

(No Model.)

G. H. HURD.
RESPIRATOR FOR FIREMEN.

No. 428,611.

Patented May 27, 1890.

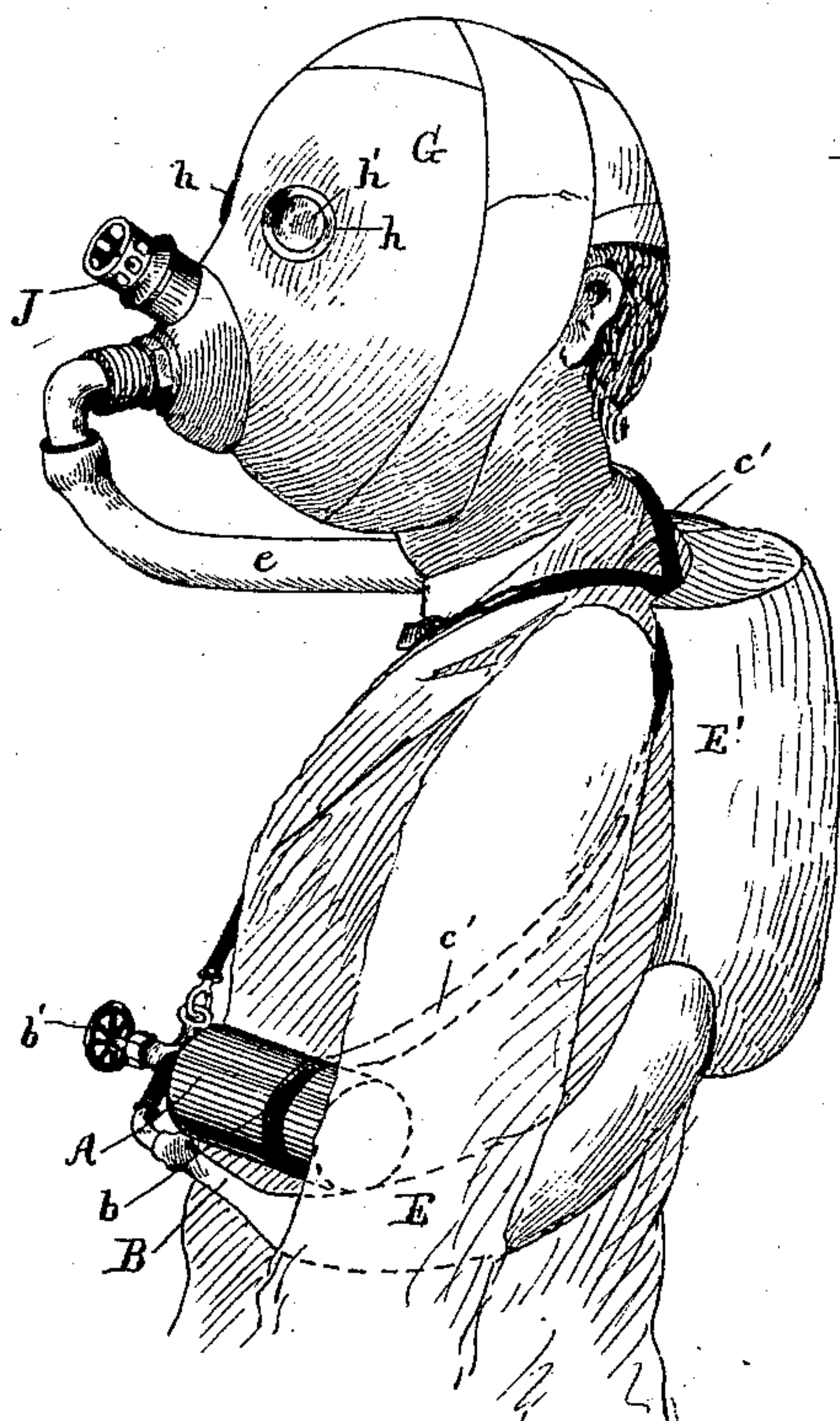


Fig. 1 -

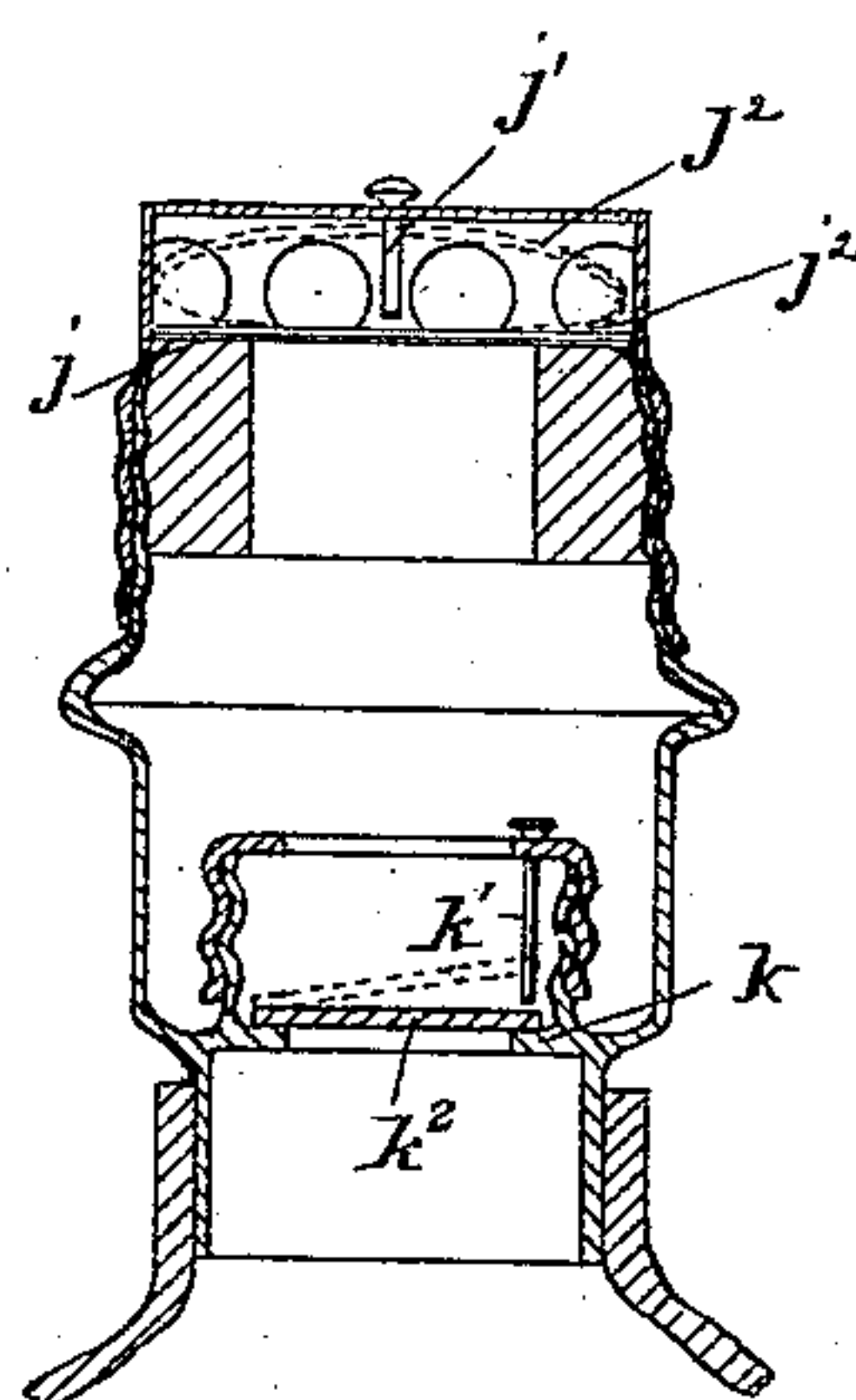


Fig. 2 -

WITNESSES,

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GEORGE H. HURD, OF CLEVELAND, OHIO, ASSIGNOR OF ONE-HALF TO J. M. HOWER, JR., OF SAME PLACE.

RESPIRATOR FOR FIREMEN.

SPECIFICATION forming part of Letters Patent No. 428,611, dated May 27, 1890.

Application filed July 1, 1889. Serial No. 316,155. (No model.)

To all whom it may concern:

Be it known that I, GEORGE H. HURD, a citizen of the United States, and a resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented certain new and useful Improvements in Firemen's Armor, of which the following is a specification, the principle of the invention being herein explained, and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

The object of my invention is an improved apparatus to enable firemen to enter burning buildings and rooms filled with smoke and noxious gases and to work therein with impunity. It may also be used by divers to enter water and carry with them their own supply of air, which will enable them to work continuously for some time without the necessity of rising to the surface or of having attendants who will furnish them with a new supply of air.

Referring to the drawings, Figure 1 is a perspective of the figure of a man protected with my improved armor. Fig. 2 is a detail view of the double valve.

A is a metal cylinder filled with compressed air, which may be compressed into one twelve-hundredth of its original bulk, if necessary. Strap *c'* passes over the shoulder of the wearer and is secured at its respective extremities to the cylinder A. Tube B is secured to one end of said cylinder, from which the air may issue, the connection between said tube and cylinder being governed by valve *b'*, adapted to prevent entirely the emission of air from chamber A or to regulate the outflow of air therefrom. Expanding-tube E connects with said tube B and passes partially around the body of the operator, and connects at its other extremity with the bag or air-expanding chamber E', that is secured in any suitable manner to the back of the operator. Tube *e* connects air-expanding chamber E' with the helmet. Said chamber has no communication with the outer air. Said helmet is made preferably of rubber adapted to stretch to a greater or less degree and its free edges to tightly inclose the head and face of the wearer. It is furnished with eye-holes *h*, pro-

vided with isinglass coverings *h'*. A compound valve J is secured in the lower front portion of said helmet, said valve being formed as follows: A primary seat *j* is formed at the outer extremity of the valve, a pin *j'* extending downwardly from the outer shell of the valve into close proximity to said seat. Resting on said seat is the isinglass disk *j*². As the wearer exhales, the disk is forced outwardly and permits the exhalations to pass out, the pin preventing the whole of the disk from moving outwardly, but affording ample opportunity for the discharge of the exhalations. The lower portion of the valve is practically a duplicate of the outer portion and consists of a seat *k* and pin *k'* and a disk *k*².

It will be understood that I in no wise confine myself to a disk made of isinglass, for any other suitable substance may answer the purpose, whether opaque or transparent—for instance, aluminum would answer as well as isinglass. As the wearer inhales, the disks, being very light, are drawn tightly against the seats and prevent any ingress of the smoke or other fluids or gases by which the wearer may be surrounded, and the duplex or compound formation of the valve renders it practically impossible for any portion of outside gases to pass into the helmet. This formation of valve I regard as of very considerable importance in the use of my invention, for I have found by practice and experiment that the usual and common forms of valves as heretofore used are inefficient and worthless after a few minutes' use. Moistened sponges have been used; but the dense smoke usually found in burning buildings and the noisome and mephitic gases frequently met with in such places render the sponges soon useless, as they become gummed and clogged and render danger of suffocation extremely imminent.

Another feature of my invention which renders it of practical use is the expanding air chamber or bag located intermediate of the cylinder and the helmet. The necessity of this intermediate expansion of the condensed air has not heretofore been thoroughly understood. The result has been that apparatus of this character have been extremely dan-

gerous in use, for if the highly-condensed air contained within the cylinder is allowed to be breathed, without proper intermediate expansion before it enters the lungs of the
 5 wearer of the helmet there is extreme, not to say certain, danger of suffocation; but by means of my apparatus I can regulate the amount of air issuing from the cylinder to a nicety and provide for its expansion in the
 10 sack to its original bulk, so that by the time it reaches the wearer of the helmet it is in condition to be breathed without danger or distress.

Another advantage of my form of apparatus is that the lower portion of the expanding-tube passes under the arm of the wearer, whereby he is enabled at all times, by merely dropping the arm, to be thoroughly conversant with the amount of air contained in said
 20 tube, and thus there can be no danger that the air-supply can become exhausted without his knowledge. This is of the highest importance for two reasons: First, a fireman when working in a burning building becomes very
 25 forgetful of himself, and is very apt to be unmindful and negligent of the condition of his air-supply; second, if he merely depended on his sight for his knowledge of the amount of air contained in the bag he would frequently
 30 be at a loss, for, the rooms being filled with smoke, his sight is obstructed, and the helmet also impedes considerably the acuteness of his sight.

As I make no claim to the manner of securing the eye-holes in the helmet, nor of the details of construction of connecting the cylinder with the tube and the sack with the helmet, I do not more particularly describe them, as any suitable and mechanical manner will
 40 be satisfactory.

It is to be understood that I in no wise confine the use of this apparatus to burning buildings, as it may be as well used for operations under water or in any place where

gases or fluids are encountered that are harmful to the life of man.

The foregoing description and accompanying drawings set forth in detail mechanism in embodiment of my invention. Change may be made therein, provided the principles
 50 respectively recited in, the following claims are retained and employed.

I therefore particularly point out and distinctly claim as my invention—

1. The combination of a condensed-air
 55 chamber provided with a valve adapted at will of the operator to regulate the emission of air from said chamber, a helmet, and an air-chamber located intermediately of said
 60 condensed-air chamber and said helmet, and wherein the air issuing from the former may expand to atmospheric pressure before passing to said helmet, said expanding air-chamber connected with said condensed-air chamber and helmet and having no connection
 65 with outer air, said helmet provided with an expiratory valve, substantially as set forth.

2. The combination of condensed-air chamber A, provided with hand-valve *b'*, adapted to prevent entirely the emission of air from
 70 chamber A or to regulate the outflow of air therefrom, helmet G, having its free edges formed of rubber adapted tightly to clasp the head of the wearer, said helmet provided with double expiratory valve J, provided with
 75 primary and secondary disks, and seats and pins with which said disks respectively engage, and an air-expanding chamber located intermediately of and connected with helmet G and chamber A and having no connection
 80 with the outer air, substantially as set forth.

In testimony that I claim the foregoing to be my invention I have hereunto set my hand this 27th day of June, A. D. 1889.

GEO. H. HURD.

Witnesses:

EMMA E. PATE,
 J. B. FAY.