Dec. 11, 1945. K. L. STORRS 2,390,562

METHOD OF MINING COAL

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Fig. 1.

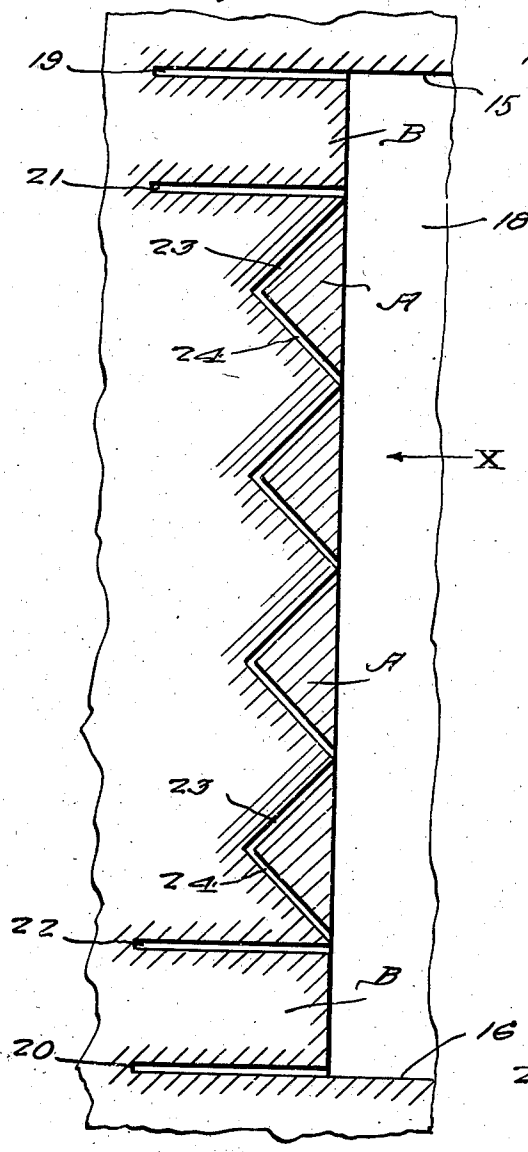
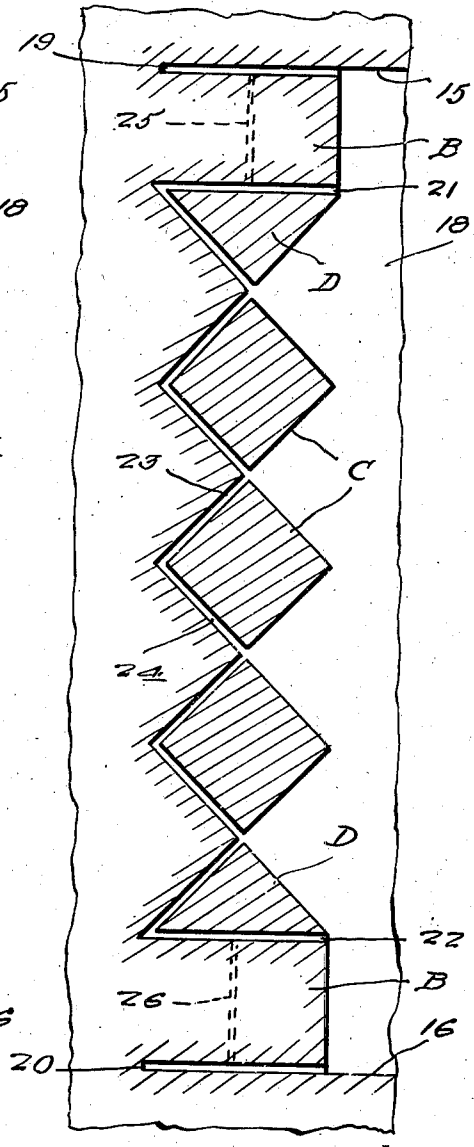



Fig. 2.




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Fig. 3.

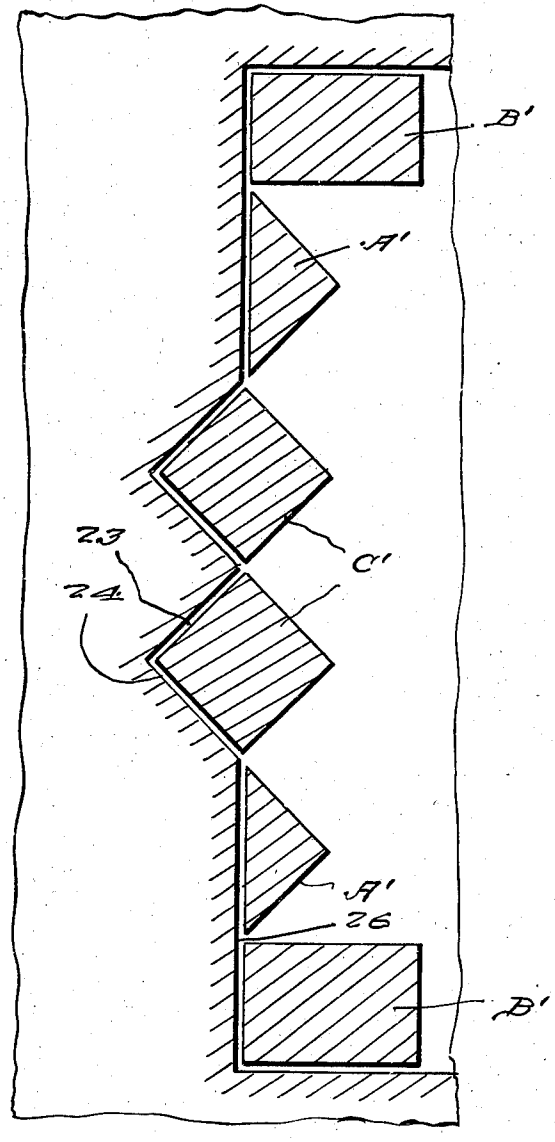



Fig. 8.

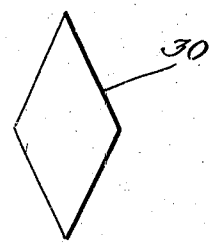



Fig. 9.

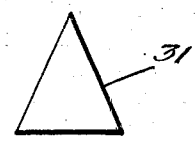
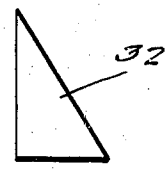



Fig. 10.




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Fig. 4.

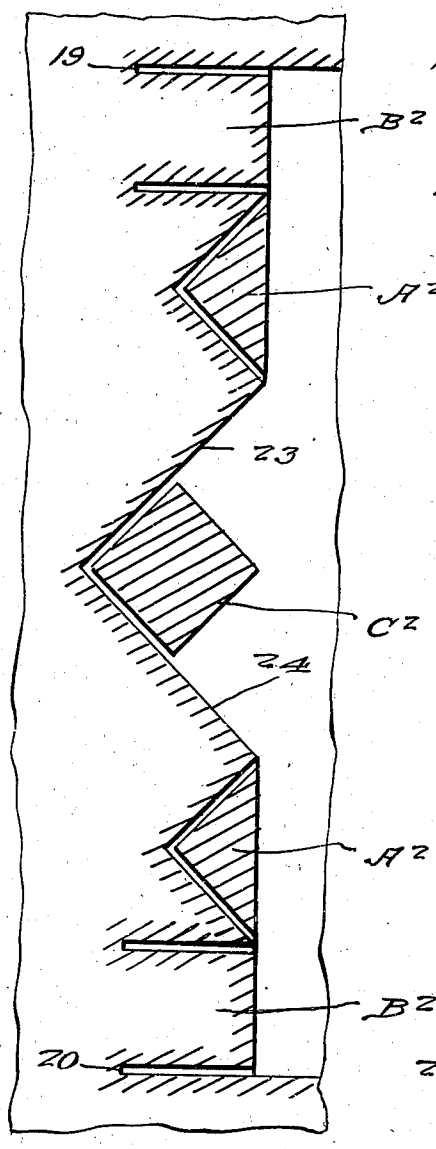
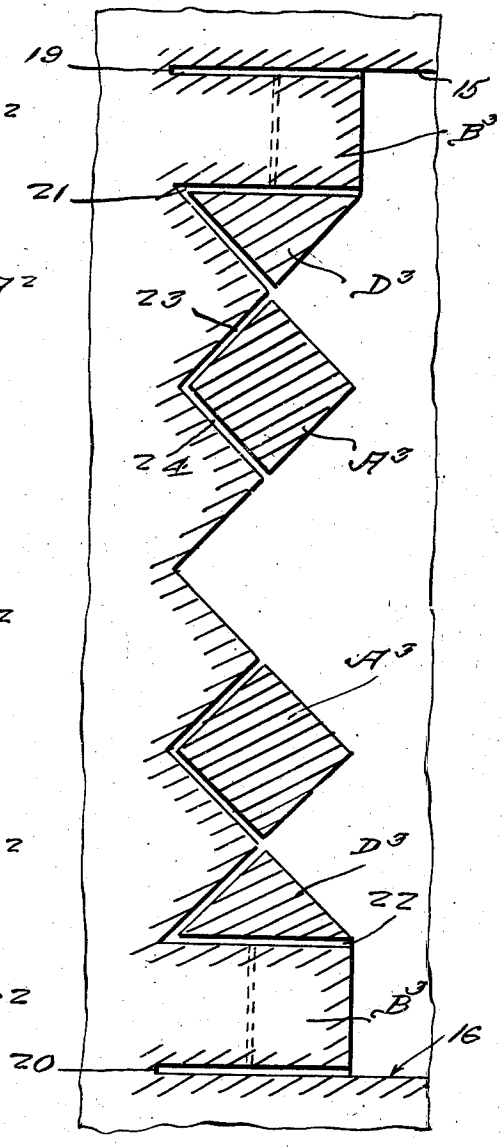



Fig. 5.




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Fig. 11.

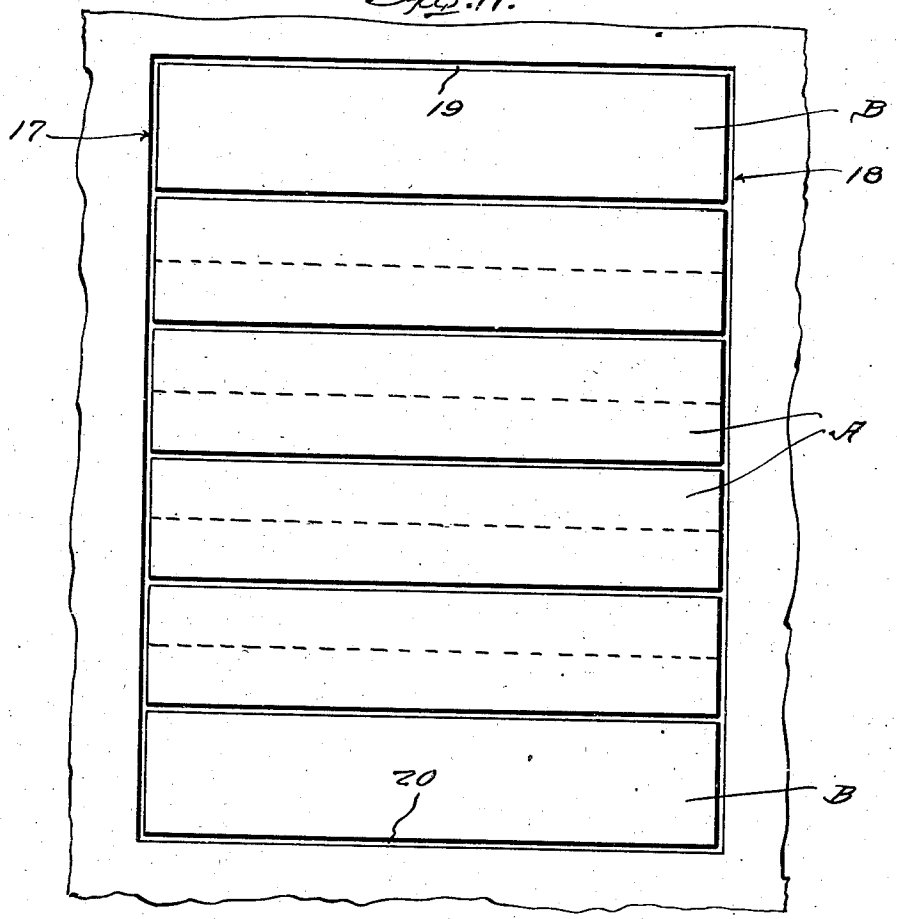



Fig. 6.

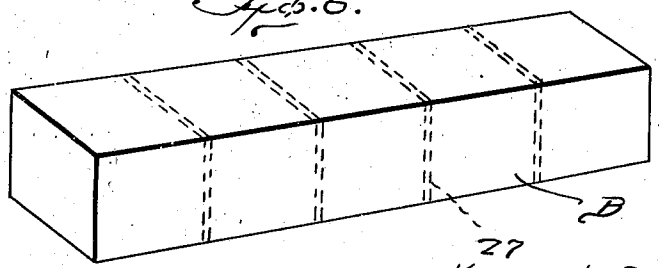
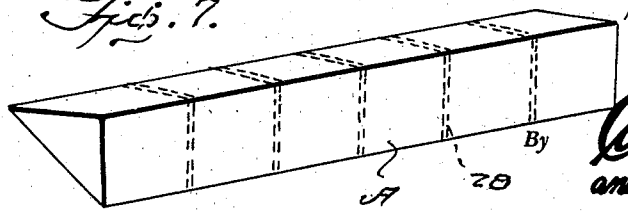



Fig. 7.




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Patented Dec. 11, 1945 2,390,562

# UNITED STATES PATENT OFFICE

2,390,562

## METHOD OF MINING COAL

Kindred L. Storrs, Salt Lake City, Utah

Application January 3, 1944, Serial No. 516,805

3 Claims. (Cl. 262—1)

The present invention relates to mining in general and more particularly to a method of excavating or mining coal, whereby bars, blocks, or large pieces of regular, uniform size and shape of coal will be obtained with hardly any waste of material and very little dust. This excavation or mining process is performed without use of explosives and results in blocks which are easily handled and removed from the coal vein and convenient for transportation.

The method is carried out by the use of cutting or punching tools of any suitable design of inexpensive machinery, such as a circular carborundum saw, a jack hammer, a trench digger or the like.

Of these tools a circular abrasive saw will cut the coal rapidly and with very little breakage. Such a saw would have to be mounted upon a bar supported by two adjustable uprights, and the saw should be allowed to move freely along the face of a coal vein and should be adjustable as to the angle of cut.

It will also be found that the present jack hammer with a saw tooth edge will cut the coal with a punching action, rapidly.

These are only suggested means, for cutting the coal to perform this method, and I do not desire to be restricted to their use, since some of the present coal cutting devices, revised and reduced in size, could perform the same purpose by following the design and method as here disclosed.

In the methods of cutting coal now prevalent in most western mines, the total output per man, is very low. In some cases being only 3 tons per man per shift. This is due to a method of cutting and shooting which entails large, cumbersome and costly cutting equipment, which in turn requires more power per ton of coal removed from the mine than should be needed.

In the case of the circular saw, or jack hammer principle of the present coal machines revised, and as applied to the angular method of cutting herein described, the output per man should be greatly increased, and the outlay in machinery and equipment greatly decreased.

The results obtained by this improved method are accordingly:

Depth of each cut, 1 to 2 feet;

No explosives needed;

Inexpensive machinery;

Coal sized within mine, elaborate tipple not needed, perhaps none;

Less dangerous due to not using explosives;

Less man power per ton of output;

Less breakage of coal in mining.

In the accompanying drawings is exemplified the resultant cuts and shapes of the present method:

Figure 1 is a vertical section along the line 1—1 of Figure 11 in the length direction of a coal vein to be mined indicating the preliminary cut through a perpendicular wall.

Figures 2 to 5 are similar views of successive cuts in the direction of the vein for obtaining blocks of different shape and size.

Figure 6 shows a block of square cross section as a result of the cutting.

Figure 7 is a similar block of triangular cross section.

Figures 8, 9, 10 show cross sections of blocks obtainable by this method.

Figure 11 is a front face of the first cut in the mine looking in the direction of arrow X in Figure 1.

Referring first to Figures 1 and 6, numeral 15 indicates the roof line and numeral 16 the floor line in the coal mine to be excavated and numerals 17 and 18 respectively the left and right face lines of the cut to be made. Or in other words, the face lines 15, 16, 17 and 18 represent a rectangle of the area to be cut out of the coal vein and the present invention, therefore, contemplates first to make horizontal cuts along lines 15 and 16, and vertical cuts along lines 17 and 18 to be followed by angular cuts in order to release long blocks of coal from the vein.

By the use of a suitable implement such as a circular saw, a jack hammer or any other suitable tool the first operation is, therefore, to make the top and bottom cuts as at 19 and 20 to the depth of the thickness of the desired blocks of coal. Assuming the height of excavation, measured between the roof and floor lines 15 and 16, to be about 6 feet, a second set of top and bottom cuts 21 and 22 are now made in similar manner about 12 inches distant from the first cuts 19 and 20.

The next step is thereupon the making of the four angular cuts 23 and 24 by working the tool

at a downwardly directed angle for cuts 23 and an upwardly directed angle for the cuts 24 which are 12 to 24 inches deep. The angularity may be any one desired as 30°, 45°, 60° or any other angle. The most practical and economical angle, however is 45° as indicated in Figures 1 to 5 inclusive.

These several angular cuts 23 and 24 will now release the blocks or bars A, A of triangular cross section in Figure 1 with the cutting tool set for 45° angle. This concludes the first mining cuts between lines 21 and 22 while leaving the coal above and below said lines respectively undisturbed.

The cutting tools are now advanced further into the mine to make the next excavation as indicated in Figure 2 where the square sectioned blocks or bars C with 12 to 24 inch sides are released with the tool again inclined 45° to make angular cuts 23, 24 as before while the horizontal cuts 19, 20, 21 and 22 are made deeper. This will then release blocks D of triangular cross section having 12 to 24 inch sides, but with the bases horizontal as seen in Figure 2. With the square and triangle blocks C and D thus removed, there will be room enough for operating the tool in vertical direction to release the blocks B and B at top and bottom by means of the vertical cuts 25, 26.

Next follows the further advancement of the mining tools into position in Figure 3 the tool still being set at 45° angle wherein two small square blocks C', C' and two larger square blocks B' and B' together with two triangular blocks A', A' are released.

In Figure 4, by the same method and setting of tool, square section blocks $B^2$, $B^2$ and $C^2$ are obtained, while in Figure 5 four square sectioned blocks $A^3$, $B^3$ and triangles $D^3$, respectively, are released.

In Figures 6 and 7 the long blocks A and B are shown with cross cuts indicated along dotted lines 27 and 28 in the event it is desired to cut these blocks into shorter pieces.

In Figures 8, 9 and 10 other possible cross sections of the blocks are indicated such as diamond shape 30 in Figure 8, isosceles triangle 31 Figure 9 and right angle triangle 32 Figure 10. Naturally many other sections are obtainable by setting the tools to cut the coal in other directions. So for instance with the tool set at any other angle than 45° as used in Figs. 1 thru 5, the triangular sections A would be other than right triangles and the square sections C change to parallelograms.

The general shape of the excavation into the coal vein by this method would be a rectangular tunnel as is the usual case in present mining methods. This is best seen in Figure 6, the four sides being along lines 17, 18, 19 and 20.

From the foregoing it will be evident that the method is based principally upon the fact that V-shaped cuts or incisions are made on the face of the coal vein thereby resulting in the release of structures of long, sharp edged blocks of any desired cross section. In other words the face of the vein after the first and following cuttings will present a surface of saw teeth appearance, that is, a series of sharp, straight parallel edges, running horizontally between the vertical sides of a rectangular tunnel.

It is to be understood that the invention as here disclosed is not limited to the details here described and shown but that the same may be varied widely without departing from the spirit of the invention as defined by the subjoined claims.

Having described the invention, what is claimed as new is:

1. A method of mining which consists in cutting spaced vertical kerfs in a mine vein, then cutting horizontal kerfs in the vein that connect the vertical kerfs respectively at the roof and floor lines, then cutting other horizontal kerfs in the vein that connect the vertical kerfs respectively adjacent but below the roof line and adjacent but above the floor line, then cutting a series of forwardly converging oppositely inclined pairs of kerfs in the vein between the second-named horizontal kerfs so that the kerfs of the inclined pairs intersect each other and connect the vertical kerfs to completely free blocks from the vein, then extending all of the kerfs further into the vein until certain of the inclined kerfs intersect again and others intersect the second-named horizontal kerfs to completely free additional blocks from the vein, then extending further into the vein pairs of inclined kerfs which are midway between the roof and floor lines so as to completely free still further blocks from the vein, and then cutting kerfs in the vein parallel with the face so as to connect the vertical kerfs and completely free more blocks from the vein above and below said still further blocks up to the roof line and down to the floor line.

2. A method of mining which consists in cutting spaced vertical kerfs in a mine vein, then cutting horizontal kerfs in the vein that connect the vertical kerfs respectively at the roof and floor lines, then cutting other horizontal kerfs in the vein that connect the vertical kerfs respectively adjacent but below the roof line and adjacent but above the floor line, then cutting a series of forwardly converging oppositely inclined pairs of kerfs in the vein between the second-named horizontal kerfs so that the kerfs of the inclined pairs intersect each other and connect the vertical kerfs to completely free blocks from the vein, then extending all of the kerfs further into the vein until certain of the inclined kerfs intersect again and others intersect the second-named horizontal kerfs to completely free additional blocks from the vein, then extending further into the vein pairs of inclined kerfs which are midway between the roof and floor lines so as to completely free still further blocks from the vein, and then cutting kerfs in the vein parallel with the face so as to connect the vertical kerfs and completely free more blocks from the vein above and below said still further blocks up to the roof line and down to the floor line, and then extending further into the vein the pairs of inclined kerfs directly adjacent the second-named horizontal kerfs and the pair midway between the roof and floor lines to completely free still more blocks from the vein.

3. A method of mining which consists in cutting spaced vertical kerfs in a mine vein, then cutting horizontal kerfs in the vein that connect the vertical kerfs respectively at the roof and floor lines, then cutting other horizontal kerfs in the vein that connect the vertical kerfs respectively adjacent but below the roof line and adjacent but above the floor line, then cutting a series of forwardly converging oppositely inclined pairs of kerfs in the vein between the second-named horizontal kerfs so that the kerfs of the inclined pairs intersect each other and connect the vertical kerfs to completely free blocks from the vein, then extending all of the kerfs further into the vein until certain of the inclined kerfs intersect again and others intersect the second-

named horizontal kerfs to completely free additional blocks from the vein, then extending further into the vein pairs of inclined kerfs which are midway between the roof and the floor lines so as to completely free still further blocks from the vein, and then cutting kerfs in the vein parallel with the face so as to connect the vertical kerfs and completely free more blocks from the vein above and below said still further blocks up to the roof line and down to the floor line, and then extending further into the vein the pairs of inclined kerfs directly adjacent the second-named horizontal kerfs and the pairs midway between the roof and the floor lines to completely free still more blocks from the vein, and then extending the remaining inclined kerfs further into the vein to completely free still other blocks from the vein between said midway pair of inclined kerfs and the second-named horizontal kerfs.

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