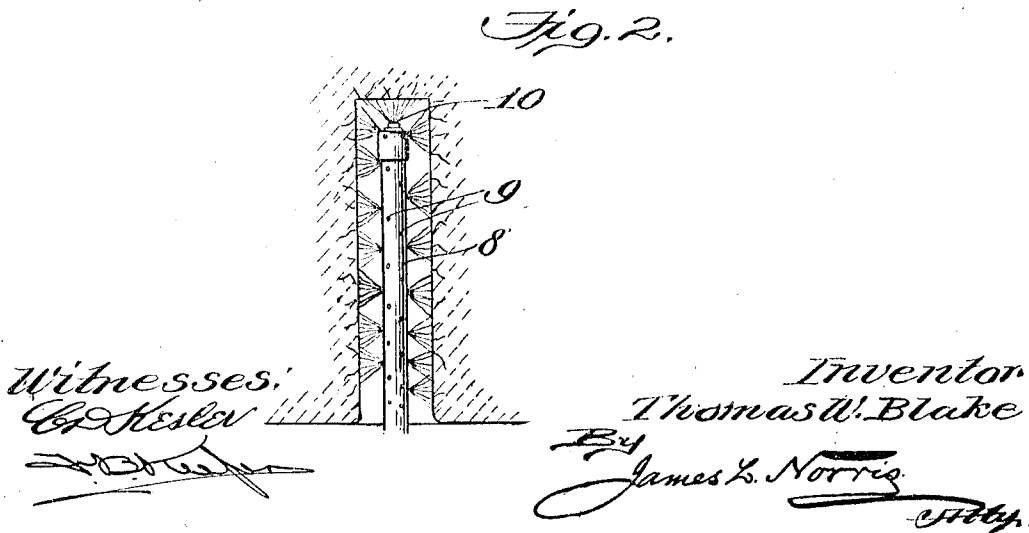
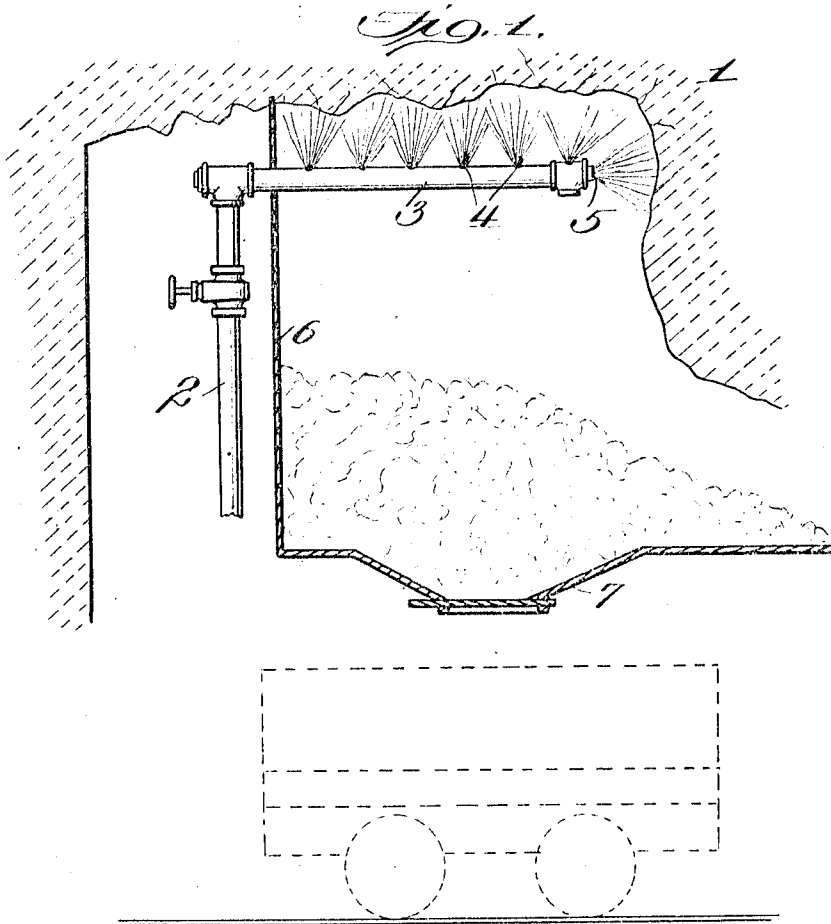


T. W. BLAKE.
METHOD OF MINING GILSONITE.
APPLICATION FILED MAY 15, 1909.

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UNITED STATES PATENT OFFICE.

THOMAS W. BLAKE, OF DRAGON, UTAH.

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Specification of Letters Patent.

Patented Feb. 22, 1910.

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To all whom it may concern:

Be it known that I, THOMAS W. BLAKE, a citizen of the United States, residing at Dragon, in the county of Uinta and State of Utah, have invented new and useful Improvements in Methods of Mining Gilsonite, of which the following is a specification.

My present invention relates to the mining of gilsonite and other substances which have the characteristic of flaking or breaking down without melting, when subjected to heat of a certain temperature, and it has for its object primarily to provide a method of mining such substances in a commercially practicable manner by the application of heat of appropriate temperature to the substance while in its natural state whereby the substance will be slacked or broken down while its original condition is preserved although the substance after the application of the heat thereto is divided or broken up into small pieces or flakes and while in this form the substance may be removed from the mine with the greatest facility, the present method enabling substances of this class to be mined very cheaply owing to the fact that the present laborious mode of picking is dispensed with, and the commercial value of the substance when mined in accordance with the present invention is not impaired, the heat applied to it serving merely to free it from the natural mass whereby it may be readily removed from the mine.

More specifically, the method consists in introducing into the mine containing the gilsonite suitable pipes which convey steam or heated air into the mine, such pipes serving to supply the steam or heated air to suitable distributing nozzles whereby the heat of the steam or air is caused to act directly upon the mass in its natural state and in such a manner that the substance after it is freed from the mass may drop therefrom, preparatory to its removal from the mine. The effect of the heat upon gilsonite is to slack or break it down in the form of flakes or small pieces, it dropping away from the mass so that the use of picks with the attendant expense and objections, is avoided so that the substance may be mined very cheaply and its commercial value is not impaired, and by using steam as a heating medium, a two-fold result is obtained of slacking or breaking

down the substance from the mass and the moisture contained in the steam serves as a humidifier to lay the dust and thereby prevent dust explosions.

It is to be understood that apparatus of various kinds may be employed in carrying out the method, such apparatus depending more or less upon the character of the mine or to the desired system that is to be used for the mining of the substance. It is generally preferable to conduct the steam or heated air into the mine from the surface owing to the fact that economy may be effected, because the power plants from which such steam or heated air may be conveyed are usually located on the surface. It will be understood, however, that the invention is not limited to a method wherein conveying pipes of steam or heated air are led into the mine from the surface, as it might be preferable in some cases to generate the heating medium within the mine itself and in proximity to the mass of the substance that is to be acted upon by the heating medium.

In the accompanying drawing, I have shown as examples two forms of devices that may be used in carrying out the method.

Figure 1 is a sectional view of a portion of a mine showing a horizontally arranged distributing nozzle arranged to act upon the mass when working horizontally, a receptacle with a hopper being shown beneath the distributing nozzle and the mass upon which it operates so as to collect the slacked or broken substance and thereby facilitate its removal by the aid of the ordinary mine cars. Fig. 2 is a sectional view of a portion of the mine showing a distributing nozzle which is arranged vertically and is adapted to act upon the mass as the same is worked upwardly.

The present invention is applicable generally to the mining of gilsonite and such other asphaltums as may have the characteristics above described, it providing an improved method for the mining of such substances which enables them to be obtained from the mine and while in their natural state inexpensively and without impairing to any appreciable extent the natural condition of the substance. The present method may be used to especial advantage in the mining of gilsonite which is an asphaltum of the finest grade and pertains to the hydro-

carbon class of minerals. This substance occurs in truly vertical fissure veins of an average, say, of six feet in width, the veins cutting through the country in almost straight lines. This gilsonite is hard and brittle, and the only mode heretofore known for mining it has been by the use of picks and similar machinery which serve to mechanically break the substance from the mass so that it can be removed from the mine. The use of picks in the mining of the substance, however, is objectionable owing principally to the labor and expense. I have discovered that the application of heat of a suitable temperature to the substance while in its natural state will cause the substance to slack or break down in the form of flakes or chips, the flaking or slacking of the substance being due probably to expansion, and I have also discovered that the substance when so slacked or broken is in no way changed from its original condition, as it is not melted owing to the fact that the moment the heat is sufficient to break down or slack the substance, the chips or pieces drop from the mass and from the influence of the heat, and this substance when so mined is in better marketable condition than when it is mined by picks.

I have found by experiments that it is entirely feasible and profitable to convey the steam or other heating medium into the stopes of a gilsonite mine by means of ordinary piping and there liberate the steam or heating medium so that it may act upon the mass of gilsonite to slack or break it, the steam or heating medium being so liberated that the substance after slacking or breaking is permitted to fall from the mass and freed from the further influence of the heating medium so as to avoid melting the substance.

In the accompanying drawing, I have shown a section of a vein 1 of the gilsonite which is in a solid mass, a pipe 2 leading from an appropriate source of steam or hot air supply which may be located within the mine itself although it may be preferable in most cases to conduct the steam or heating medium into the mine from the surface. This pipe leads to the mass to be mined and it is connected to an appropriate distributing device or nozzle 3, that shown in the present instance being so attached to the supply pipe 2 as to extend horizontally and its upper side is provided with a suitable number of orifices 4 through which the steam or heating medium is liberated and directed against the roof of the mass, an auxiliary orifice 5 being formed in the end of the nozzle so that a jet is projected horizontally therefrom. The steam or other heating medium liberated and projected against the roof of the mass acts to break down or slack the substance causing it to fall away from the roof in the

form of flakes or small pieces, and the jet of steam or heating medium which is liberated from the orifice 5 acts upon the mass beneath the roof, causing it to fall away and thereby form a clearance to permit the dropping of the substance from the roof. In order to increase the efficiency of the apparatus, a casing may be provided for confining the steam or heating medium to the zone where the substance is being mined, this zone being thereby blocked off from the other passages of the mine. In the present instance, I have shown conventionally a casing 6 for accomplishing this purpose, this casing forming substantially a chamber within which the mining operation may be carried on advantageously, this casing serving as a receptacle to receive the substance which drops from the roof of the mine, and a chute or hopper 7 may be provided through which the broken or mined substance may pass to the mine cars, the latter serving to remove the mined substance from the mine in the usual manner.

In upraising, the distributing device or nozzle may be constructed and operated in the manner shown in Fig. 2, a hole being first drilled vertically into the mass which hole should be larger than the outside diameter of the distributing device or nozzle, and a distributing pipe or nozzle 8 is shown in this instance which is provided with orifices 9 which are spaced both circumferentially and axially of the nozzle, these orifices being arranged closer together toward the bottom of the nozzle than toward the top thereof, the upper end of the distributing device or nozzle being provided with a supplemental orifice 10. The steam or heating medium conducted to the distributing device 8 will be projected from the orifices 9 and 10 therein, and by reason of the closer spacing of these orifices toward the bottom of the distributing device, the substance toward the lower end of the hole will be broken away more rapidly than that toward the upper end of the bore or hole so that the substance breaking away from the upper portion of the bore or hole will be free to drop downwardly the moment it is freed from the mass. The steam or heating medium liberated from the top orifice 10 is projected against the top wall of the hole or bore and thereby removes the substance from the mass so as to permit the uplifting of the distributing device or nozzle as the mining operation progresses. In both instances, the orifices in the distributing devices are preferably relatively small in size and are staggered so as to insure uniform distribution of the steam or heating medium, thereby insuring a uniform application of the heat to all portions of the mass and preventing undue heating of any particular part that might otherwise

result in melting, a result that is to be avoided owing to the fact that when the gilsonite is melted, it is worthless.

While hot air may be used advantageously, it is generally preferable to employ steam owing to the facility for generating it and the fact that it serves the dual function of applying heat to the mass to break it down or slack it, and the moisture of the steam acts upon any dust that might be developed, thereby moistening it and preventing dust explosions.

According to the present method, substances of the class mentioned may be mined very cheaply and the substance when so mined is in better marketable condition than when it is mined with the aid of picks as heretofore practiced and, moreover, uniform results are obtainable for it will be observed that the heat is so applied to the mass that the substance receives only the required amount of heat to slack or break it down whereupon it falls in the form of flakes or small pieces from the zone of heat and into a place where it can be readily removed from the mine so that after it has been broken down it is no longer subjected to such heat as might tend to melt it so that the natural condition of the substance is preserved after it has been broken or separated from the mass.

It will be understood that I have shown but one example of a method whereby the present invention may be carried into effect, the invention consisting essentially in the application of heat of appropriate temperature, preferably steam, to the mass in such a manner so that the substance is heated only to such an extent as will break it down or slack it and thus permit it to separate itself from the mass. By using steam, obviously the temperature of such as a heating medium may be easily controlled so that the most efficient action upon the substance is insured.

I claim as my invention:

1. A method of mining gilsonite which consists in subjecting such substance while in its natural state to heat sufficient to cause its separation from the mass but insufficient to cause melting of such substance.

2. A method of mining gilsonite which consists in subjecting a mass of the substance while in its natural state to heat sufficient to cause pieces thereof to separate themselves in their natural condition from the mass, such heat being insufficient to impair the natural condition of the substance after its separation.

3. A method of mining gilsonite which

consists in subjecting a mass of the substance while in its natural state to heat sufficient to cause pieces of the substance to separate themselves in their natural condition from the mass and insufficient to melt or fuse the substance.

4. A method of mining gilsonite which consists in subjecting a mass of the substance while in its natural state to heat sufficient to break down substance from the mass and to permit the dropping of the broken substance in its natural condition from the mass.

5. A method of mining gilsonite which consists in projecting against the under side of a mass of the substance while in its natural state steam of a temperature sufficient to separate pieces of the substance in natural condition from the mass and insufficient to melt or fuse such pieces.

6. A method of mining gilsonite which consists in subjecting a mass of the substance while in its natural state to heat to break down the substance in the mass and permitting the dropping of the broken substance in its natural condition from the heating zone before reaching a temperature sufficient to melt or fuse the broken substance.

7. A method of mining gilsonite which consists in subjecting a mass of the substance while in its natural state to a heating medium which is projected against the mass of substance at a plurality of points to cause the breaking of the substance and the separation of the broken substance in its natural condition from the mass and thereby permitting removal of the broken substance from the influence of the heating medium.

8. A method of mining gilsonite which consists in subjecting a mass of the substance while in its natural state to the action of steam to cause a breaking of the substance and a separation of the broken substance in its natural condition from the mass and removal of said broken substance from the influence of the steam.

9. A method of mining gilsonite which consists in subjecting a mass of the substance while in its natural state to jets of steam to cause a breaking down of the substance in the mass and a falling of the broken substance in its natural condition therefrom and from the influence of said steam.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

THOMAS W. BLAKE.

Witnesses:

W. D. HALPIN,

HARRY JOHNSTON.