(No Model.)

C. W. BEEHLER.

HYDROTHERMAL MINING PROCESS.

No. 497,513. Patented May 16, 1893.

Fig. 1.

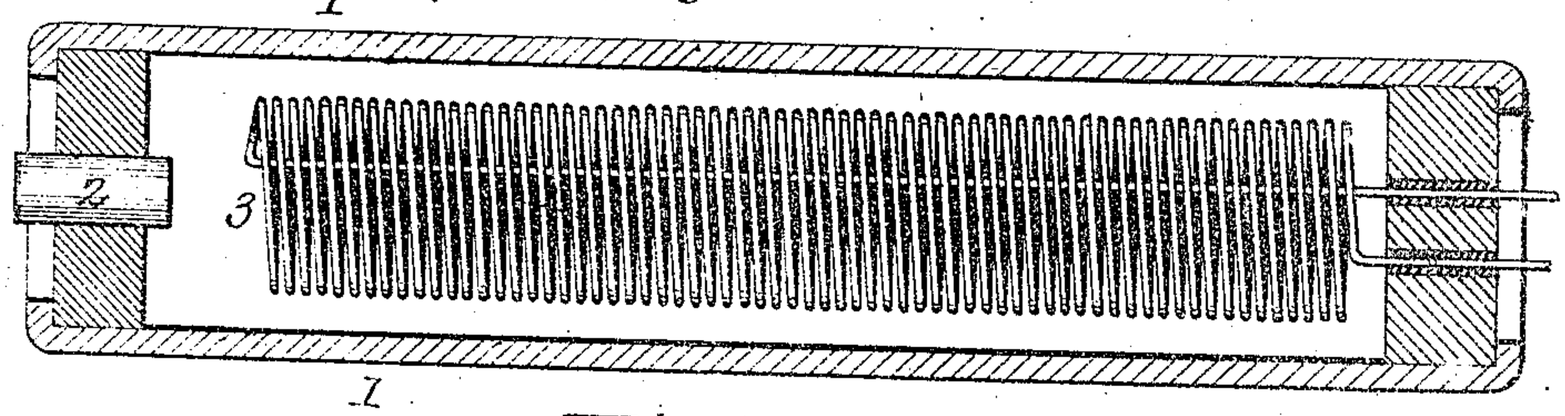


Fig. 2.

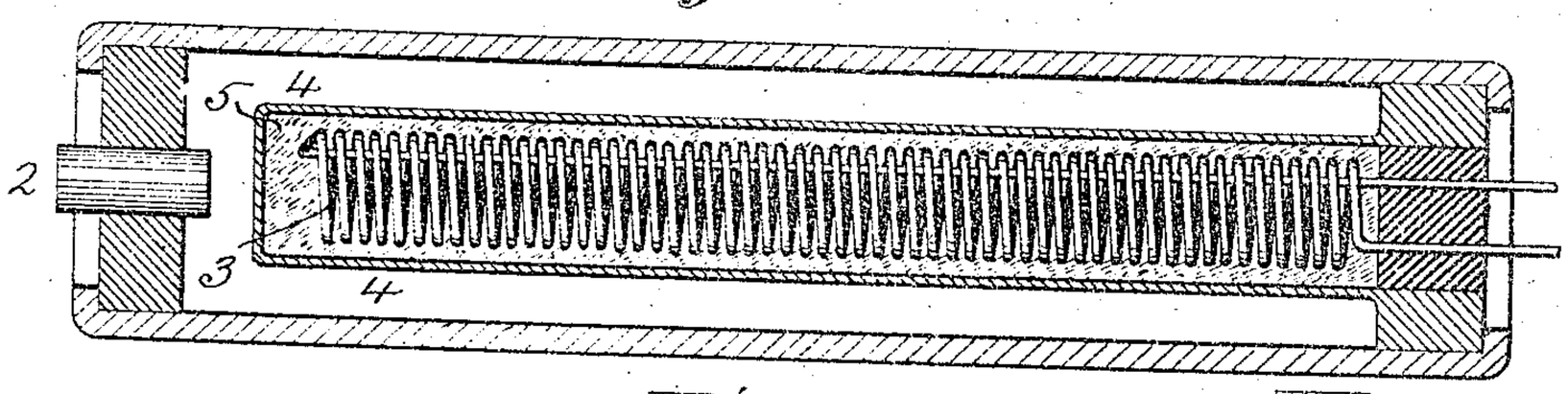
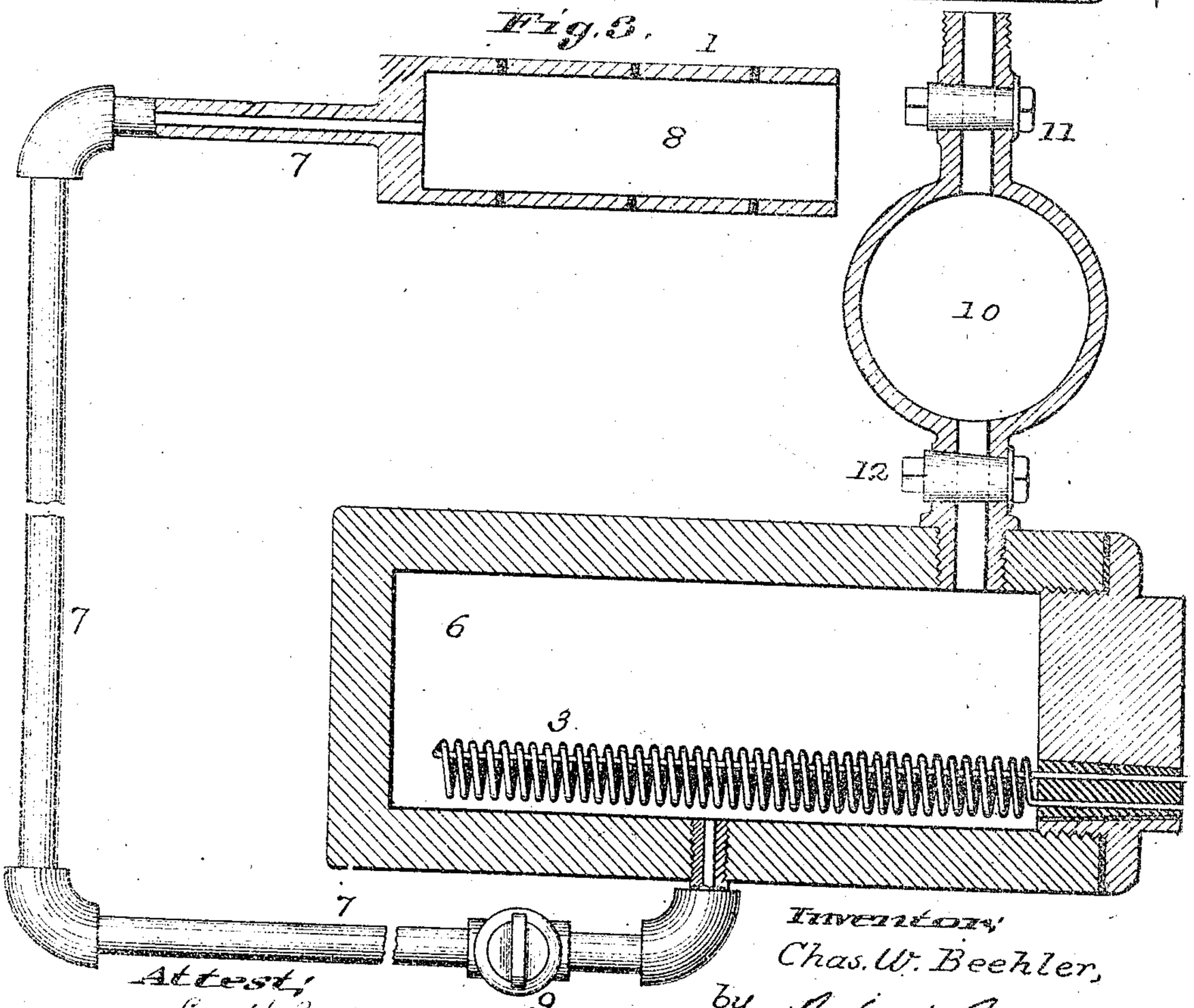


Fig. 3.



Attest,
Geo. H. Arthur
W. H. Holmes

Inventor,
Chas. W. Beehler,
by Robert Burns
Attorney.

UNITED STATES PATENT OFFICE.

CHARLES W. BEEHLER, OF ST. LOUIS, MISSOURI, ASSIGNOR TO ALBERT KUEHNE, OF SAME PLACE.

HYDROTHERMAL MINING PROCESS.

SPECIFICATION forming part of Letters Patent No. 497,513, dated May 16, 1893.

Application filed March 11, 1891. Serial No. 384,619. (No model.)

To all whom it may concern:

Be it known that I, CHARLES W. BEEHLER, a citizen of the United States, residing at St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Hydrothermal Mining Process and Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates more especially to the blasting or rending part of mining operations, the novelty of the present method, as distinguished from the older blasting or rending operations, in which explosives were employed, consists in the application of the expansive force generated by heating a body of liquid in a confined state, so as to cause the same to expand; the intense thermal force generated by such expansive action of the liquid being applied within the drill-hole or bore to rend or separate the body of rock, &c., that is being acted upon.

To enable others skilled in the art to more fully understand and carry out my present invention, I will now proceed to describe the same more in detail, referring to the accompanying drawings, in which I illustrate various forms of apparatus, by which my improved process of hydro-thermal blasting can be effected.

Figures 1 and 2 are longitudinal sections of hydro-thermal cartridges, illustrating the simpler types of apparatus for carrying out my present invention; and Fig. 3. a similar view of an apparatus more especially adapted for continuous operation.

Similar numerals of reference indicate like parts in the several views.

Referring to the drawings, 1 represents the casing of the hydro-thermal cartridge, which may be of any usual form that will adapt itself to the usual mining drill hole or bore, and admit of being tamped or packed in place in the usual manner.

In carrying out my present hydro-thermal blasting process, the whole operation may be carried out within the cartridge casing, or partly within the same, and partly within a separate chamber or generator arranged outside of the drill hole or bore, that is suitably connected to the cartridge casing by tubular connections, flexible or otherwise.

The first mentioned method can be very effectively carried out by the construction illustrated in Figs. 1 and 2, in which the cartridge is shown as of a hollow closed form, filled with water or other suitable liquid, and having a plug 2, closing an orifice in one end of the casing as shown, to form a seal that will require some force to rupture.

A thermal or resistance coil 3, of German silver, platinum, or other suitable metal, is arranged within the cartridge, and affords the means of communicating a sudden and high temperature to the confined liquid, by the passage of a suitable current of electricity through the coil in the usual well-known manner; the terminals of such coil being properly insulated where they pass out through the wall of the cartridge casing, as clearly illustrated in the drawings.

In order to avoid a disruption of the coil by the rapid discharge of the cartridge, I propose to inclose it within a suitable interior casing 4, filled with a body or mass 5, of any suitable material that possesses the dual properties of a conductor of heat and a non-conductor of electricity.

The second, or continuous method, above referred to, is best effected by an apparatus, substantially of the construction illustrated in Fig. 3. In this, the thermal or resistance coil, 3, is arranged within an auxiliary chamber, or generator 6, of the required size and strength, and which, in the present construction, is adapted to contain the water or other liquid used, and has suitable pipe connections 7, flexible or otherwise, with the hydro-thermal cartridge, which in this special form of the apparatus is in the form of an an open-ended shell 8, the sides of which may be perforated or not, as desired.

9, is a valve in the connecting pipe 7, for controlling communication between the auxiliary chamber, or generator 6, and the hydro-thermal cartridge.

10. is a superimposed auxiliary feeding tank, connected to the generator 6, and provided with valves 11 and 12, by the manipulation of which a supply of the water, or other

liquid used, can be introduced into the interior of the generator in the following manner: By closing the valve 12, and opening the valve 11, the auxiliary chamber can be filled by hand, and by closing the valve 11 and opening the valve 12, the contents of the auxiliary chamber will flow by gravity down into the generator.

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

1. The herein described improvement in mine blasting or rending, the same consisting in confining a liquid body within a closed casing, inserting the filled casing within the drill bore or hole, and heating the confined liquid body so that its expansive force will be exerted within the drill bore or hole, substantially as set forth.

2. The herein described improvement in mine blasting or rending, the same consisting in confining a liquid body within a closed casing, inserting the filled casing within the drill bore or hole, and heating, by means of an electric resistance coil, the confined liquid body so that its expansive force will be exerted within the drill bore or hole, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES W. BEEHLER.

Witnesses:
W. B. SWAN,
L. P. YOUNG.