

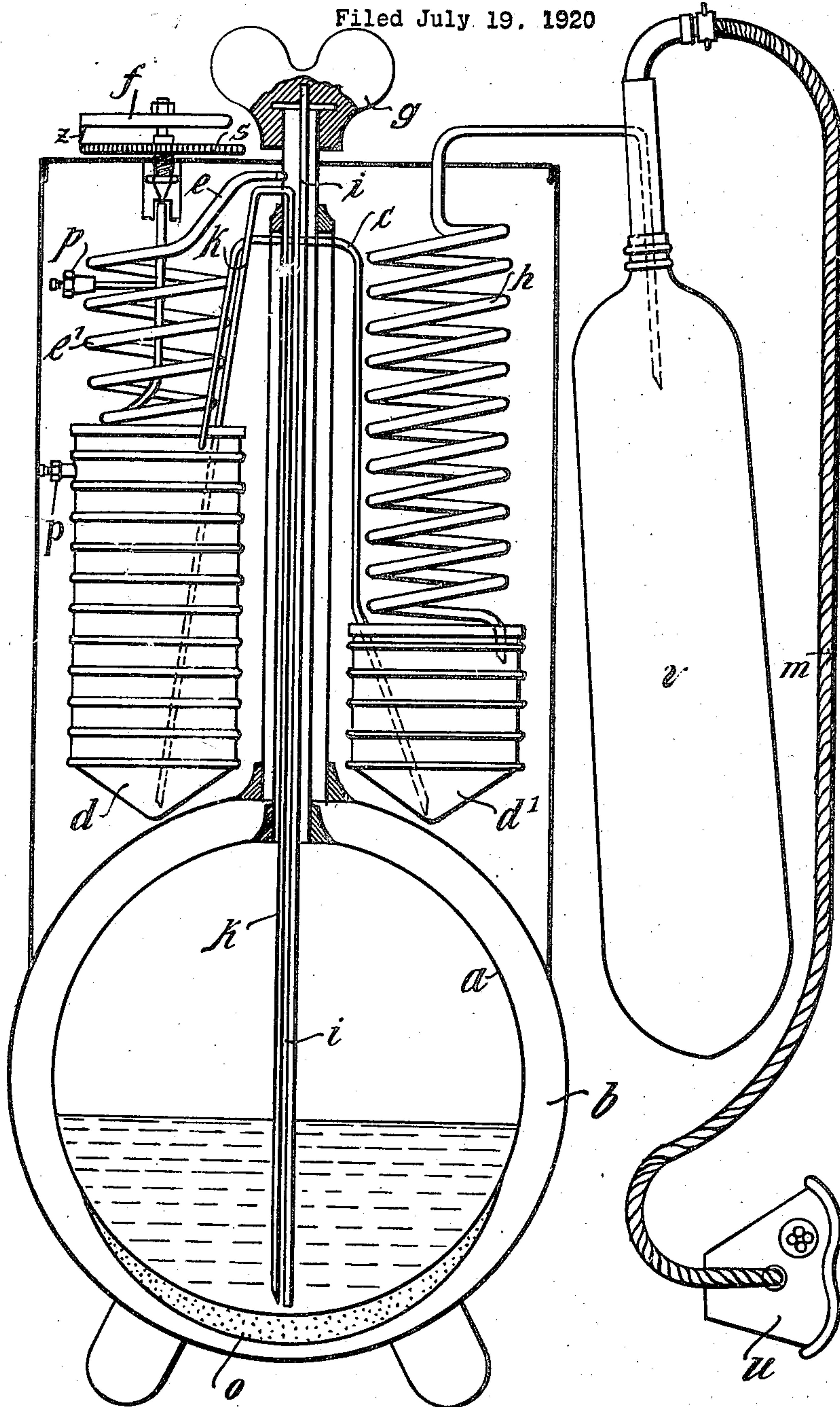
June 19, 1923.

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1,459,158

APPARATUS FOR GENERATING RESPIRABLE AIR FROM LIQUEFIED GASES

Filed July 19, 1920



Witnesses
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UNITED STATES PATENT OFFICE.

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APPARATUS FOR GENERATING RESPIRABLE AIR FROM LIQUEFIED GASES.

Application filed July 19, 1920. Serial No. 397,555.

To all whom it may concern:

Be it known that I, LEOPOLD LISSE, a subject of the German Empire, and a resident of Berlin, Germany, have invented certain new and useful Apparatus for Generating Respirable Air from Liquefied Gases, of which the following is a specification.

My invention relates to apparatus for generating respirable air from liquid air.

In prior apparatus of this type the liquid air was permitted to evaporate continuously. No means was provided for preventing the evaporation of the liquid while the apparatus was not in use, and no provision was made to facilitate evaporation when the apparatus was placed in use.

The object of my invention is an improved apparatus provided with means by which the evaporation of the liquid air may be accurately controlled, so that, air suitable for inhaling through the mask of a breathing apparatus as used in aircraft, for instance, is generated only when required and the evaporation of the liquid can then be facilitated.

An apparatus embodying my invention is illustrated by way of example in the accompanying drawing.

Referring to the drawing *a* is a storage vessel containing the liquid air. The liquid air contained in a vessel *a* protected by a vacuum jacket *b*, is, as soon as respirable air is required, caused to evaporate, for instance by introducing heat into the vessel through a bar or rod *i*, fixed to a screw cap *g*. When a supply of respirable air is required, heat is introduced into the liquid container by means of a heated bar or rod *i* fixed to a screw cap *g*. In consequence of the evaporation of the liquid pressure is generated in the vessel *a* and a small quantity of liquid rises in the pipe *k* and reaches the first evaporation chamber *d*. The vapours produced then pass into a second evaporation chamber *d*¹ and even if desired into a third one, in order to induce the vapours to deposit any liquid carried along by them. From the last chamber the vapor passes through a coil *h*, to a pressure regulating reservoir *v* and hence through a flexible tube *m* to the gas mask *u* of the user. In this manner the vapours are exposed to large contact surfaces and are thus dried and also warmed by the outside air and thus reach the mask in a completely dry and sufficiently heated state.

One of the essential features of my invention is that, as above described, the pressure upon the liquid air is increased or diminished and a greater or smaller quantity of liquid is forced into the evaporation chamber *d* and hence to the respiratory mask for inhaling. For this purpose the space of the vessel *a* above the liquid air is in communication with the atmosphere through a coiled pipe *e*, the outlet of which is controlled by throttle valve *f*. The position of the valve *f*, is preferably indicated by means of a pointer *z*, fixed upon the valve operating disc and moving over a stationary graduated scale *s*. When the valve is throttled a little the pressure on the liquid forces a small quantity of liquid through the pipe *k* into the evaporation chamber *d*. The quantity of liquid forced into the chamber *d* increases as the valve *f* is throttled and reaches its maximum when the valve is closed entirely. In order to avoid dangerous over-pressures safety valves such as *p*, *p*, may be provided in proper places.

Preferably a Dewar-Heyland vessel is used as container for the liquid air, the vacuum space *b* of which contains an absorbent for gases or humidity which may enter this space.

It will be understood that I do not limit myself to the exact details of the construction illustrated, but that these may be varied within the limit of the claims.

What I claim as my invention and desire to secure by Letters Patent is:

1. In apparatus for generating respirable air from liquid air container with means for facilitating the evaporation, a pipe through which said liquid container communicates with the atmosphere, a throttle valve at the outlet of said pipe, an evaporation chamber, a pipe connecting said container with said chamber, said chamber being supplied with more or less liquid the more or less said valve is throttled.

2. In apparatus for generating respirable air from liquid air, the combination of a liquid air container, a rod adapted to be heated and introduced into the container to raise the temperature and to increase the evaporation within said container, a pipe through which said liquid container communicates with the atmosphere, a throttle valve at the outlet of said pipe, an evaporation chamber, a pipe connecting said liquid

container with said chamber, said chamber being supplied with more or less liquid the more or less said valve is throttled.

3. The improved breathing apparatus
5 with liquid air supply, comprising in combination a liquid air container in the form of a Dewar-Heyland vessel, a pipe through which said vessel communicates with the atmosphere, a throttle valve at the free end
10 of said pipe, a heated rod adapted to be introduced into said container to raise the temperature within it, an evaporation chamber, a pipe connecting said chamber with said container, a second evaporation cham-

ber, a pipe connecting said second chamber 15 with said first evaporation chamber, a pressure regulating reservoir, a coil connecting said regulating reservoir with said last evaporation chamber, a gas mask and a flexible tube connecting said mask with said 20 pressure regulating chamber.

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

LEOPOLD LISSE.

Witnesses:

PETER MEFFERT,
FRITZ LUNDBURG.