No. 702,924. Patented June 24, 1902.

G. R. CLARKE.

APPARATUS FOR THAWING FROZEN GROUND.

(Application filed Apr. 4, 1901.)

(No Model.) 2 Sheets—Sheet 1.

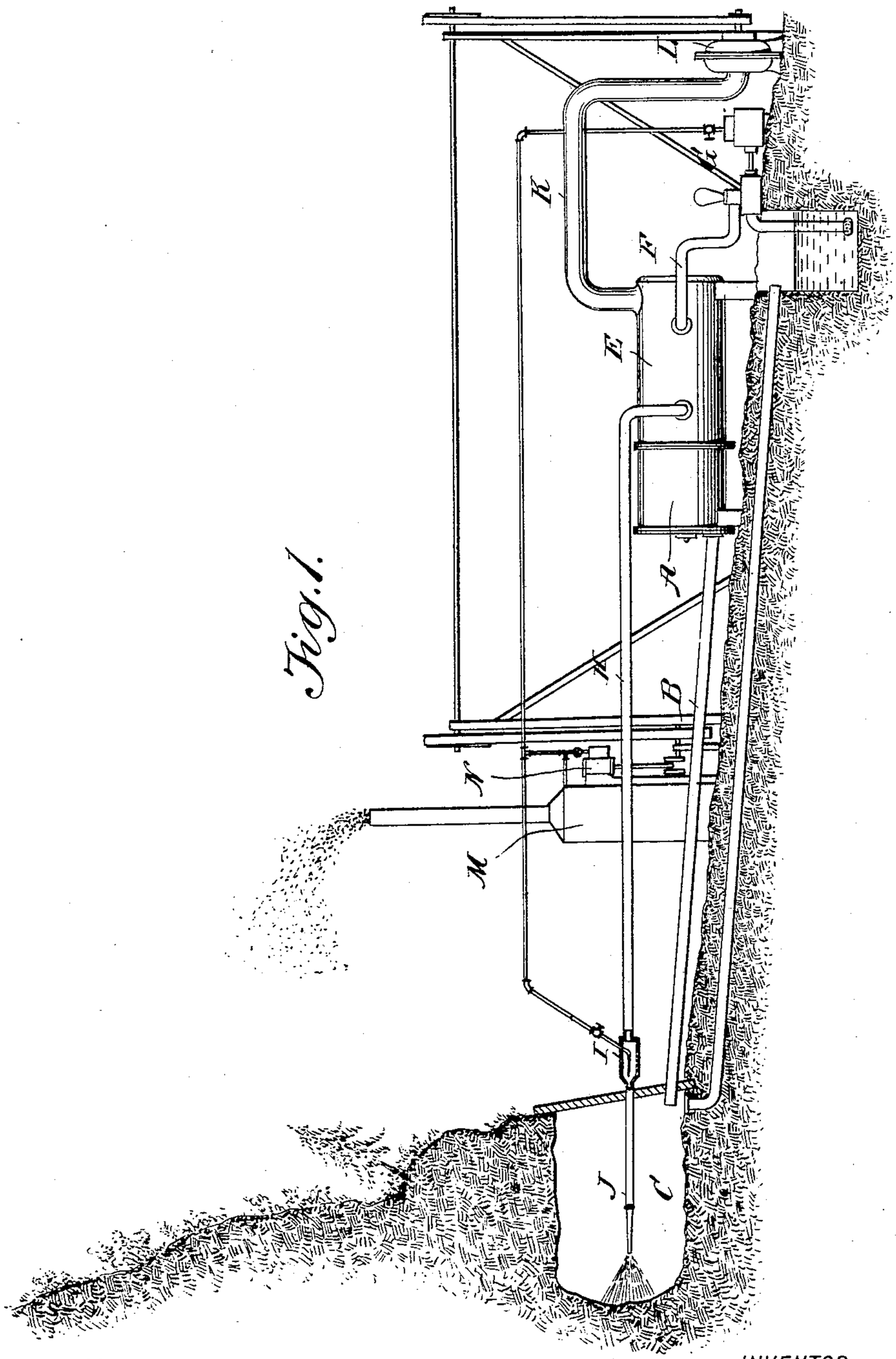

Fig. 1.

WITNESSES:

H. H. Walker

Geo. J. Hoster

INVENTOR

George R. Clarke

BY Munn & Co.

ATTORNEYS

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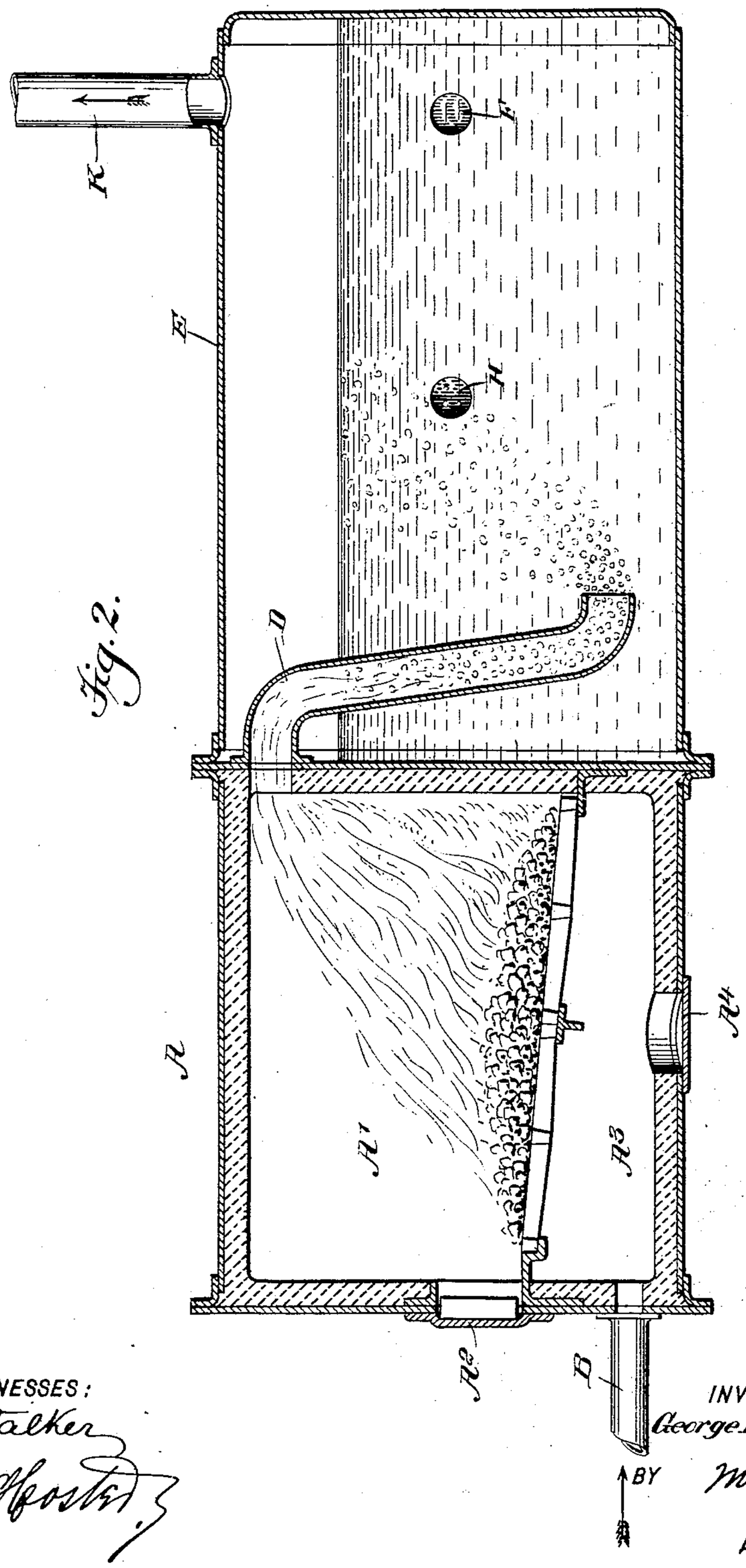
Fig. 2.



WITNESSES:
H. L. Walker
Percy J. Hoosteg

INVENTOR
George R. Clarke
BY Munn & Co
ATTORNEYS

UNITED STATES PATENT OFFICE.

GEORGE RUSSELL CLARKE, OF DAWSON, CANADA.

APPARATUS FOR THAWING FROZEN GROUND.

SPECIFICATION forming part of Letters Patent No. 702,924, dated June 24, 1902.

Application filed April 4, 1901. Serial No. 54,289. (No model.)

To all whom it may concern:

Be it known that I, GEORGE RUSSELL CLARKE, a citizen of the United States, and a resident of Dawson, Yukon Territory, Dominion of Canada, have invented certain new and useful Improvements in Apparatus for Thawing Frozen Ground, of which the following is a full, clear, and exact description.

The invention relates to mining in northern countries; and its object is to provide certain new and useful improvements in apparatus for thawing frozen ground, whereby the hot water necessary for a successful placer-mining operation is readily and cheaply furnished, and in the case of hot hydraulic mining the hot air and vapors in the drift are removed therefrom and utilized in the furnace employed for heating the water.

The invention consists of novel features and parts and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in both the views.

Figure 1 is a side elevation of the improvement as applied to hot hydraulic mining, and Fig. 2 is an enlarged sectional side elevation of the water-heater.

A furnace A, of suitable dimensions, is provided with a fire-box A′, having a door A^2 for placing the fuel in the fire-box, the ash-pit A^3 of which is provided with a suitable outlet A^4, normally closed, and with a pipe B, leading from the face of a drift C, so that the heated air and vapors in the drift pass through the pipe B into the ash-pit and from there to the burning fuel in the fire-box to insure proper combustion of the fuel.

The upper end of the fire-box A′ is provided with an outlet-pipe D, discharging the products of combustion directly into the water contained in a water-compartment E, preferably arranged adjacent to the furnace A, as illustrated in the drawings. The water-compartment E is connected by a pipe F with a pump or other device G for supplying the water-compartment with water, and from said water-compartment E leads a pipe H, connected with a hydraulic placer-mining apparatus I for drawing the water from the tank and forcing the same through a nozzle J against the ground to be thawed—for instance, as shown, for thawing the ground in the drift C.

From the top of the water-compartment E leads a suction-pipe K, connected with a suction-pump L of any approved construction for drawing the products of combustion from the water-compartment after said products have passed through the water by way of the outlet-pipe D from the fire-box A′ of the furnace A.

As indicated in Fig. 2, the pipes F and H are above the discharge end of the pipe D, so that said discharge end is always submerged in the water contained in the compartment E.

Any suitable means may be employed for drawing the water from the heater and forcing the same through the nozzle and for operating the pumps. The means shown comprises a boiler M and engine N, the engine being arranged to drive the suction-pump L and the boiler supplying steam for operating the pump G and also for operating the ejector I for drawing the water from the heater and forcing it through the nozzle J.

When the device is in use for hot hydraulic mining, as shown in Fig. 1, then the products of combustion in passing directly into and through the water contained in the compartment E highly and efficiently heat the water, and this water is then drawn from the compartment and forcibly thrown upon the frozen ground in the drift to thaw the ground and loosen the same. It is evident that during this process of thawing the ground the hot vapors arising during said process heat the air contained in the drift, and this heated air and the vapors pass through the pipe B into the ash-pit A^3 to supply the burning fuel with the necessary oxygen for proper combustion. The action of the suction-pipe K insures at all times a proper flow of the products of combustion arising from the burning fuel into and through the water in the compartment E to highly heat the same.

Although I have described the use of a water-heater and furnace in connection with hydraulic placer-mining, it is evident that the heated water can be used for open-ground sluicing. In either case the water may be

gathered in settling-tanks and reused by forcing the water by the pump G and pipe F back into the water-compartment E.

It is expressly understood that the apparatus described is more especially designed for use in northern countries, in which the ground is solidly frozen and the air during the greater part of the year is at a low temperature.

By utilizing the hot water for thawing in the drift, and thereby heating the air therein, and utilizing this air in the furnace instead of the cold outer air it is evident that a very effective and economical apparatus is provided.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. An apparatus for thawing frozen ground, comprising a furnace, a water-compartment into which pass the products of combustion from said furnace, an exhauster for said water-compartment, for removing the products of combustion from the water-compartment after their passage through the water, means for drawing the water from said water-compartment and discharging it upon the frozen ground in the drift, and a pipe leading from the drift to the furnace, for supplying the latter with heated air, as set forth.

2. An apparatus for thawing frozen ground, comprising a furnace, a water-compartment into which pass the products of combustion from said furnace, an exhauster for said water-compartment, for removing the products of combustion from said water-compartment after their passage through the water, means for drawing the water from said water-compartment and discharging it upon the frozen ground in the drift, a pipe leading from the drift to the furnace, for supplying the latter with heated air, and means for supplying said water-compartment with water, the point of supply of the water to the compartment and the point of drawing off the water from the compartment being above the connection between the furnace and the water-compartment, as set forth.

3. An apparatus for thawing frozen ground, comprising a furnace, a water-compartment into which pass the products of combustion from said furnace, a suction device for drawing the products of combustion from the water-compartment, a pipe leading from the water-compartment, means for drawing the water from the water-compartment and discharging it through said pipe upon the frozen ground, and means for returning the water from the place of discharge to the said water-compartment, as set forth.

4. An apparatus for thawing frozen ground, comprising a furnace, a water-compartment connected therewith and into which pass the products of combustion from said furnace to heat the water, a suction-pump for drawing the products of combustion from the water-compartment, means for drawing the water from the water-compartment and discharging it upon the frozen ground, means for supplying the furnace with air heated by the discharged hot water, and a pump for supplying said water-compartment with water, as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE RUSSELL CLARKE.

Witnesses:
WM. F. HOWE,
H. W. CARR.