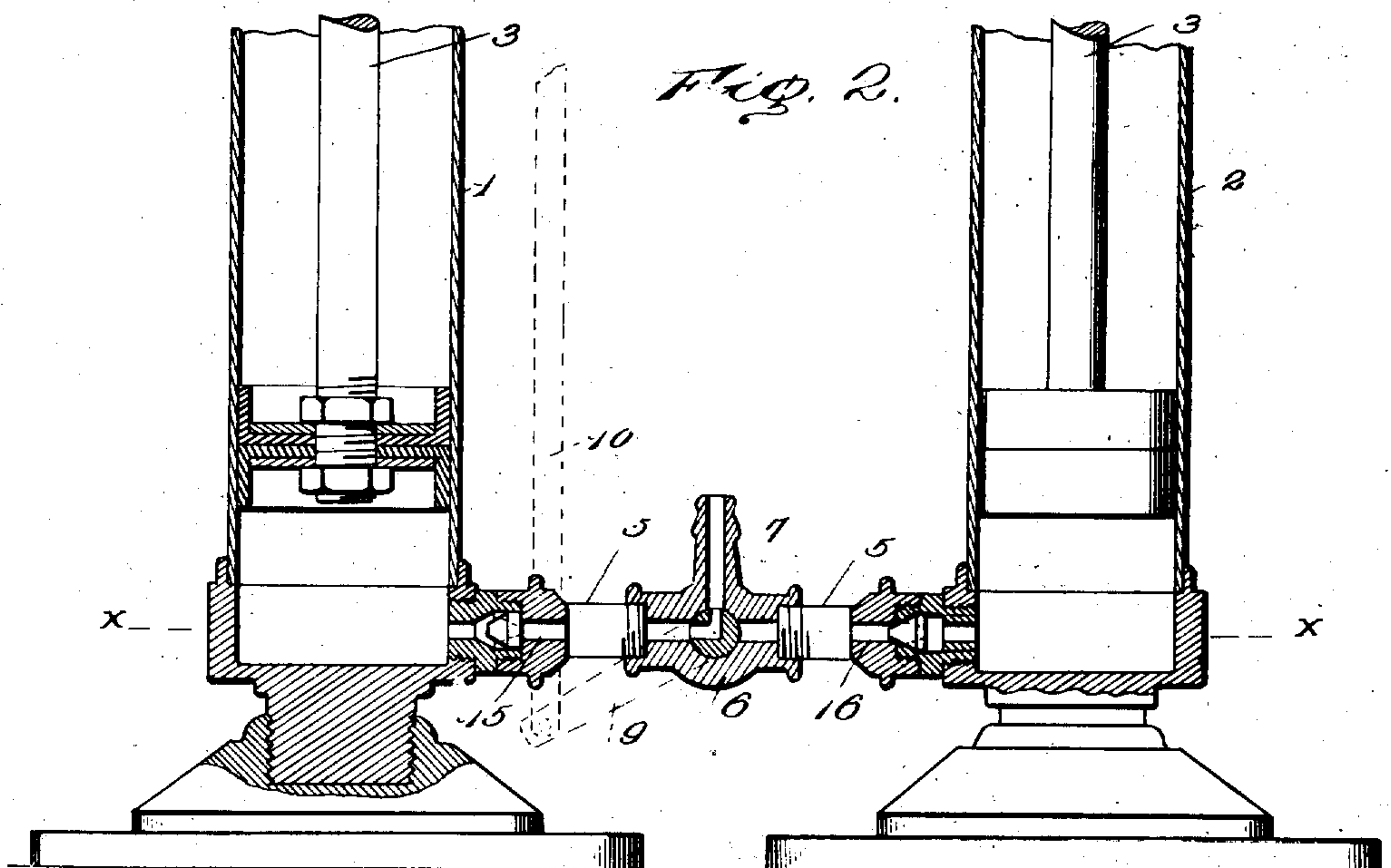
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Witnesses

*W. J. Moore*  
*W. J. Hodson*

Inventor

*A. N. Habberley*

By

*Pha. M. May*

Attorneys



# UNITED STATES PATENT OFFICE.

ALBERT N. HABBERLEY, OF NEWTON, MASSACHUSETTS.

## MECHANICAL RESPIRATOR.

No. 896,824.

Specification of Letters Patent.

Patented Aug. 25, 1908.

Application filed June 19, 1907. Serial No. 379,815.

*To all whom it may concern:*

Be it known that I, ALBERT N. HABBERLEY, a citizen of the United States, residing at Auburndale, city of Newton, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Mechanical Respirators, of which the following is a specification.

This invention has for its object to devise mechanical means for inducing respiration in cases of apparent death from drowning, asphyxia or suffocation. The mechanism alternately inflating and exhausting the lungs so as to aerate the blood and restore, if possible, natural respiration should it be possible to overcome the effect of the shock or other cause of stopping the natural functions of the respiratory organs.

The invention provides a novel mechanism embodying two pneumatic devices, the one adapted to inflate the lungs and the other to exhaust the air from the lungs, said inflating and air exhausting devices being provided with an automatically operated valve and with valve inlet and outlet to prevent injury to the tissues of the lungs by a too great inflation or suction.

For a full understanding of the invention and the merits thereof and also to acquire a knowledge of the details of construction and the means for effecting the result, reference is to be had to the following description and accompanying drawings.

While the invention may be adapted to different forms and conditions by changes in the structure and minor details without departing from the spirit or essential features thereof, still the preferred embodiment is shown in the accompanying drawings, in which:

Figure 1 is a perspective view of a respiratory mechanism embodying the invention. Fig. 2 is a vertical central section of the appliance, parts being broken away. Fig. 3 is a horizontal section on the line  $x-x$  of Fig. 2. Fig. 4 is a central longitudinal section of the mouth piece. Fig. 5 is a front view of the mouth piece.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

The appliance comprises twin pumps 1 and 2, each consisting of a cylinder and a piston arranged to operate therein, the piston rods 3 being connected by means of a handle 4 common to each. The pumps may be connected in any manner and are yoked near their lower ends or coupled in any substantial way. The pump 1 is of the suction type, whereas the pump 2 is of the pressure variety and is designed to inflate the lungs, whereas the pump 1 is intended to exhaust the air from the lungs. The pumps 1 and 2 are representative of devices commonly employed for inflating and expanding articles in the mechanic arts. A pipe 5 connects the lower ends of the pump barrels or cylinders and is in communication with each and is provided in its length with a three-way valve 6. A coupling 7 projects from the casing of the three-way valve and a rubber tubing 8 is connected thereto. The valve 6 is automatically actuated at each stroke of the pump piston, whereby the suction and pressure pumps are alternately brought into play to exhaust and inflate the lungs in a manner approximating natural respiration so as to induce the same if life is still present in the patient. A handle 9 projects from the plug or operating part of the valve and a rod or bar 10 is connected thereto. A cross head 11 is applied to the upper end of the bar or rod 10 and is held in place and directed in its movements by means of the piston rods 3, the end portions of the cross head being apertured for said piston rods to pass loosely therethrough. A tappet rod 12 is connected at its upper end to a handle 4 and is provided at its lower end with a stop 13. An adjustable stop 14 is secured to the upper portion of the tappet rod 12 and is arranged above the cross head 11. The stops 13 and 14 constitute tappets to engage with the cross head 11 and operate the valve 6 to throw one pump out of action and the other pump into operative position. The tappet 13 is arranged to engage with the underside of the cross head 11 when the pistons are completing their up stroke and the tappet 14 is arranged to engage with the upper side of the cross head when the pump pistons are about reaching the limit of their down stroke. By having the stop or tappet 14 adjustable,



the effective stroke of the pump pistons may be regulated to meet existing conditions. The stop or tappet 13 is preferably fixed.

The suction pump is provided with a check valve 15 adapted to open outward and to close inward. The pressure pump 2 is provided with a check valve 16 adapted to close outward and to open inward. The check valves 15 and 16 are of similar construction and are fitted to the lower ends of the pump barrels, each consisting of two members united by means of a screw thread and inclosing a valve between them, the valve and its seat being of tapered formation. As the pistons move upward in the pump barrels, the check valve 15 closes, thereby permitting the pump 1 to create a suction in the tube 8 so as to exhaust air from the lungs, while at the same time the check valve 16 opens to permit air to enter the pump cylinder 2. Upon depressing the handle 4 to move the pump pistons downward, the check valve 15 opens to permit the air in the lower portion of the pump barrel 1 to be expelled, whereas the check valve 15 closes to admit of the air in the lower portion of the pump barrel to be forced into the lungs of the patient. It is to be understood that as the pump pistons reach the limit of their travel in each direction, the valve 6 is operated to reverse the action of the pump to produce pressure and exhaustion of the air in alternation, with the result that the lungs are alternately expanded and contracted. It will be understood that pure air is supplied at each stroke of the pump 2 and that the air forced into the lungs upon the down stroke of the pump pistons is exhausted upon the up stroke of said pistons, thereby supplying the lungs with fresh and pure air at each operation.

Injury to the lung tissue is prevented by a too great pressure or suction, since the valve 6 is reversed an instant before the pistons complete their stroke in each direction, hence upon the up stroke of the pistons, should there be any suction upon the lungs, the air from the suction pump 1 is drawn through the pipe 5, valve 6 and inlet 16, thereby relieving the lungs of any suction which would tend to produce injury. This operation takes place near the completion of the up stroke of the pump pistons at the moment the valve 6 is reversed. Upon the down stroke of the pump pistons, should there be a pressure on the lungs, the valve 6 is reversed a moment before said pistons complete their down stroke, hence the air is forced from the pump 2 through the pipe 5, valve 6 and out through the check valve 15, with the result that the lungs are relieved of injurious pressure.

The mouth piece consists of complemental

plates 17 and 18 which are curved to conform approximately to the shape of the lips, which latter are clamped between said plates when the appliance is placed in position for use. The plate 17 is introduced into the mouth of the patient, whereas the plate 18 is placed over the mouth, the lips being confined between the plates 17 and 18. A hollow stem 19 projects from the plate 17 and passes loosely through a boss 20 of the plate 18 and is threaded to receive a set nut 21 by means of which the plate 18 is forced towards the plate 17 so as to clamp the lips between the two plates. A coupling 22 at the outer end of the stem 19 receives the end of the tube 8 connected to the mouth piece.

Having thus described the invention, what is claimed as new is:

1. In a mechanical respirator, the combination of a suction and a pressure device, a tube, a valve connection between the tube and the two devices, actuating means for the suction and pressure devices, and means positively operated by the suction and pressure actuating means for moving the valve to throw the tube alternately into communication with the suction and pressure devices.

2. In a mechanical respirator, the combination of suction and pressure pumps, a tube, a valve connection between the tube and the two pumps, operating means for the pumps, a tappet rod carried by the pump operating means and provided with spaced tappets, and connecting means between the valve and tappet rod for positively moving the valve to throw the tube alternately into communication with the two pumps.

3. In a mechanical respirator, the combination of suction and pressure pumps, a tube, a valve connection between the tube and the pumps, means for operating the pumps, a tappet rod carried by the pump operating means, a fixed and an adjustable tappet applied to the tappet rod, and connecting means having a part arranged in the path of the said tappets and serving to positively move the before mentioned valve to throw the tube alternately into communication with the two pumps.

4. In a mechanical respirator, the combination of companion suction and pressure pumps, a connection between said pumps, a three-way valve in the length of said connection, operating means for the pumps, a tappet rod extended from the pump operating means, a fixed and an adjustable tappet on said tappet rod, and connecting means leading from the three-way valve and having a portion extended into the path of the said tappets to be alternately engaged thereby for reversing the valve, whereby the suction and pressure pumps are alternately thrown into and out of operation.

5. A mouth piece comprising companion plates conformable to the lips and adapted to clamp the lips between them, a hollow stem extended from the inner plate and passed loosely through the outer plate and threaded, and a set nut mounted upon the threaded portion of said stem and adapted to place the plates together to cause them to

clamp the lips when the mouth piece is in position.

In testimony whereof I affix my signature in presence of two witnesses.

ALBERT N. HABBERLEY. [L. s.]

Witnesses:

ELMER E. BICKFORD,  
ARTHUR H. HARDY.