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C. W. JOYNT.
PORTABLE APPARATUS FOR THAWING FROZEN GROUND.

APPLICATION FILED AUG. 7, 1903.

NO MODEL.

Fig. 1.

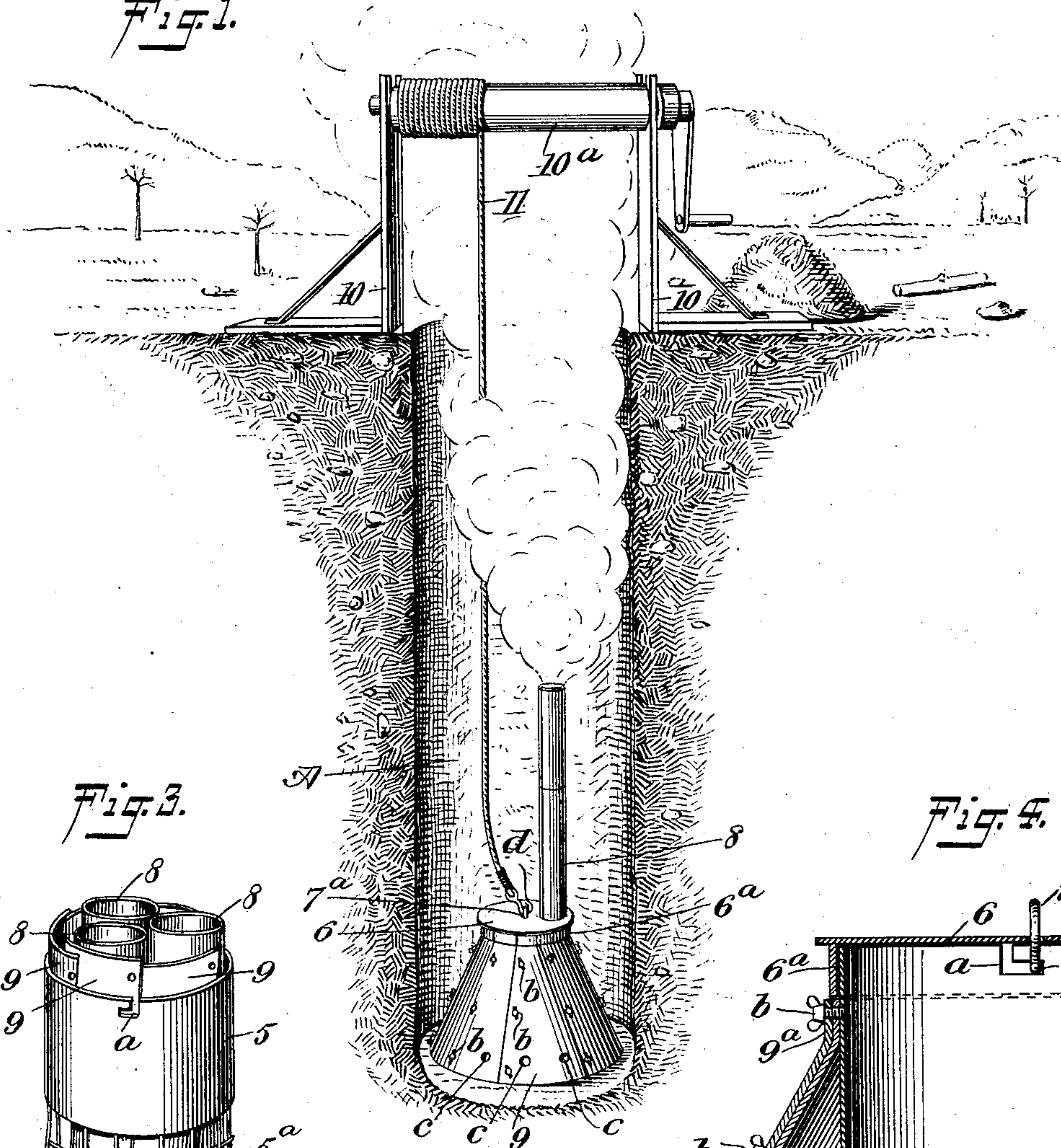


Fig. 3.

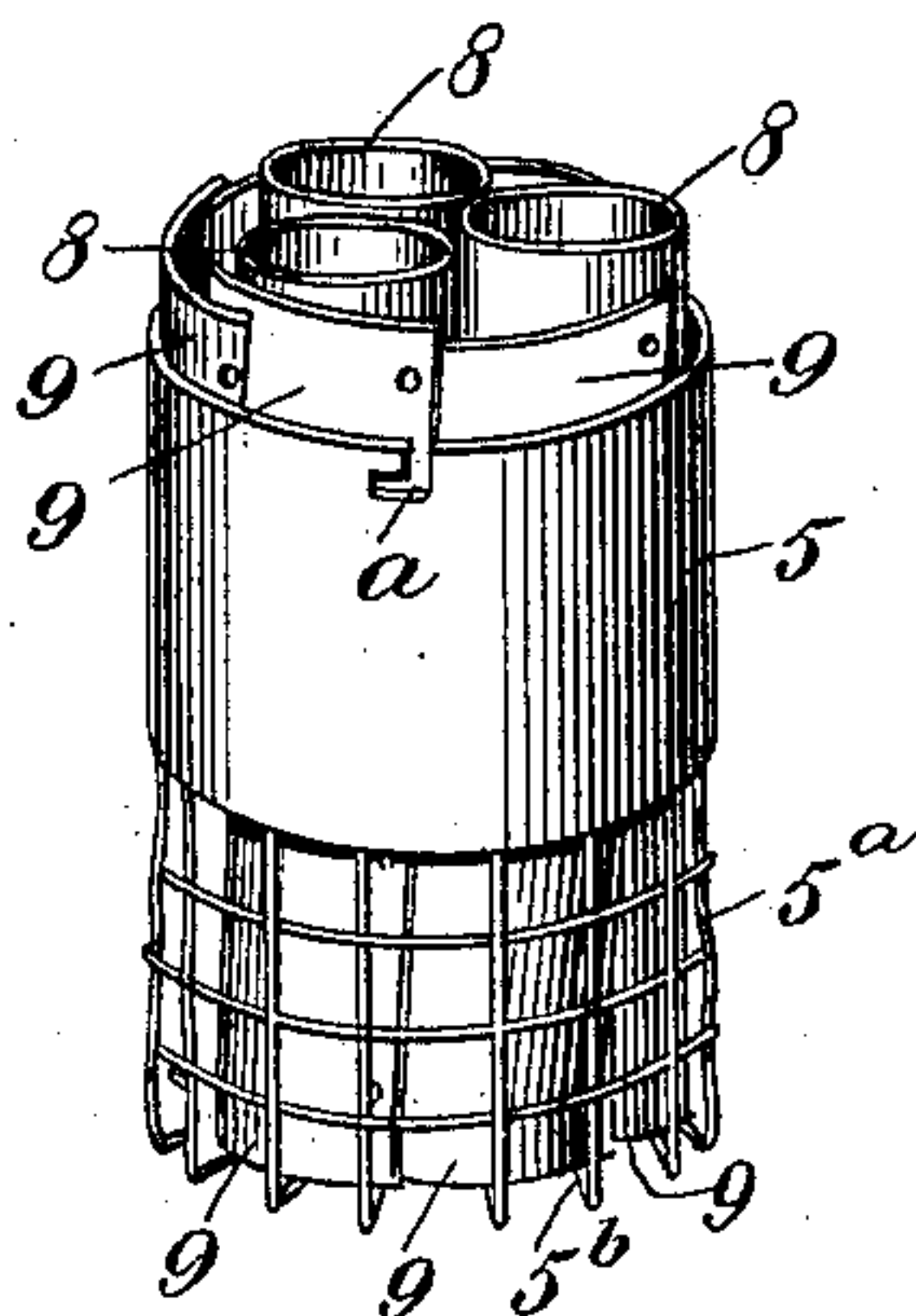


Fig. 4.

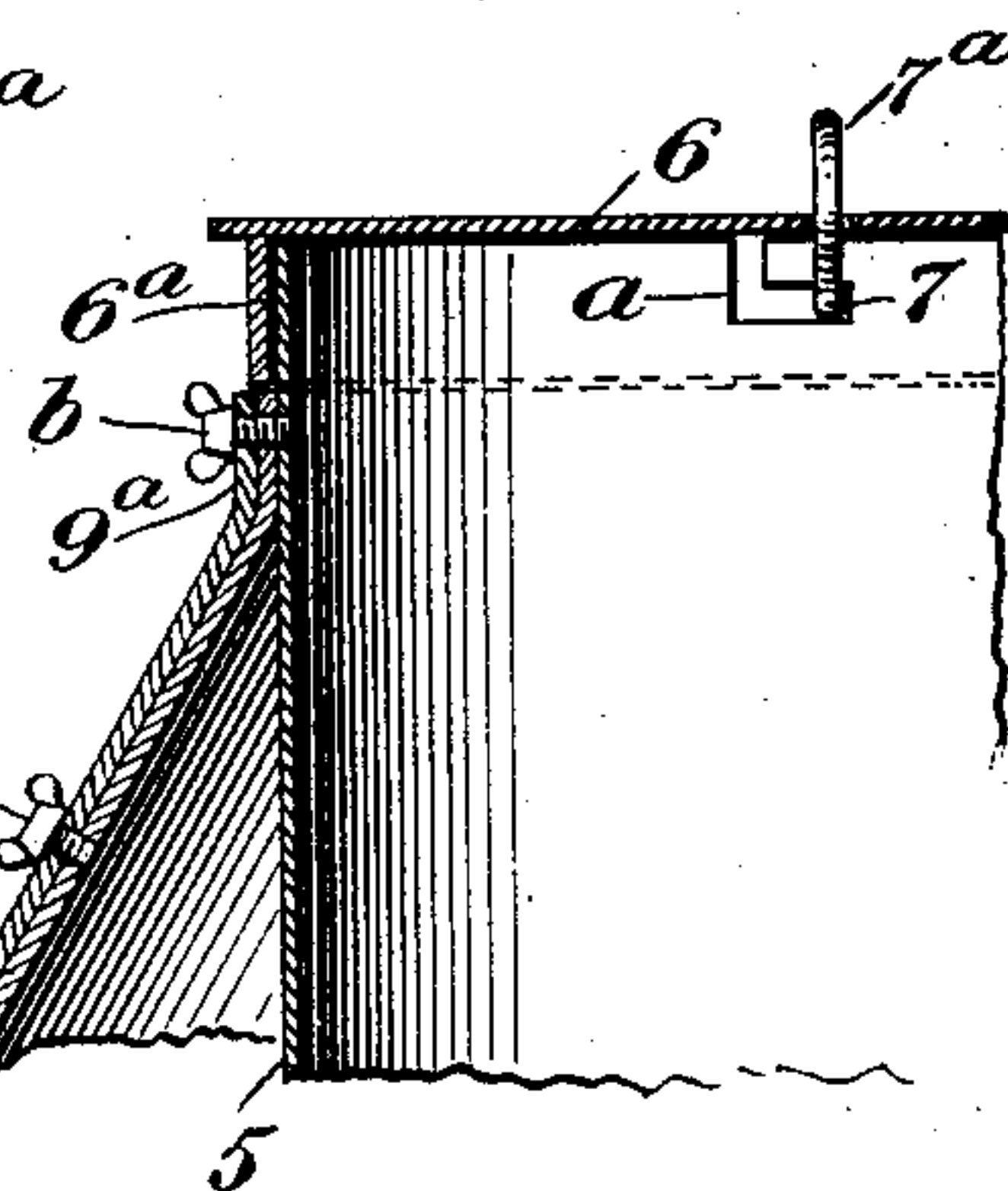
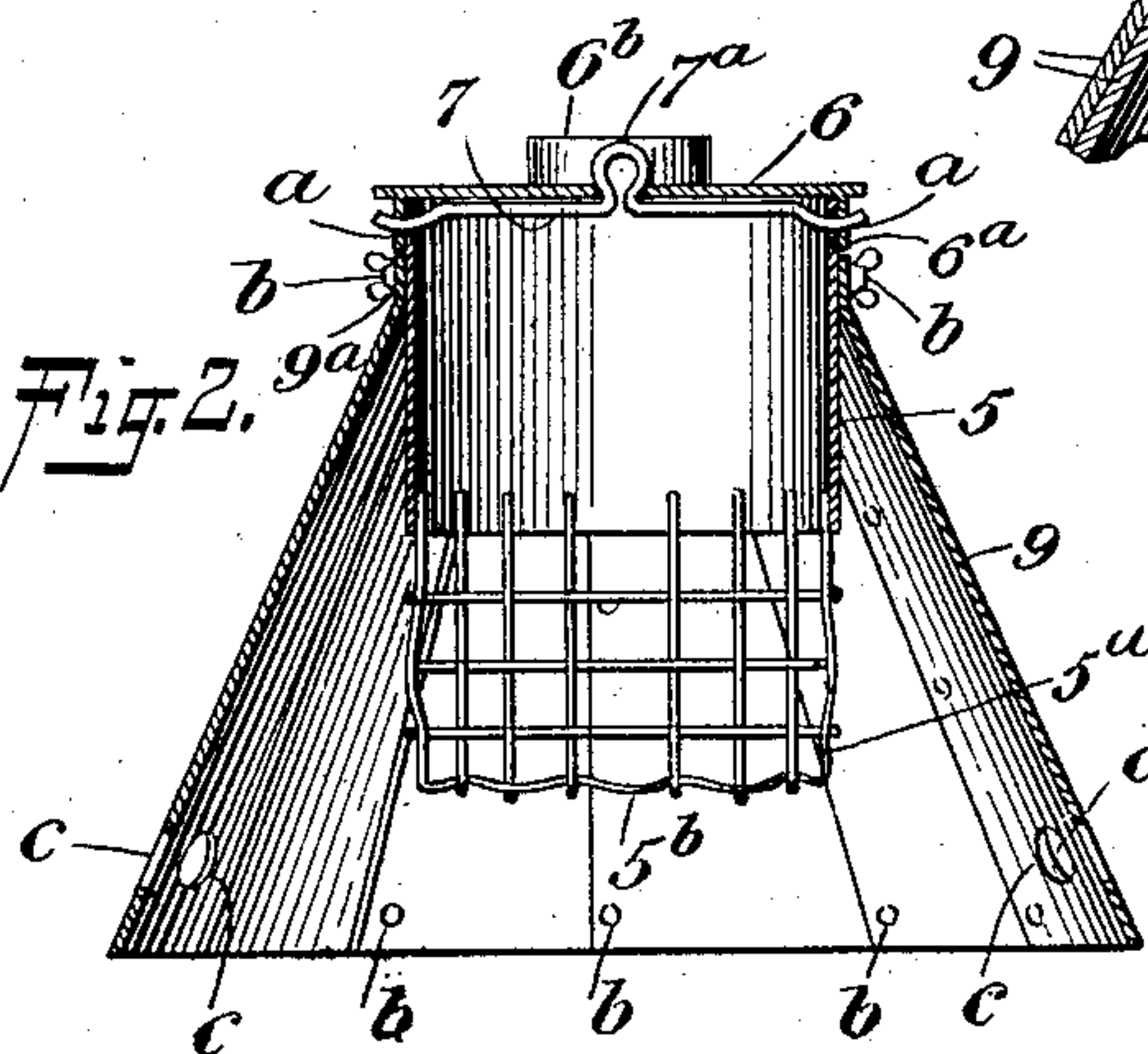


Fig. 2.



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PORTABLE APPARATUS FOR THAWING FROZEN GROUND.

SPECIFICATION forming part of Letters Patent No. 763,612, dated June 28, 1904.

Application filed August 7, 1903. Serial No. 168,622. (No model.)

To all whom it may concern:

Be it known that I, CHARLES W. JOYNT, a citizen of the United States, and a resident of Seattle, in the county of King and State of Washington, have invented a new and Improved Portable Apparatus for Thawing Frozen Ground, of which the following is a full, clear, and exact description.

In gold-mining where the ground is frozen to a great depth it is found necessary to thaw the ground either by the combustion of fuel or by means of steam. Ordinarily a fire of wood is built on the ground where a shaft is to be sunk, and after consuming considerable fuel the partially-thawed soil, which may be pervaded with gold ore, is excavated as far as it has been thawed, and this operation is repeated indefinitely to thus obtain pay-dirt, which is subsequently operated upon for the removal of the gold therefrom. It is found in sinking a shaft by the employment of an open fire at successive intervals that as the heat rises from the combustion of the fuel and escapes at the top of the shaft the fire has comparatively but little effect on the ground beneath it and that a large percentage of the heat is wasted. The use of steam for thawing the ground requires the provision of a large boiler and steam-pipes, which are very expensive and difficult to transport. Furthermore, the rapid condensation of the steam in a frigid climate renders the use of steam unprofitable, produces excess of water in the bottom of the shaft, and has been found less advantageous than a wood fire in many situations.

The object of my invention is to provide a novel, simple, light, and portable apparatus adapted to utilize the combustion of wood for thawing frozen ground in a very economical manner, effect a rapid dissipation of the frost that pervades the ground by directing the entire volume of heat resulting from fuel combustion upon the bottom surface of an excavation, thus avoiding waste of the heat-producing agent, a further object being to enable the starting of the fire at the upper surface of the ground and also enable the convenient removal of the heating apparatus from the excavation to permit the thawed ground to be readily loosened and elevated from the shaft.

The invention consists in the novel construction and combination of parts, as is hereinafter described, and defined in the appended claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a perspective view showing the apparatus and its application for thawing the earth at the bottom of a mine-shaft. Fig. 2 is an enlarged sectional side view of the apparatus, showing the interior construction of the same. Fig. 3 is a side view of the apparatus, showing part of the same packed together in a compact manner for transportation; and Fig. 4 is an enlarged sectional elevation of two portions of the apparatus, showing the means for detachably connecting them together.

The apparatus, in brief, comprises a fire-chamber having a perforated lower portion, a cover removably secured on the upper end of the fire-chamber, a bell-shaped hood attachable at its upper end on the fire-chamber that it encompasses, an asbestos lining, a draft-pipe for the fire-chamber, and a means to reciprocate the heating apparatus in an excavation as it is deepened.

The fire-chamber is shown as having a cylindrical form, which is preferred; but it may also be given a square or oblong contour with rounded corners and afford efficient service. Preferably the upper half of the fire-chamber is formed of imperforate sheet metal, and from the lower end of the said sheet-metal shell a perforated lower portion 5^a depends, which may be formed of sheet metal that is numerously perforated throughout its area; but, as shown, this portion 5^a of the fire-chamber is formed of coarsely-woven heavy wire-screen material that is given cylindrical shape and is provided with a coarsely-reticulated bottom wall 5^b of the same material. The dimension of the described fire-chamber is such as adapts it to contain a proper quantity of wood billets for combustion at one time, and on the upper end of the fire-chamber a cover 6 is removably secured. The cover 6 may be formed of sheet metal similar to that composing the upper portion of the fire-cham-

ber 5 5^a and is thereupon mounted by means of a depending border flange 6^a, that is affixed upon the margin of the flat cover-piece and may slip over the upper end portion of the chamber-wall 5. Centrally in the cover-piece 6 an oblong perforation is formed to permit the upward insertion therethrough of an eye 7^a, that is formed or secured on the latch-bar 7, which is held by the eye or other means transversely and against the lower surface of the cover-piece 6 and extends at each end of said bar through a perforation in the depending flange 6^a, the end portions of the latch-bar being bent down and outward to permit material of the border-flange 6^a to remain above each of said perforations therein. In the side wall 5 of the fire-chamber at diametrically opposite points lantern-lock slots *a* are formed that cut through the upper edge thereof and are of proper size to receive the latch-bar 7 when the cover 6 is mounted upon the fire-chamber wall 5, a turning movement of the cover in a proper direction serving to lock it upon the fire-chamber by an engagement of the latch-bar 7 within the angular slots *a*. The cover-piece 6 is apertured at one side of the eye 7^a, and a collar 6^b is extended upward around said aperture, this circular upstanding collar receiving the lower end of a draft-pipe 8, that may consist of several joints that are connectible in the usual manner to afford such a height to the draft-pipe as will insure effective combustion of fuel in the fire-chamber.

The petticoat or hood 9 may with advantage be coniform in shape with the exception of an integral cylindrical upper end portion 9^a, that is of a diameter internally which adapts it to fit neatly upon the outer surface of the body portion 5 of the fire-chamber. The hood 9 may be formed of a single piece of sheet metal and be joined at the side edges of said piece by means of short bolts, and the part 9^a may be secured upon the body-piece 5 of the fire-chamber with like screw-bolts *b*, the bolts passing through and screwing into aligned perforations in the parts they connect. If preferred, bolts and nuts may in an obvious manner be used in place of the thumb-screws *b*.

For economy in material and to facilitate the compact lapping together of the sheet-metal hood it may with advantage be formed in a plurality of sections, as indicated in the drawings, and these sections be joined together by bolts *b*, screwing into perforations in the lapped edge portions of the hood-sections. Preferably the hood 9 is lined with asbestos-board to protect it and prevent upward radiation of heat. At intervals there are perforations *c* for the introduction of air provided in the lower portion of the hood 9, which provision is necessary when the hood is seated on the earth upon which it is to direct heat.

A windlass-frame 10 is preferably employed to support the drum 10^a for manual rotation

above the excavation A and is represented in Fig. 1 as having been sunken to a considerable depth. Upon the drum 10^a a rope 11 is affixed by one end, whereby the rope is held connected to the drum and is wrapped thereon or unwrapped therefrom as occasion may require, and, as shown, there is a hook *d* on the depending end of the rope which is engaged with the eye 7^a.

In conducting the thawing operation the apparatus that has been described is drawn to the surface of the ground by means of the rope and windlass and seated thereon so that the cover 6 may be removed, which affords free access to the fire-chamber 5 5^a. A fire of wood is now started in the lower portion 5^a of the fire-chamber, and the entire chamber is filled with the combustible material. Then the cover 6 is replaced, the rope 11 is connected with the ring-eye 7^a, and the heating apparatus complete is lowered to the bottom of the excavation A. It will be seen that the fire in the chamber 5 5^a will quickly evolve intense heat as the wood is consumed, and the larger portion of the heat is deflected downward by the hood 9 directly into contact with the frozen surface of earth at the bottom of the excavation A. As soon as the charge of wood is consumed the apparatus may be elevated to the top of the excavation and drawn to one side for heating it upon the ground and again starting a fire therein to renew the thawing of the earth at the bottom of the shaft or pit when the thawed ground has been excavated and elevated by a bucket and the windlass in the usual way.

It will be evident from the foregoing description that the combustion of fuel is economical, that the heat produced will be deflected by the flared hood, as well as from the numerous openings in the lower portion of the fire-chamber, directly against the frozen ground, which will be thawed a much greater depth with a comparatively small quantity of fuel than could be effected by the combustion of a greater amount of wood if it is burned as an open fire. Furthermore, as noxious fumes frequently result from burning wood openly at the bottom of a mining-shaft and danger of suffocation results time is lost to permit an escape of such fumes. By use of the improvement all danger and loss of time are avoided, as the draft of the smoke-pipe 8 will effectively conduct the fumes along with the smoke upward and out of the lower portion of the shaft, so that the operation of excavating may be resumed upon removal of the thawing apparatus from the pit.

As some of the northern gold-mines are difficult to reach except by the employment of pack horses or mules, it is a feature of great advantage to be enabled to form the detached parts of the improved thawing apparatus into a compact bundle, this provision being illustrated in Fig. 3. As shown in said figure, the

hood 9 is removed from the fire-chamber 5, and if formed of sections said sections are separated from each other and stowed endwise within the fire-chamber, where they are
 5 closely lapped together. The cover 6, that has been removed, may be secured upon the lower end of the fire-chamber 5^a in any suitable manner and the draft-pipe 8 be separated
 10 into sections and inserted in the remaining space in the fire-chamber 5 5^a, which completes the packing together of the heating apparatus.

To enable the retention of the several parts of the apparatus in closely-packed condition
 15 for transportation on a pack horse or mule, they may be wrapped up in blankets, that are needed in the frigid temperature of the regions through which goods must be transported, or be packed in any other suitable
 20 manner on the animals, so that the apparatus, which is comparatively of light weight, may be conveniently and safely carried as a package strapped on an animal over devious paths that more bulky apparatus could not be car-
 25 ried over.

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

1. A thawing apparatus, comprising a fire-chamber perforate in its lower portion, a
 30 detachable cover for the fire-chamber, and a depending flaring hood formed of connectible sections, means to connect the hood-sections, and means to detachably secure the upper portion of the hood on the fire-chamber.

35 2. A thawing apparatus, comprising a cylindrical fire-chamber, the lower portion being perforate, a removable lid for the fire-chamber, a hood cylindrical in its upper portion and flaring in its lower portion, said hood being
 40 formed of detachable sections having draft-openings in the flaring walls near the lower edges thereof, means to detachably se-

cure the hood-sections together, and means to detachably secure the cylindrical portion of the hood upon the upper portion of the fire- 45 chamber.

3. A thawing apparatus, comprising a cylindrical fire-chamber having a reticulated lower portion, a detachable cover thereon, a draft-pipe extended above an opening in the 50 cover, a depending flaring hood open at its lower end and removably secured on the upper portion of the fire-chamber, and incasing said chamber, and means for detachably connecting a hoisting-rope with the cover. 55

4. The combination with a fire-chamber comprising a sheet-metal cylindrical upper portion, a reticulated lower portion and a bottom wall, a plate-metal flanged cover, a latch-bar having a central eye extending through 60 the cover-plate, and projecting at its ends through the fire-chamber wall to detachably interlock with angular slots in the flange of the cover, a collar on the cover, bounding an opening therein, and a downwardly-flaring 65 hood of sheet metal detachably secured upon the outer side of the upper portion of the fire-chamber and having draft-holes in its wall near its oven lower end.

5. In a device of the character described, 70 the fire-chamber, the separately-jointed draft-pipe, the detachable cover for the fire-chamber, and the flared sheet-metal hood, all so proportioned that the draft-pipe, cover and hood may be arranged within and upon the 75 fire-chamber to form a compact package for transportation.

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

CHARLES W. JOYNT.

Witnesses:

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