

F. BILLINGS.
PROCESS OF UNDERCUTTING IN MINES.
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974,632.

Patented Nov. 1, 1910.

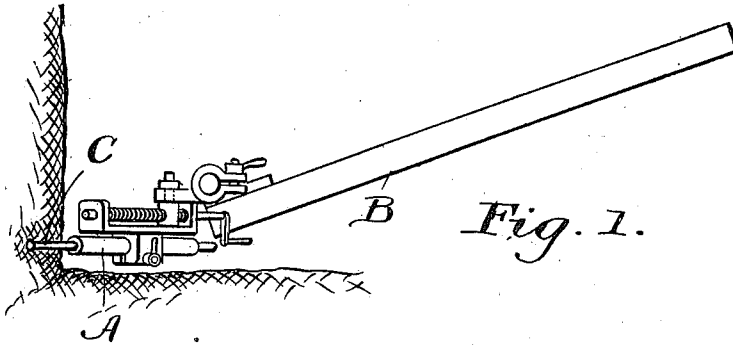


Fig. 1.

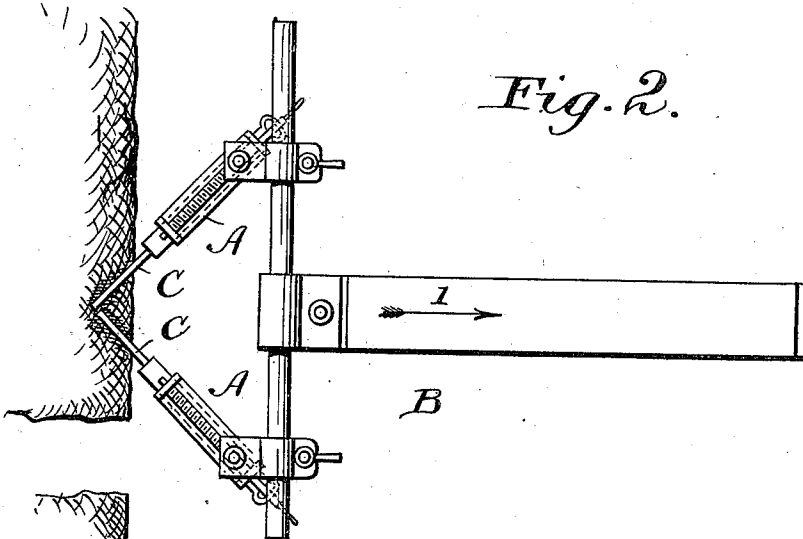


Fig. 2.

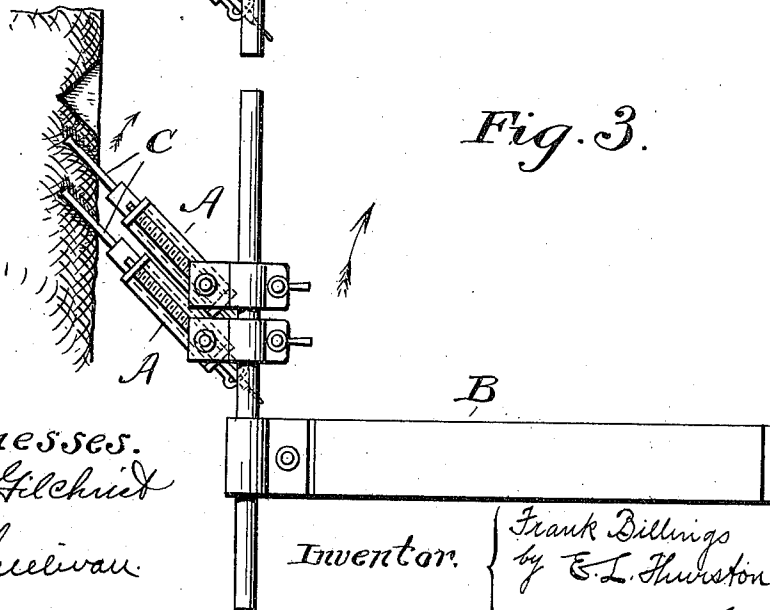


Fig. 3.

Witnesses.
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UNITED STATES PATENT OFFICE.

FRANK BILLINGS, OF CLEVELAND, OHIO.

PROCESS OF UNDERCUTTING IN MINES.

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To all whom it may concern:

Be it known that I, FRANK BILLINGS, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Processes of Undercutting in Mines, of which the following is a full, clear, and exact description.

The common method employed in mining operations, and particularly in coal mining operations, for breaking the mineral from the working face of the vein is to undercut a groove in said working face near the floor level; then to drill into the working face above this undercut groove; and then, by blasting or wedging, to break down the mineral between this upper line of holes and the undercut groove. The most common way of undercutting is to drill a row of holes, after which the miner, with a pick or crow-bar, pries out part of the mineral between these drilled holes. This invention is a new method by which this undercutting may be done more quickly and more cheaply than by any of the hitherto employed methods, provided the mineral to be undercut is sufficiently friable.

The invention consists in drilling a hole or several holes in the working face of the coal, and in then withdrawing the drill bit or drill bits in a direction at an angle to the longitudinal axes of the drill bits, whereby the bits break out the mineral, and thereby form a part of the undercut groove.

The invention also includes several specific methods of operation, as will be hereinafter described and pointed out definitely in the claims.

The drawing shows drills capable of drilling the holes required, and a drill support on which the drills are secured and by means of which they may be moved in directions at the required angle to the longitudinal axes of the drill bits.

In the drawing, Figure 1 is a side elevation of the drill support and one of the drills. Fig. 2 is a plan view of the drills and drill support when the drills are in the relative positions they preferably occupy when beginning an undercutting operation and when the drill bits have drilled the required holes. Fig. 3 is a plan view of the drills and their support when the drills are in the relative positions which they preferably occupy during the subsequent undercutting operations.

Referring to the parts by letters A, A represent drills which may be of any suitable sort—that is to say, they may be steam drills or air drills or electric drills, provided they are of such common character that the drill bits advance while drilling independent of a supporting frame-work of some sort.

B represents a drill support. It is preferably a beam having a horizontal cross bar in its front end. The drills are to be secured to this cross bar by means which permit them to be set in different angular positions relative to each other and to the support. For example, each drill may be connected on a vertical swivel with a clamp adapted to embrace the cross bar. Means must, of course, be provided for tightening the clamp upon the bar, and for preventing the drill from turning on its vertical swiveling axis when it has been set in the right position.

It is obvious that to carry out this invention to any practical advantage suitable mechanism must be employed by which to move the drill support. In my prior application, Serial No. 538,480, filed January 17, 1910, I have shown a machine which includes a beam primarily intended to serve as a hoe shank, but capable of being moved longitudinally and of being rocked about a horizontal axis and of being turned about a vertical axis. The machine shown in this application may be employed in the practice of the process herein described by merely providing said beam or shank with means for attaching to it the required drills. Any other mechanism may, however, be employed in connection with the drill support which is capable of moving it in directions angular in respect to the drill bits.

In beginning an undercutting operation in accordance with the process herein described, two drills are preferably adjusted on the drill support so as to be close to each other and so that the longitudinal axes of their drill bits C are at an angle of ninety degrees, more or less, to each other. Then the drills are operated so as to drive the bits into the working face of the coal, or other mineral being operated upon, until the holes so formed intersect, or nearly intersect each other, as shown in Fig. 2. Then the drill support is drawn backward away from this working face in the direction of the arrow 1 on Fig. 2, and this will move both drill

bits in a direction at an angle to their longitudinal axes, and thereby break out of the working face the triangular piece of mineral between them. After this is done, then
5 both drills should be set with their axes substantially parallel to each other, and preferably so that they would be substantially parallel to that drilled hole which is on the same side of the triangular recess on
10 which the drills are now to be operated. The drills are now operated so as to drive the drill bits into the working face in the same horizontal plane with said triangular recess, and then the drill support may be
15 moved, preferably as about a vertical axis, so as to carry both drill bits toward said triangular recess and thereby break out the mineral between them and said recess. This operation may be repeated as often as necessary to form the required undercut groove.
20 The invention is not restricted to the number of drills used. If the material is sufficiently friable, more than two can be used to advantage. In some cases probably only one
25 drill can be used advantageously after the triangular recess has been formed.

Having described my invention, I claim:

1. The herein described method of cutting

a groove in the working face in a mine, which consists in drilling holes into said
30 working face and in then withdrawing the drill bit in a direction at an angle to its longitudinal axis.

2. The herein described process of cutting a groove in the working face in a mine, 35 which consists in drilling two holes at an angle to each other and in directions such that their longitudinal axes intersect, and in then withdrawing both drill bits simultaneously and in a direction at an angle to
40 the longitudinal axes of both.

3. The herein described process of cutting a groove in the working face in a mine, which consists in removing a part of the mineral and then in drilling a hole at an
45 angle to the working face and in the same horizontal plane with the material removed, and in then removing the drill bit by swinging it horizontally toward the recess formed by the said removal of such material. 50

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

FRANK BILLINGS.

Witnesses:

H. R. SULLIVAN,

W. L. MCGARRELL.