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H. W. C. SCHRÖDER

BREATHING APPARATUS PARTICULARLY FOR ADMINISTERING ANÆSTHETICS

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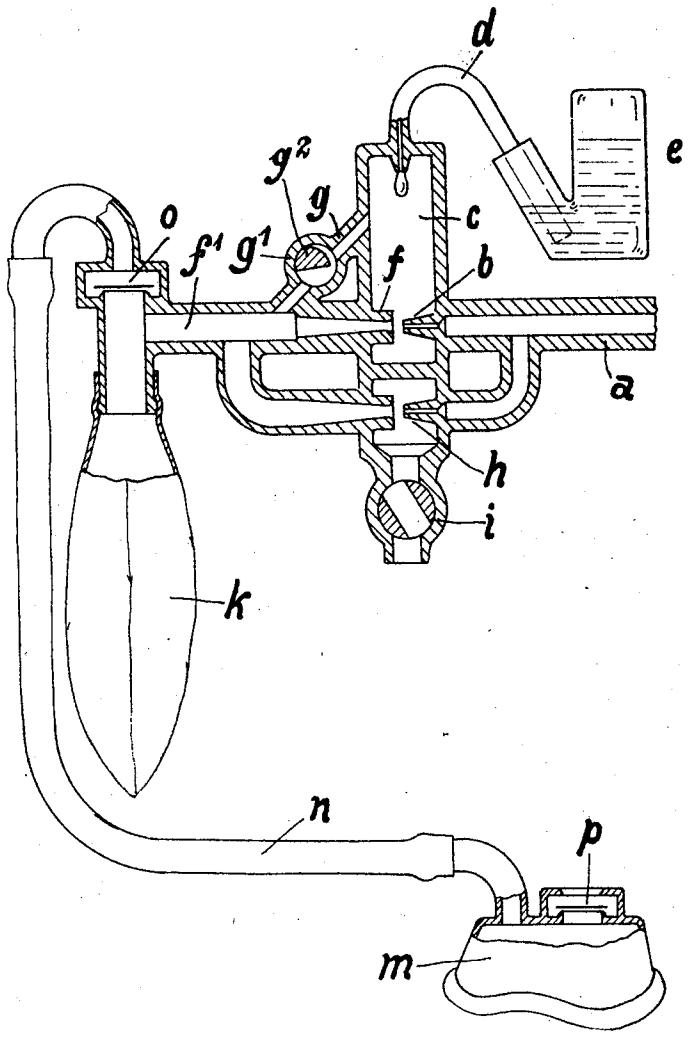

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HANS WILHELM CHRISTIAN SCHRÖDER, OF LUBECK, GERMANY, ASSIGNOR TO ALEXANDER BERNHARD DRÄGER, OF LUBECK, GERMANY; ELFRIEDE DRÄGER, NÉE STANGE, EXECUTRIX OF SAID DRÄGER, DECEASED.

BREATHING APPARATUS PARTICULARLY FOR ADMINISTERING ANÆSTHETICS.

Application filed July 17, 1926, Serial No. 123,125, and in Germany November 16, 1925.

Apparatus operating by compressed gas are known in which a liquid anæsthetic is sprayed or evaporated to a regulatable amount that is administered to the patient together with the working gas for inhaling. The physician who attends the patient, it is true, knows what quantities of the liquid by weight are inhaled within a certain time, but, he never knows what effect such quantities of liquid have in comparison to the amount of air inhaled at the same time; because the patient beside the working gas (compressed air or oxygen) necessary for spraying also inhales atmospheric air to a far greater amount through an opening in the breathing mask. According to the depth and frequency of breathing the amount of atmospheric air varies, and therefore also the concentration of the inhaled vapors varies correspondingly. It therefore has occurred that a large quantity of liquid administered was less effective than a small quantity, and moreover there was the possibility that the physician had a quite erroneous conception with regard to the patient's susceptibility to the anæsthetic.

A clear judgment and comparison with regard to the effect of inhaled substances can only be gained if the degree of dilution with the air of the vapors is known and can be taken into account.

The invention overcomes these difficulties by admixing a regulatable quantity of air corresponding to the depth of breathing with the vapors of the anæsthetic, in addition to the predetermined or fixed amount of compressed gas to be sprayed.

In the drawing the apparatus is shown in sectional elevation.

Compressed air or compressed oxygen is supplied by the pipe *a*, the end of which has a nozzle *b* projecting into a casing *c* opposite the suction nozzle *f* forming part of the injector *f'*. By the compressed air or oxygen passing from the nozzle *b* into the nozzle *f* a vacuum or a partial vacuum will be created within the casing *c* adapted to draw medicine or anæsthetic from a glass *e* or other vessel connected with the upper part of the casing *c* by the pipe *d*. The medicine or anæsthetic will enter the casing *c* by the pipe *d* in drops, which fall into the space between the two nozzles *b* and *f*, and will thus be driven into the nozzle *f* in a fine spray. Between the injector *f'* and the casing *c* there is a return pipe *g* and a cock *g'* having a notched plug g^2. According to the position of the plug the return pipe *g* will be more or less throttled, and thus a more or less partial vacuum and a more or less frequent falling down of the drops within the casing *c* results. For spraying the largest amount of liquids only a very small amount of compressed air is required, which will be sufficient for filling the lungs on slow breathing. The deficiency of air is supplied or supplemented by atmospheric air being drawn in by the injector nozzle *h* and the shut-off or throttling member *i*. The compressed gas passing the nozzles *b* and *h* is a determined amount and the amount of outer air sucked in may be read off from a dial according to the position of the shut-off member *i*. From the proportion of the amount of sprayed liquid and the total amount of air the concentration may be calculated. The amount of air inhaled by the patient can be judged by the moderate distension of the bag *k*, which always ought to show a moderate distention. When the mask *m* fits snugly the patient produces therein a small vacuum and sucks gas from the bag *k* by the pipe *n* and the non-return valve *o*. In exhaling the valve *o* will be closed and the exhaled air escapes into the atmosphere by the non-return valve *p*.

The shut-off or throttling member *i* may be of any well known construction; in the drawing it is shown as a cock.

The feeding of the additional air by aid of an injector operating by compressed gas is particularly a simple solution of the task. For producing a regulatable stream of air any other suitable source may be used.

I claim:—

Breathing apparatus comprising a breathing bag, a conduit for gas under pressure leading to said breathing bag, an injector in said conduit, a chamber about said injector, a source of anæsthetic communicat-

ing with said chamber, means for regulating the output of anæsthetic, a second conduit connected with said first mentioned conduit, bypassing said injector and leading to said breathing bag, an injector in said second conduit, a chamber about said second injector, said last mentioned chamber having a passage communicating with the atmosphere, and a valve in said passage for regulating the amount of air injected.

In testimony whereof I have signed my name to this specification.

HANS WILHELM CHRISTIAN SCHRÖDER.