Sept. 8, 1953 E. RAMSAY 2,651,513

METHOD OF MINING AND HANDLING COAL

Filed Feb. 5, 1951 2 Sheets-Sheet 1

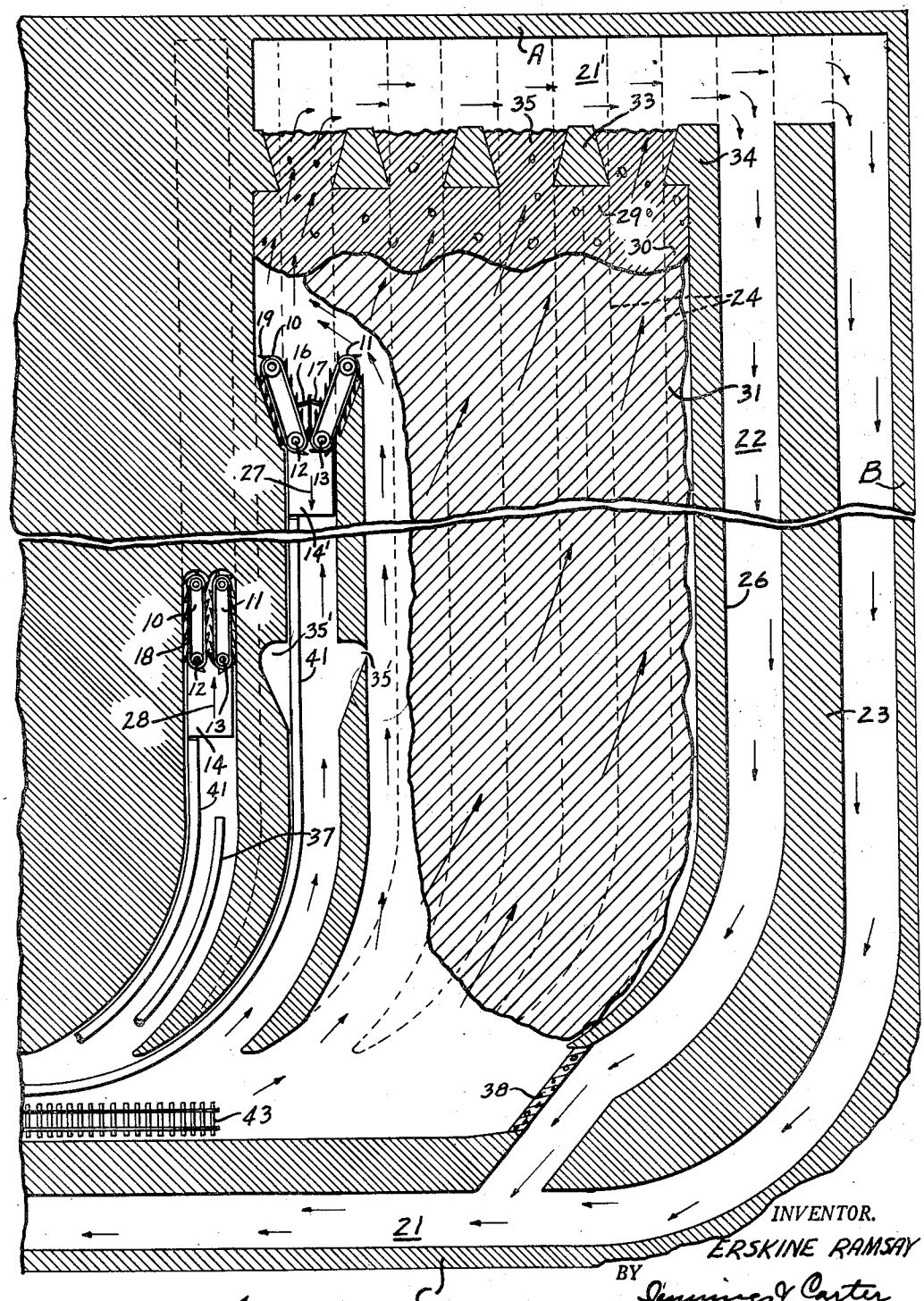


Fig. 1

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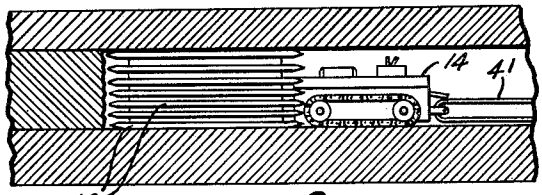


Fig. 2

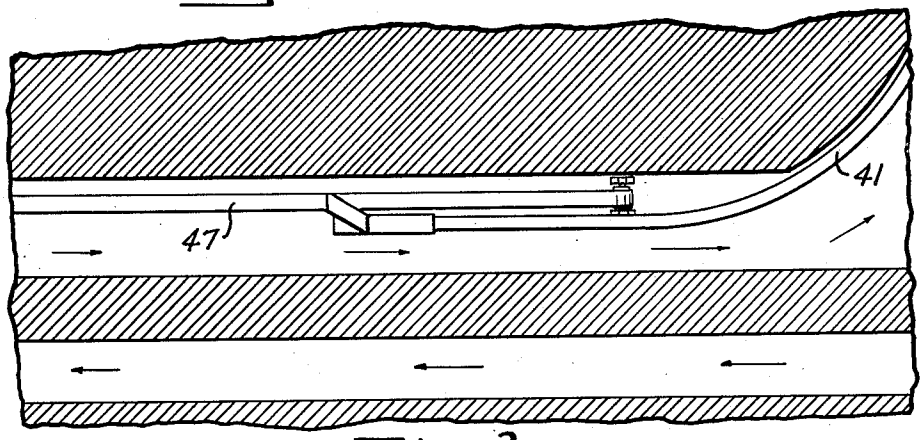


Fig. 3

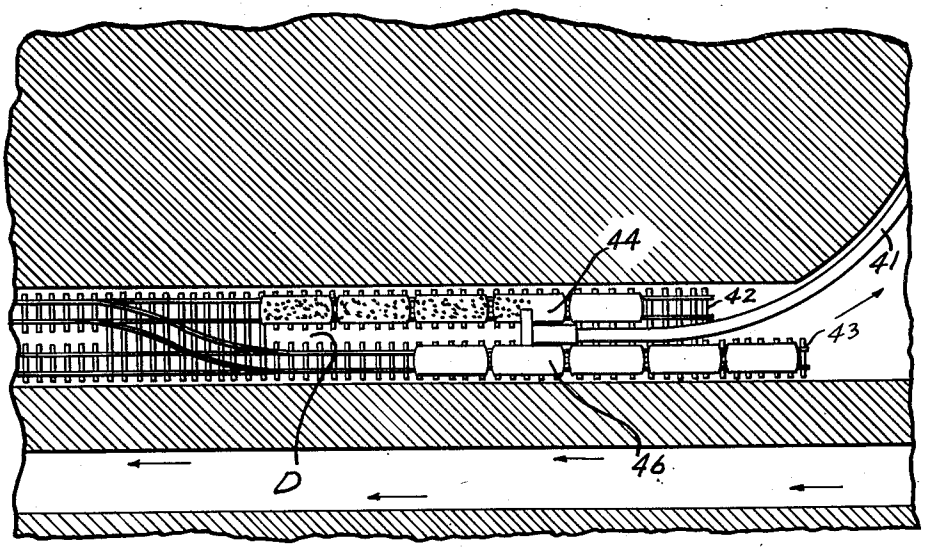


Fig. 1a

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METHOD OF MINING AND HANDLING COAL

Erskine Ramsay, Birmingham, Ala.

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5 Claims. (Cl. 262—1)

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This invention relates to a method of mining coal and has for an object the provision of a method which shall be effective to obtain a larger percentage of coal from a given area than has been theretofore possible.

A further object of the invention is to provide a method of mining coal which shall be effective to remove all coal from a prescribed area without danger to workmen.

A still further object of my invention is to provide an improved method of mining coal which shall include improved means for the circulation of air through the working.

A still further object is to provide a more economical method of mining than has heretofore been practiced and in which the coal is mined and removed simultaneously.

While my invention is particularly adapted for the mining of coal employing the mining machine disclosed in my U. S. Patent No. 2,407,448, dated September 10, 1946, it will be apparent that it may be practiced, using other machines. Briefly, my invention is a modification of the retreating long wall mining method and includes as an initial operation, the driving of an air course which extends along two adjacent sides of the remote limit of the area to be mined out. This is followed by driving a course parallel to one side of the area remote from the entry and driving an intersecting course on the adjacent side, leaving a flank pillar along the air course of a width approximating that of the first mentioned courses. Next a course is driven parallel to the second course, leaving a pillar between it and the second course. Then by retreating down the third mentioned course, remove half the coal in the pillar between it and the second course but leaving a sufficient pillar to support the second course and the main air course. Following this operation, successive parallel courses are driven, leaving a pillar between each course and its next preceding course. The courses are driven while advancing with the mining machine, and, while retreating along each course, the pillar between it and the next preceding course is removed entirely and the coal is mined out alongside the course.

As the coal is removed, the overburden is allowed to fall in which relieves the weight on the working face of the coal, thus requiring a minimum of props and timbering if any, as the work proceeds. This method of operation provides two parallel courses along the side of the area remote from the entry with a half width pillar alongside the proximate course and a full width

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pillar between the courses. At the intersection between each course and the main air course extending at an angle thereto a short pillar is left if needed to protect the main air course. Also, the gob when and if made, is stacked, but not to the roof in most cases, alongside this portion of the air course thus leaving enough space for air to pass. Air is supplied to the working through an air conduit from a suitable source of supply as the work advances and may return by way of the return air courses. When the area has been mined out except for the first two courses, the machine is driven forwardly with spread cutter elements along the nearer course, removing the half pillar and half the full width pillar. Then by retreating along the more remote course with elements spread apart the area is completely mined.

An example of my improved method is illustrated in the accompanying drawings, forming a part of this application, in which:

Figs. 1 and 1*a* are diagrammatic plan views of a coal mine in which my improved method of mining is being carried out;

Fig. 2 is a diagrammatic partial sectional view thereof; and,

Fig. 3 is a diagrammatic partial plan view showing alternative means for removing the coal as it is mined.

Referring to the drawings, I show in Figs. 1 and 1*a* a section, or area of a coal mine the adjacent boundaries of which are indicated at A, B and C. The entry to the mine is indicated generally at D.

My improved method is preferably carried out, utilizing the mining machine illustrated, described and claimed in my previously issued Patent No. 2,407,448, dated September 10, 1946, though other mining machines may be employed to advantage. No detailed description of that machine is given herein. Two machines 14 and 14' are shown diagrammatically in the drawing. Each is shown as embodying two cutter gangs 10 and 11 pivotally mounted at 12 and 13 and extending forwardly of the machine. The cutter gangs 10 and 11 may be spread apart by means of lever arms 16 and 17 as shown with machine 14' to thereby cut a relatively wide path, or they may be drawn close together as shown with machine 14 to cut a relatively narrow path one half the width of that when spread apart. Each of the cutter gangs employs a plurality of cutter chains 18 carrying cutter elements 19 which are so driven that the cutter elements

move rearwardly with the outer reach of each cutter chain.

In carrying out my improved method I first drive a combined air course and heading 21 along the boundaries B and C of the area to be mined. This combined course is driven with the cutter gangs 10 and 11 close together so as to be of minimum width and so that the roof over the course will require little or no timber or other temporary support. This combined air course and heading extends along the boundaries B and C as shown in Fig. 1 until it reaches boundary A. A second combined air course and heading 22 is next driven alongside the course 21 and parallel thereto leaving a flanking pillar 23 therebetween which is of a width equal to that of the courses 21 and 22.

Following the driving of the course 22 a third course, indicated in dotted lines at 24 is driven alongside and parallel to the course 22, leaving a flanking pillar 26 between it and the course 22 equal in width to the course 22. The pillars between the courses are made of a width equal to the width of the courses so that when the machine is driven in a reverse direction as indicated by the arrow 27 on machine 14' with the cutter gangs spread, one half of the pillar on each side is mined out. When the course 24 is driven with the mining machine advancing and with the cutter gangs close together as indicated at 28, the course is driven until it reaches boundary A. As each course is driven to the boundary A, the cutters 10 and 11 are spread apart and the machine retreated to remove the pillars between the courses adjacent the boundary A and from a course 21' which is joined to and forms an extension of course 21. The machine is then retreated with cutters drawn together a distance equal to the width of the pillar 23 to leave pillars 33 and 34. The cutters are then spread to remove coal on each side of the heading along paths 29 and 30, each equal to one-half the width of the course or one-half the width of the adjacent pillar 26. This widens the heading to such an extent that the roof may fall in as indicated at 31, thus relieving pressure on the adjacent face of the coal. Preferably, as the mining proceeds, the gob, or large stones are stacked between the pillars 33 and 34 as shown at 35, in such way as to permit the passage of air therethrough. In forming the course 21' and the pillars 33 it may be necessary to do some hand mining.

The operations just described are repeated until the prescribed area is mined out except for the flanking pillar 23 and one-half the flanking pillar 26. A machine may then move forwardly up the combined air course and heading 22 with cutters spread apart to remove the remainder of the flanking pillars 26 and one-half the pillar 23. It may return along the combined air course and heading 21 with cutter gangs spread apart to complete the removal of the flanking pillar 23 and to remove some coal along the boundary B of the area to be mined. When this has been accomplished, substantially all the coal in the prescribed area will have been removed.

During the mining operation, air under pressure from a blower (not shown) is carried to the mining machines through hose 37 to insure fresh air to the operators of the mining machines at all times. Air is forced into the workings through the air courses and through the headings being driven from whence it passes, as indicated by the arrows, through the gob into the combined heading and air courses 21 and 22 from whence it returns to the entry. The pillars between passages may be cut at suitable intervals, as shown at 35' for the passage of air. Water may also be supplied to the working face of the coal, as is well understood. Preferably a brattice 38 is erected to separate the course 22 from the worked out area.

During the mining operations, the coal mined by each machine is continuously removed from the machine by means of a conveyor indicated diagrammatically at 41. The conveyor may extend rearwardly over tracks 42 and 43 to deliver its coal selectively into mine cars indicated at 44 and 46. The mine cars convey the coal out of the mine or heading in a manner well understood.

As an alternative, the conveyor 41 may be made to deliver its coal into a continuously operating conveyor 47 which conveys the coal out of the mine or heading. The details of such conveyors are not herein illustrated and described as they are well known in the art.

From the foregoing it will be apparent that I have devised an improved method of mining and handling coal which results in a continuous break-down of the over-burden thereby relieving weight on the pillars and on the working face of the coal and making the coal easier to remove. When the time comes to draw the last of the pillars, the over-burden breaks down all around them and the removal of the coal is made easy.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claims.

What I claim is:

1. The method of mining coal which comprises driving air courses and headings along the remote side of the area to be mined and of a width such that the overburden requires little or no support, driving a second course parallel to and adjacent the first mentioned course and a third course parallel to and adjacent the second mentioned course leaving intervening flank pillars between the courses of a width approximating that of the first mentioned course and extending the entire length thereof, then while retreating removing from said third course approximately one-half the pillar between it and said second course and a like amount of coal from the other side of said third course, thereafter while advancing driving parallel courses to the first, second and third mentioned courses each of said last mentioned courses being of a width while advancing such that the overburden requires little or no support and leaving a pillar between successive courses of a width approximately one-half that of the next adjacent course and extending the entire length thereof, and while retreating removing said pillar.

2. The method of mining coal which comprises driving a combined air course and heading to and along the remote side of the area to be mined and of a width such that the overburden requires little or no temporary support, driving a second course parallel to and adjacent the first mentioned course and a third course parallel to and adjacent the second mentioned course leaving flank pillars between the courses of a width approximating that of the first mentioned course

and extending the entire length thereof, then while retreating removing from said third course approximately one-half the pillar between it and said second course and a like amount of coal from the other side of said third course, thereafter driving successive courses parallel to the first, second and third mentioned courses each of said last mentioned courses being of a width while advancing such that the overburden requires little or no timber or other support and leaving a pillar between successive courses of a width approximately one-half that of the next adjacent course and extending the entire length thereof, and while retreating removing said pillar.

3. The method defined in claim 2 in which a combined heading and air course is initially driven along two adjacent remote sides of the area to be mined and in which the successive courses intersect the said heading and air course on one side of the area and are parallel to the said course on the other side.

4. The method defined in claim 2 in which a combined heading and air course is initially driven along two adjacent remote sides of the area to be mined and in which the successive courses intersect the said heading and air course on one side of the area and are parallel to the said course on the other side and in which pillars are left at the points of intersection of said successive courses and said initial course and in which the gob if any is loosely stacked between said last mentioned pillars.

5. The method defined in claim 2 in which two parallel courses are provided along one remote side of the area to be mined with a full width pillar between the courses and a half width pillar alongside the nearer course and in which the mining of the area is completed by removing the half width pillar and half the full width pillar, and removing the remainder of the full width pillar.

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