No. 622,053. Patented Mar. 28, 1899.

J. W. LIVERMORE.

THAWING APPARATUS.

(Application filed Mar. 30, 1898.)

(No Model.)

Fig. 1.

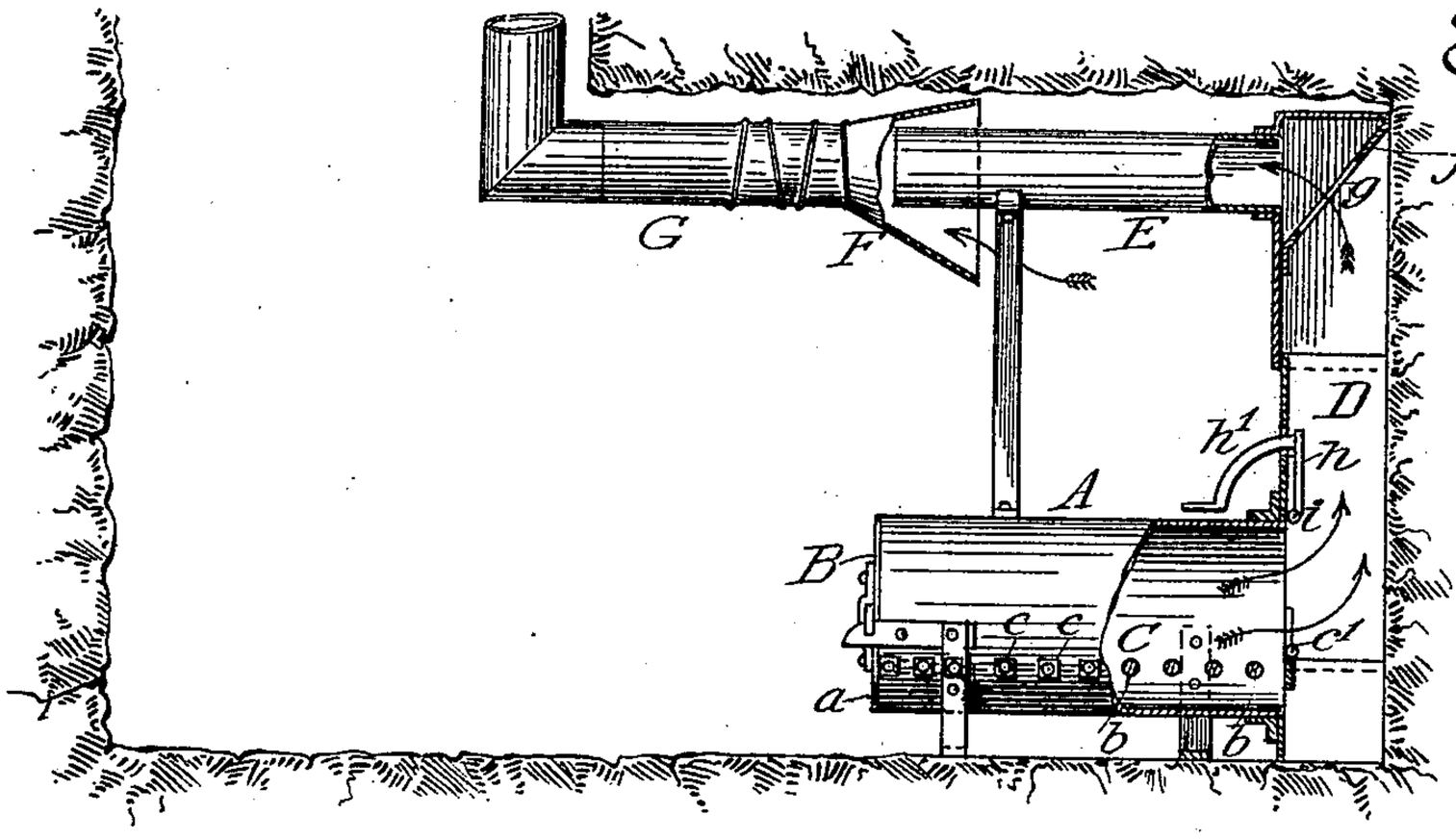


Fig. 2.

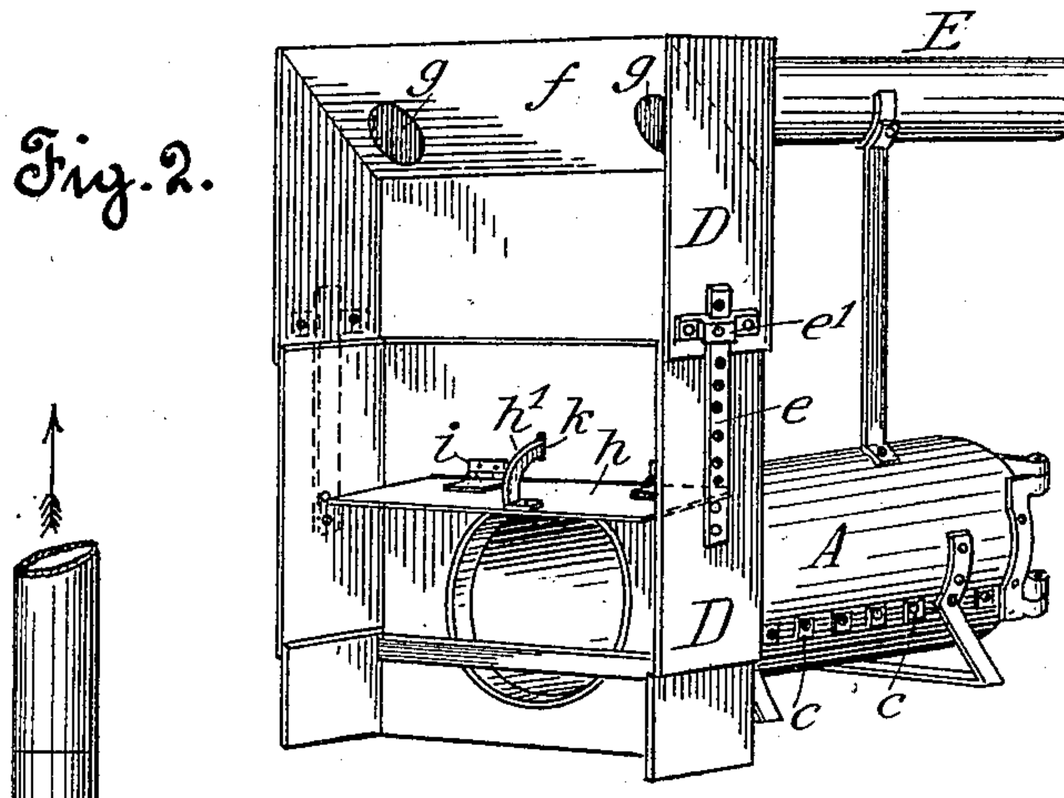
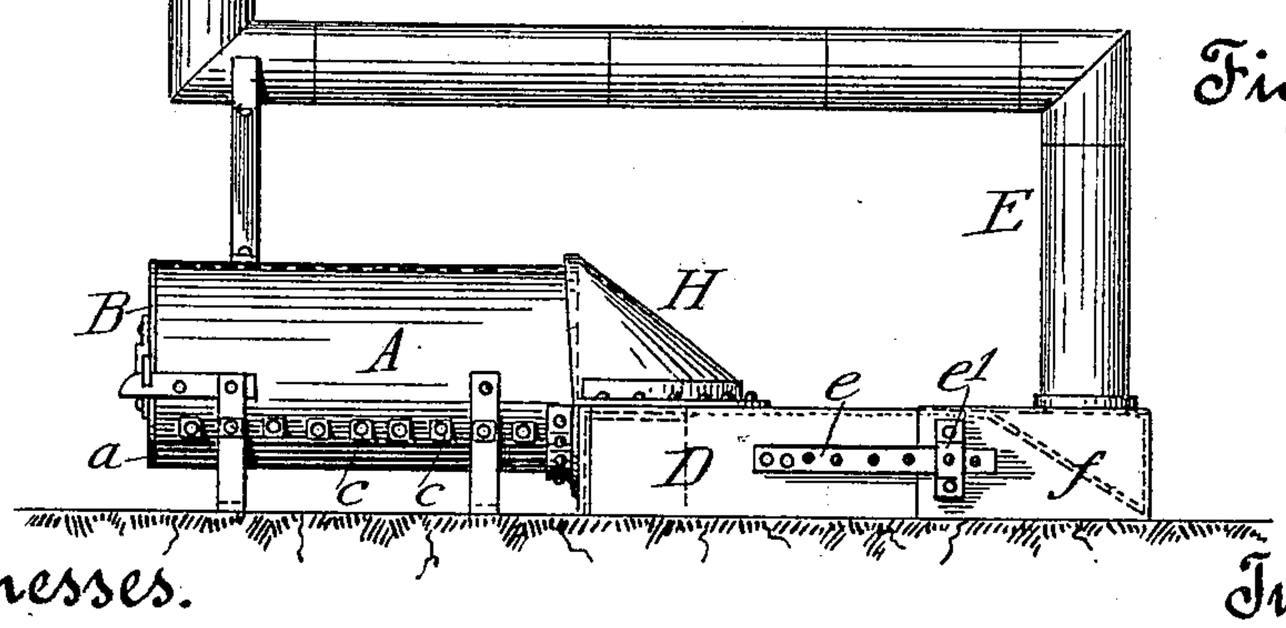


Fig. 3.



Witnesses.

F. Ellis Courteverde.

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UNITED STATES PATENT OFFICE.

JOHN W. LIVERMORE, OF SELMA, CALIFORNIA, ASSIGNOR OF ONE-HALF TO CLARENCE J. BERRY, OF SAME PLACE.

THAWING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 622,053, dated March 28, 1899.

Application filed March 30, 1898. Serial No. 675,752. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. LIVERMORE, a citizen of the United States, residing at Selma, in the county of Fresno and State of California, have invented certain new and useful Improvements in Thawing Apparatus, of which the following is a specification.

My invention is a portable apparatus of cheap and simple construction for applying heat to frozen ground at the surface or in shafts, tunnels, drifts, &c., as a preliminary to prospecting or mining operations.

My invention is fully hereinafter described and is embodied in an apparatus illustrated in the accompanying drawings, in which—

Figure 1 is a side view of the apparatus applying heat to a vertical surface. Fig. 2 is a perspective view of the same. Fig. 3 is a side view of the apparatus applying heat to a horizontal surface.

A represents a furnace or stove, which is preferably a sheet-iron cylinder closed at one end by a door B, a draft-opening *a* being left in the end. This furnace is furnished with a grate, which is preferably composed of a suitable number of bars or pieces of gas-pipe C, which are passed through holes *b* pierced in the cylinder and extend across it, being secured in place by exterior nuts *c*. The furnace is supported on legs and is set longitudinally, as shown, and its end opposite the draft-inlet is open. Hinged at the rear or discharge end of the furnace by hinges *c'* is the heat-applying chamber D, which communicates directly with the furnace and receives the flame and heat from the same. In Fig. 1 this chamber is in vertical position, pushed up into contact with the surface to which the heat is to be applied.

The chamber D has an open face and closed back and is preferably formed in two sections, one of which slides upon the other, so as to adjust its height. This adjustment is shown in Fig. 2, where a perforated bar *e* is secured to the lower section and is guided through a perforated stirrup *e'*, so that a pin may be passed through registering holes in the bar and stirrup.

The position of Fig. 1 is that of the apparatus when applying heat to a vertical surface, such as the face of a drift leading from a shaft. In this position the chamber D is set close against the vertical face, forming a closed compartment, into which the flame and heat rush from the furnace and are distributed against the whole surface covered by the chamber. In the upper end of the chamber D a plate *f* connects the two sides, forming a draft-chamber provided with holes *g* to allow the smoke to escape. A pipe E extends back from this chamber and preferably terminates at or near the adjustable draft-funnel F, which is on the end of a draft-pipe G, carried to or up the shaft, and through which there is a natural draft. This arrangement keeps the air comparatively clear in front of the furnace and carries away the smoke, fumes, &c., without inconvenience to the miners.

I have shown in Fig. 3 the capacity of the apparatus for applying heat to the surface of the ground preparatory to prospecting or digging a hole or shaft. The hinge connection of the chamber D enables it to be thrown down to a horizontal position upon the ground with its open lower end communicating with the furnace. In this case a separate hood H is placed over the opening in what is now the top of chamber D, and the flames and heat are now confined in a horizontal chamber instead of a vertical one and are applied to the surface over the area covered by the horizontal chamber. The single portable machine is thus adapted to both of the kinds of thawing which are required in cold mining countries—that of horizontal and that of vertical frozen surfaces.

A deflecting-plate *h* is hinged at *i* to the rear wall of the chamber D, Fig. 2, which is adjustable through the curved arm *h'*, which passes through a slot *k* in the wall. This deflector when used as in Fig. 2 prevents the draft in the escape-pipe from carrying the heat away too rapidly and directly and causes it to come into contact with the face of the excavation. It will be noticed that the draft-space formed by the walls and top of the chamber D and the plate *f* is provided with two draft-openings *g*, Fig. 2, placed near the end of said plate *f*. This is one of the most im-

portant features of my construction, as it insures the distribution of the flame over the whole surface of the ground. If the escape-pipe led centrally into the back of chamber D, the draft would be central and the heat would be directly applied only over a narrow central space; but by separating the draft-openings, as shown, the draft is divided, causing the flames and heat to spread upwardly from the furnace and to cover the whole surface.

This apparatus forms a cheap, convenient, and portable means for applying heat for the purposes mentioned. It is simply constructed of common material and is well adapted for use in localities where there are few or no facilities for construction or repair.

Having thus described my invention, what I claim is—

1. In a thawing apparatus, the combination with a furnace of a heating-chamber having a closed back, an opening in the back communicating with the furnace, a hinge connection between said furnace and chamber, whereby the chamber can be adjusted from vertical to horizontal and a hood to cover said back opening when the chamber is horizontal, substantially as described.

2. In a thawing apparatus, the combination with a furnace, of a heating-chamber communicating therewith and hinged thereto, and formed of separate sections, one of which is capable of sliding on another, a perforated bar on one section, and a perforated guide on the other, the said bar and guide being adapted to receive a pin for locking said sections at any adjustment.

3. In a thawing apparatus and in combination a furnace, a heating-chamber adapted to be placed against the surface to be thawed, and draft-openings in the chamber and near opposite sides thereof, and communicating with a common escape-pipe, substantially as and for the purpose set forth.

4. In a thawing apparatus and in combination a furnace, a heating-chamber adapted to be placed against the surface to be thawed, a plate connecting the sides and end of the chamber and forming a draft-space, a draft near each end of said plate, and an escape-pipe communicating with said draft-space.

In testimony whereof I have affixed my signature, in presence of two witnesses, this 14th day of March, 1898.

JOHN W. LIVERMORE.

Witnesses:
L. W. SEELY,
A. BARION.