

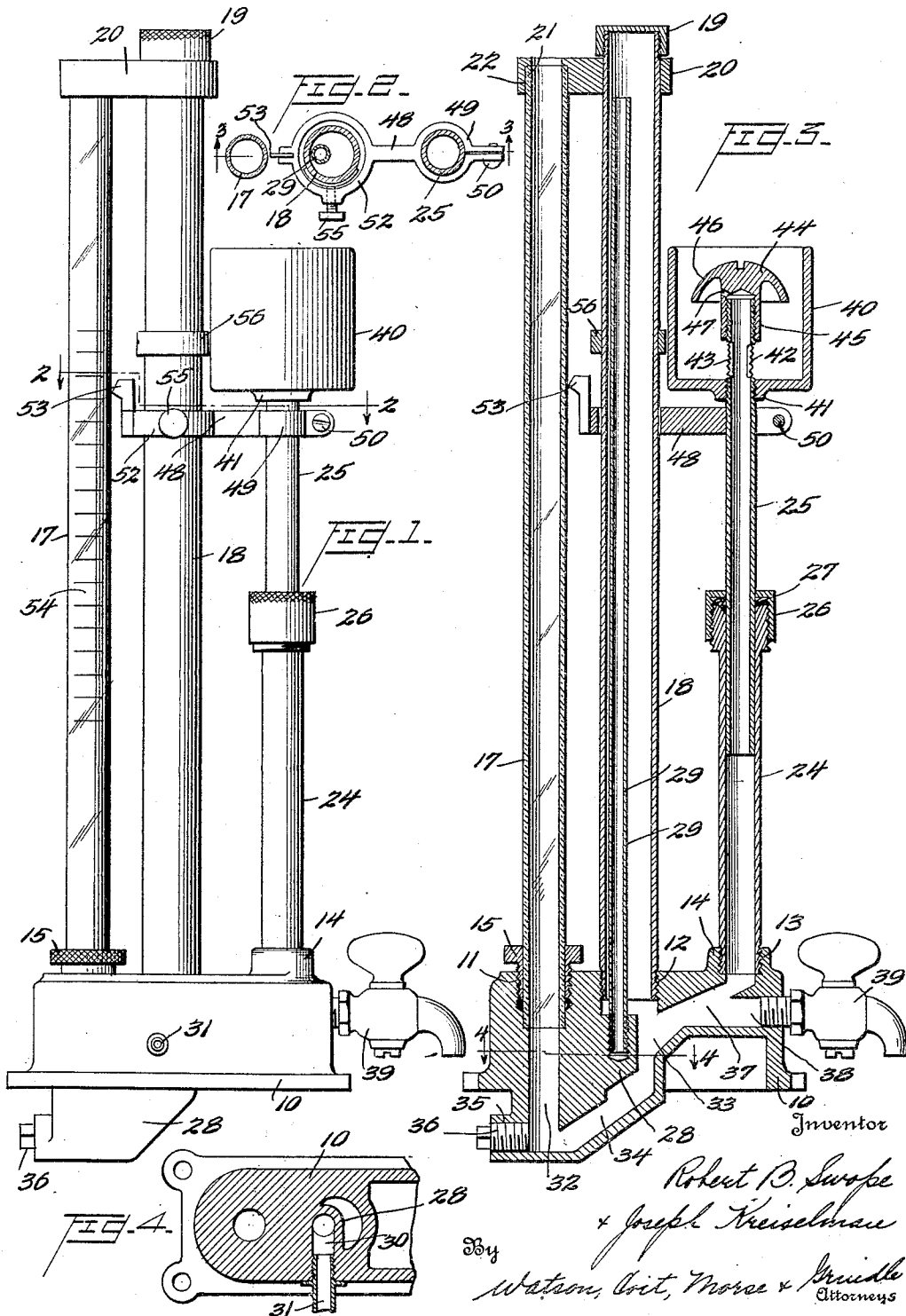
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PRESSURE INDICATING AND RELIEF DEVICE

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PRESSURE INDICATING AND RELIEF DEVICE

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This invention relates to pressure indicating and relief devices of general application, and particularly to devices of this character adapted for use with resuscitation apparatus; by means of which a gas may be introduced into the lungs of a patient, to indicate the pressure under which the gas is supplied, and to automatically relieve the pressure when it exceeds a predetermined amount.

The degree of pressure introduced into the lungs of a patient is of vital importance in resuscitation apparatus, as an excess pressure would rupture the air vesicles. Such injury is generally fatal, particularly for the reason that the patient requiring resuscitation is already in a weakened condition. Hence accuracy of pressure indication is essential, in order that the attendant physician or operator of the apparatus may know exactly what pressure is being introduced. Also the apparatus must not fail to prevent the introduction of gas under excessive pressure to the patient's lungs. Furthermore, as different patients require different pressures, the relief device must be capable of adjustment to the particular pressure suitable for the patient under treatment.

The structural features of the invention are of importance for various reasons in other uses, and the invention is therefore susceptible of general application.

Other objects and features of novelty will be apparent as the following description proceeds as taken in connection with the accompanying drawings, in which:

Figure 1 is an elevation of the manometer according to the present invention;

Figure 2 is a cross section taken along the line 2—2 of Fig. 1;

Figure 3 is a vertical cross section taken along the line 3—3 of Fig. 2; and

Figure 4 is a cross section through the manometer base along the line 4—4 of Fig. 3.

Referring more particularly to the drawings, in which one embodiment of the invention is illustrated by way of example, there is shown a manometer base indicated generally at 10. The top of this base is provided with vertical bores 11, 12 and 13 respectively to receive the manometer tubes, which co-

operating with the base 10, constitute the pressure indicating device.

The bore 11 receives a hollow threaded plug 15 which forms a stuffing box to seal therein a glass tube 17. The bore 12 is threaded to receive a pressure tube 18 preferably of metal having its upper end closed by a threaded cap 19. The tube 18 supports a bridge piece 20 located slightly below the cap 19 and serving as a support for the open upper end 21 of the glass tube 17 which is received in a socket 22 of the bridge piece 20.

The bore 13 is provided with a boss 14 and is threaded to receive pressure relief tube 24, which is preferably of metal. Slidable within the tube 24 is an extension tube 25 which may telescope therein. The upper end of the tube 24 is threaded to receive an apertured cap 26 provided with packing 27 to form a stuffing box for the extension 25.

Within the base 10, a boss 28 is formed, projecting into the bore 12 from one side thereof and threaded to receive a smaller pipe 29 preferably of metal which extends up inside the tube 18 to the upper end thereof, terminating slightly short of the cap 19. As shown in Fig. 4, a bore 30 communicates with the tube 29 and extends laterally therefrom outside of the base 10 where it is threaded to receive a nipple 31 to which a gas under pressure is introduced.

The bore 11 is continued downwardly into the base as at 32 and the bore 12 is also continued downward at 33. In the lower part of the base 10, a passage 34 is provided to connect the extensions 32 and 33. An access opening 35 in communication with the passage 34 is normally closed by a plug 36.

Above the passage 34 and second passage 37 which affords communication between the bores 12 and 13, a drain passage 38 connects with the passage 37 and is threaded to receive a drain spigot 39.

The slidable extension 25 of the overflow pipe 24 is provided with an overflow receptacle 40 which in the form shown is a substantially cylindrical cup open at its upper end and having the pipe 25 threaded through an aperture in a central boss 41 formed on the under side thereof. The portion of the

pipe 25 which projects inside the container 40 is cut away at two sides forming overflow openings 42 and 43 respectively. Threaded on the upper end of the pipe 25 is a cap 44 which, as shown, comprises a sleeve 45 and a curved annular flange 46 forming a mushroom-shaped hood over the top of the pipe 25. An air orifice 47 is provided in the sleeve 45 to afford communication from the top of the pipe 25 and the underside of the flange 46.

Secured to the extension 25 immediately below the cup 40 is a pointer member 48 having a split sleeve 49 provided with a clamp screw 50 for securing the member 48 on the tube 25. The central portion of the member 48 is provided with a sleeve 52 which is slidable on the tube 18 and provided with an indicating pointer 53 which moves over a scale 54 preferably etched in the surface of the glass tube 17. A set screw 55 is provided for the sleeve 52 to hold it in adjusted positions on the tube 18. A collar 56 is fixed on the tube 18 as an upper limit of movement of the member 48.

In operation a liquid, preferably water, is poured into the container 40 and passes through the openings 42 and 43 into the pipes 25 and 24, thus filling the passages 37, 33, 34 and 32, all of which are in communication so that the liquid will rise to the same height in the tubes 17, 18 and 24. The water is poured in until its level reaches the zero position etched on the glass tube 17. Then the set screw 55 is loosened and member 48 moved up to the desired maximum pressure for the gas. The member 48 being rigidly secured to the tube 25, the tube 25 and the container 40 will be moved along with the pointer. Then the set screw 55 is operated to secure the parts in the desired position.

When gas is introduced through the coupling 31, it passes through the bore 30 into the pipe 29 and communicates its pressure to the interior of the pipe 18 above the water level. This pressure will lower the level of the liquid in the tube 18 and cause the free level of the liquid to rise equally in the other two tubes 17 and 24, which are open to the atmosphere.

As the level in the tube 18 is forced downward by the gas pressure, the level in the tube 17 will be forced upward, and as its surface is graduated, the height of the water column may be read directly and clearly observed. When the pressure is great enough to lower the level in the tube 18 and correspondingly raise the level in the tube 24 until it ascends the tube 25, the water displaced from the tube 18 will overflow through the apertures 42 and 43 and be retained in the container 40. Thus a pressure somewhat higher than the upper limit of the scale 54 will not cause liquid to be spilled out of the device as the

container 40 is of sufficient capacity to prevent this.

When the level of water in the tube 18 has fallen below the passage 37, bubbles of gas will pass therethrough to the pipe 24, through the pipe 25 and out of the air vent passage 47, and thus escape from the apparatus. It should be noted that the passage 37 is higher than the passage 34, so that the escaping gas will always pass up the tube 24 and there is no danger of its passing out the tube 17 and interfering with the reading of the pressure scale etched thereon.

It should be noted that the pressure indicating and relief device above described is peculiarly adapted for use in connection with resuscitation apparatus for administering gas to the lungs of a patient. When the gas is being supplied, the pressure may be instantly read on the scale at all times. Furthermore, the point 53 being located at the maximum safe pressure which may be imposed upon the lungs of the particular patient without rupturing the air vesicles, hence, if this pressure is exceeded for any cause whatsoever, no injury will result to the patient, as the pressure will be automatically relieved by the bubbles of gas passing through the passage 37 and escaping up the relief pipe 24 and out of the bleed passage 47.

The hood 46 covers the greater part of the internal diameter of the container 40, and thus prevents splashing of the liquid, even when the maximum safe pressure is exceeded.

While one embodiment of our invention has been shown and described in great detail, the broad idea of the invention is not limited to any of the details shown, but includes such embodiments as come within the scope of the subjoined claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In a manometer, a pressure tube, a graduated indicating tube, an overflow tube and means providing communication between all of said tubes, said overflow tube being connected to said pressure tube above the connection with the indicating tube, and an overflow receiver at the top of said overflow tube comprising a cup into which the overflow tube projects, said overflow tube having lateral discharge apertures within said cup and a flanged cap thereabove.

2. In a manometer, a pressure tube, a graduated indicating tube, an overflow tube and means providing communication between all of said tubes, said overflow tube being connected to said pressure tube above the connection with the indicating tube, and an overflow receiver at the top of said overflow tube comprising a cup into which the overflow tube projects, said overflow tube having lateral discharge apertures within said cup and a flanged cap thereabove, an air vent being pro-

vided from the interior of said cap to the under side of its flange.

responding pressure, another of said remaining tubes being open to the atmosphere and adjustable in height.

In testimony whereof we hereunto affix our signatures.

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5	and means providing communication between all of said tubes, said overflow tube being connected to said pressure tube above the connection with the indicating tube, said overflow tube comprising telescoping sections relatively adjustable to change the height of liquid column at which overflow occurs.	70
40	4. In a manometer, a pressure tube, a graduated indicating tube, and an overflow tube and means providing communication between all of said tubes, said overflow tube being connected to said pressure tube above the connection with the indicating tube, said overflow tube comprising telescoping sections relatively adjustable to change the height of liquid column at which overflow occurs, and a pointer on one of said telescoping sections adapted to move over the graduations of said indicating tube to indicate the pressure at which overflow occurs.	75
15	5. In a manometer, a pressure tube, a graduated indicating tube, and an overflow tube and means providing communication between all of said tubes, said overflow tube being connected to said pressure tube above the connection with the indicating tube, said overflow tube comprising telescoping sections relatively adjustable to change the height of liquid column at which overflow occurs, and an overflow cup carried by one of said sections.	80
20	6. In a manometer, a pressure tube, a graduated indicating tube, and an overflow tube and means providing communication between all of said tubes, said overflow tube being connected to said pressure tube above the connection with the indicating tube, said overflow tube comprising telescoping sections relatively adjustable to change the height of liquid column at which overflow occurs, and a pointer on one of said telescoping sections adapted to move over the graduations of said indicating tube to indicate the pressure at which overflow occurs, and an overflow cup carried by the section which carries the pointer.	85
25	7. In a manometer, means for mounting a plurality of substantially vertically disposed tubes with their lower portions in communication, means for introducing liquid into one of the tubes to rise to the same level in all of the tubes above the communicating parts, one of said tubes being closed at its top, the others being vented to the atmosphere, means for introducing a gas under pressure to the interior of said closed tube at the upper portion thereof, which will lower the level of liquid in the closed tube and raise the level in the remainder of said tubes, means associated with one of said remaining tubes for indicating the level of the liquid therein, said indicating means being calibrated for the cor-	90
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