H. A. KUHN.

METHOD OF MINING COAL.

APPLICATION FILED DEC. 9, 1915.

1,200,205.

Patented Oct. 3, 1916.

2 SHEETS—SHEET 1.

FIG. 1.

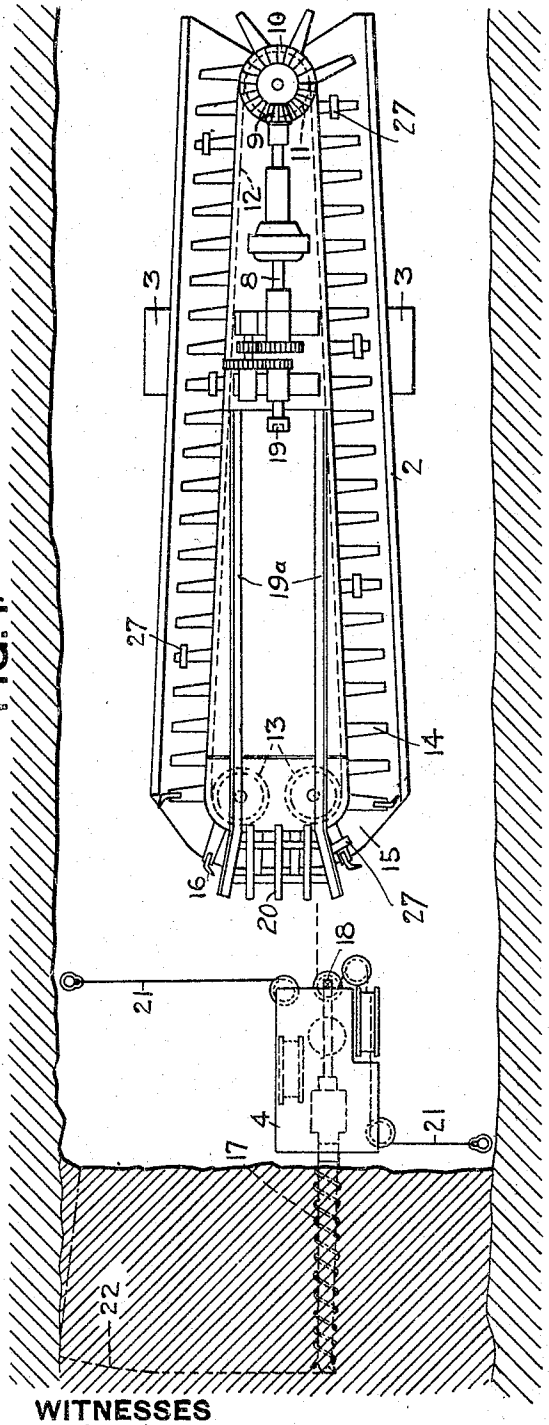


FIG. 3.

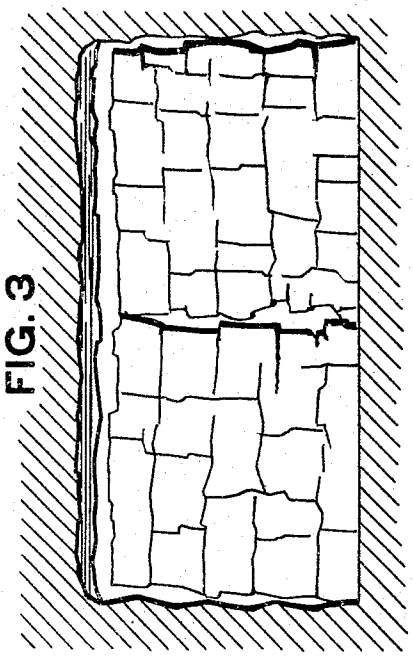
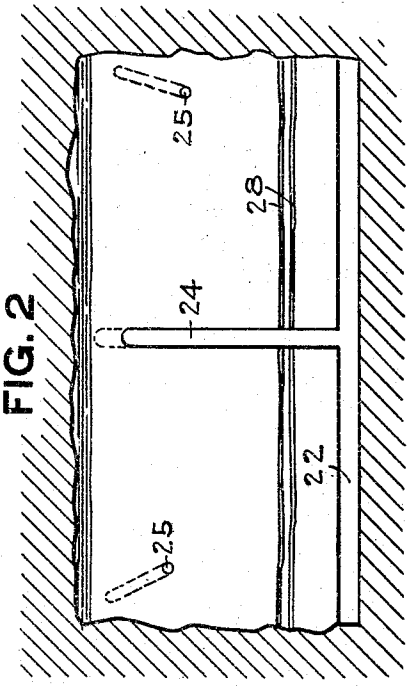


FIG. 2.



WITNESSES

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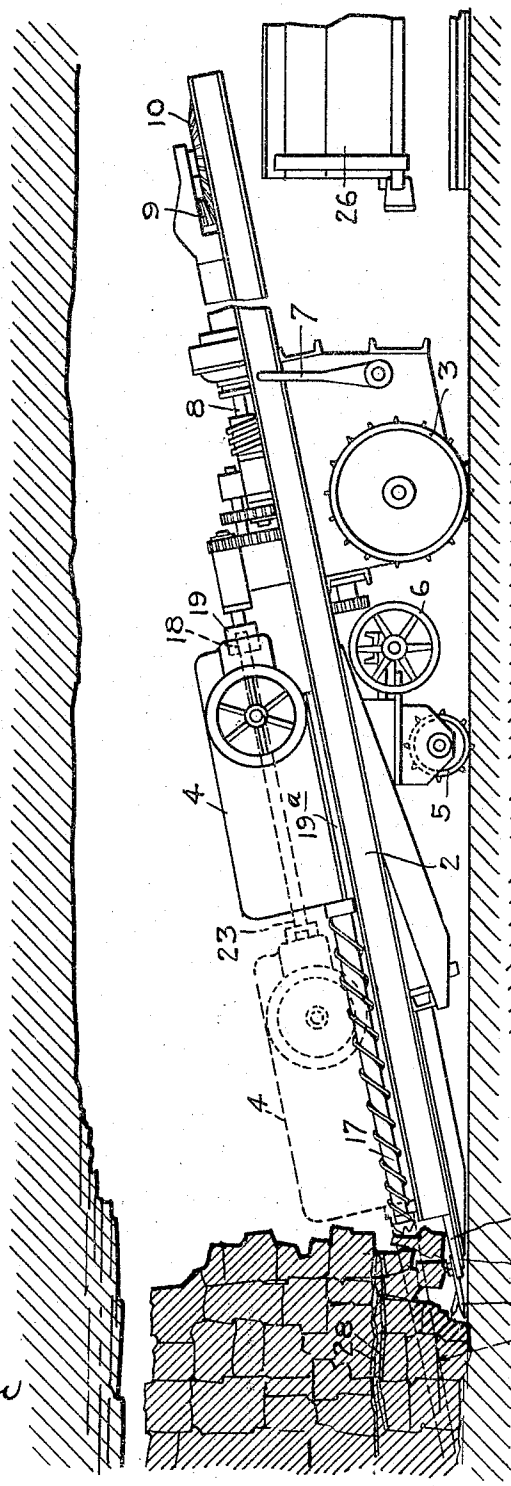
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2 SHEETS—SHEET 2.

FIG. 4



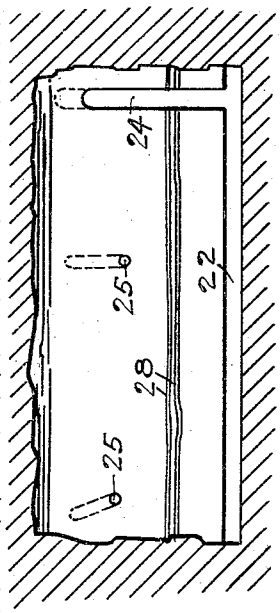


FIG. 5

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METHOD OF MINING COAL.

1,200,205. Specification of Letters Patent. Patented Oct. 3, 1916.

Application filed December 9, 1915. Serial No. 65,942.

To all whom it may concern:

Be it known that I, HARRY A. KUHN, a citizen of the United States, and resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Methods of Mining Coal; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to a method of mining coal.

The object of my invention is to provide a method of mining coal in which the coal instead of being shot so as to break it up into small lumps and fine coal, is so expanded as to only release the coal along lines of its cleavage, so that when a force is applied to undermine and dislodge the mass of coal, the force applied will act to break the coal into lumps substantially along lines of its cleavage, so that the coal can be removed in large lumps, thereby creating a great saving and, at the same time, increasing the value of the coal, which commands a higher price in large lumps than in small lumps or slack form.

The invention consists, generally stated, in undercutting the wall of coal, making a cut at an angle to the undercut and extending for substantially the height of the wall, then introducing an expansive force in the coal at one side of the last-named cut, whereby the coal is lowered into the undercut and separated along lines of its cleavage, the cut made at an angle to the undercut permitting the coal to expand in that direction and move toward said cut, which is preferably at about the mid-point of the wall, or the shearing cut may be made at one corner or side and the whole mass of coal expanded toward it.

In the accompanying drawings, Figure 1 is a plan view of a machine adapted for removing the coal after it has been expanded, and for making the preliminary undercut; Fig. 2 is a cross-section of a mine showing the undercut, the cut at right angles thereto, and the holes for the insertion of the explosive or expansive force; Fig. 3 is a view of the face of the coal after the coal has been expanded; Fig. 4 is a side elevation of the machine for removing the coal after it has been expanded; and Fig. 5 is a modified form of my invention.

The machine for making the preliminary undercut and the cut at an angle thereto in the wall of coal may be any suitable apparatus, that illustrated forming the subject-matter of a separate application for Letters Patent of the United States, filed by me on the 16th day of May, 1914, Serial No. 839,325, and the parts of this machine have only been illustrated diagrammatically and it will only be referred to generally.

The numeral 2 designates the frame which is mounted on the traction-wheels 3 connected up by suitable gearing to the motor 4. The steering-wheel 5 is provided which is operated by the hand-wheel 6. The lever 7 is operated to operate the mechanism for throwing the traction-wheels 3 into and out of engagement with the driving mechanism.

The shaft 8 is driven by the motor 4, and said shaft has the beveled pinion 9 which engages the beveled gear-wheel 10. The sprocket-wheel 11 is connected with the beveled-gear 10, and a chain 12 passes around said sprocket-wheel and around the sprocket-wheels 13 at the forward end of the frame. Flights 14 are carried by the chain, said flights moving along the pan 15. The flights 14 are provided with the cutters 16, which project out beyond the pan 15 at the forward end thereof.

To form the preliminary under-cut, I employ the cutter-bar 17, said cutter-bar connected to and driven by the motor 4. The motor 4 has its shaft 18, detachably connected by coupler 19 to the motor, and the cutter-bar 17 may be moved off the frame 19^a down into the position indicated in Fig. 1, a skid 20 being provided for the convenient movement of the motor and its platform to and from the frame 2. When the under-cutting mechanism is arranged in position indicated in Fig. 1, the customary cables 21 are employed for drawing the machine across the wall of coal, and in this manner, the under-cut 22 is formed. When the undercut 22 has been formed in this manner, the motor and cutter-bar 17 are drawn back onto the frame 2, and an elongated shaft 23 is employed so that the cutter-bar 17 will extend beyond the front end of the frame 2, as indicated in dotted lines, Fig. 4. The cutter-bar is rotated, and the

forward end of the machine is raised so that the cutter-bar 17 cuts a kerf 24 in the face of the coal, and at an angle to the under-cut 22. While I have shown the kerf 24 as substantially vertical, it may be arranged at other angles with reference to the under-cut 22, and while I have illustrated it at the mid-portion of the wall of coal, this particular location need not be followed so long as the coal is sheared above the undercut.

The holes 25 are drilled in the upper corners of the wall of coal extending upwardly and outwardly, and a suitable explosive or expansive force is inserted in said openings. The coal is shot or expanded and the effect of such shooting will be to separate the coal along lines of its cleavage, and at the same time, the coal will settle down into the undercut 22. The kerf 24 also provides a chance for the coal to move from both sides toward the center, substantially filling up said kerf, as indicated in Fig. 3. The coal, however, has not been expanded so violently as to break it up into small lumps or fine slack, but has simply been expanded with sufficient violence to crack it along lines of its cleavage, so that the adhesions between the lumps are almost entirely released, although the individual lumps will retain their individual relations or positions in the original bed of coal. In order to remove the coal, the machine is advanced up to the wall of coal and the chain 12 put in operation so that the flights 14 with the cutters 16 will advance thereto, and projecting beyond the outer end of the pan 15, will cut their way under the mass of coal, undermining, lifting, and disrupting the same so that the coal is broken into large lumps, which are deposited on the pan 15 and carried by the flights up said pan and discharged into the mine car 26 at the rear of the machine. As a further aid in the disrupting of the coal, the flights may be provided with the shoes 27, which work their way in under the coal and give an undulating effect, which ruptures and breaks the coal, as set forth in an application filed by me Serial No. 839,335. The front end of the machine may also be raised during this operation so as to break through any slate-bands, such as 28, which may be in the wall of coal, and which will be broken up by the upward force applied in this manner. In this manner, I have provided for the expanding of the coal so that it is not violently blasted into small lumps and fine coal, but is simply loosened or fractured along lines of its cleavage, so that when removed in the above manner, it is taken out in large lumps, thereby creating a saving in the mining of the coal and commanding a higher price in the market.

In Fig. 5, I have illustrated a modified form of my invention in which the kerf 24 is made over toward one side-wall.

What I claim is:

1. The method of mining coal consisting in under-cutting the solid wall of coal, making a cut at an angle to said under-cut, expanding and disrupting the coal along lines of its cleavage on one side of the second cut and above the under-cut, whereby it dislodges and settles down into the under-cut and moves in the direction of the second cut, subsequently under-cutting this settled mass of coal, and simultaneously lifting it with a vertical force traveling laterally in the plane of the first cut to further disrupt the mass along the lines of its cleavage, and simultaneously therewith dislodging the mass of disrupted coal and conveying it away.

2. The method of mining coal consisting in under-cutting the solid wall of coal, making a cut at an angle thereto, expanding and disrupting the coal along lines of its cleavage on one side of the second cut and above the under-cut whereby the coal settles down into the under-cut and moves in the direction of the second cut, subsequently undercutting this mass of settled coal along the floor of the original under-cut, simultaneously therewith dislodging the mass of settled coal and conveying it away.

3. The method of mining coal consisting in under-cutting the solid mass of coal, making a cut at an angle to said under-cut, expanding and disrupting the coal along lines of its cleavage on one side of the second cut and above the under-cut whereby it settles down into the under-cut and moves in the direction of the second cut, subsequently under-mining this settled mass of coal with a force traveling laterally along the floor of the original under-cut, and simultaneously therewith dislodging the mass of settled coal and conveying it away.

4. The method of mining coal consisting in under-cutting the solid wall of coal, making a cut at an angle to said under-cut at or about the mid-portion of the mass of coal, expanding and disrupting the coal along lines of its cleavage at both sides of said second cut whereby it dislodges and settles down into the under-cut and moves in the direction of said second cut, subsequently under-cutting this settled mass of coal, and simultaneously lifting it with a vertical force traveling laterally in the plane of the first cut to further disrupt the mass along lines of its cleavage, and simultaneously therewith dislodging the mass of disrupted coal and conveying it away.

5. The method of mining coal consisting in making a plurality of openings in the solid coal at an angle to each other, expanding and disrupting the coal, making an

opening in the expanded and disrupted mass of coal, and simultaneously therewith introducing into said last mentioned opening, conveying and dislodging forces working in the plane of said last mentioned opening whereby the coal is dislodged and conveyed away.

In testimony whereof, I the said HARRY A. KUHN have hereunto set my hand.

HARRY A. KUHN.

Witnesses:
JOHN F. WILL,
S. F. ARMSTRONG.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."