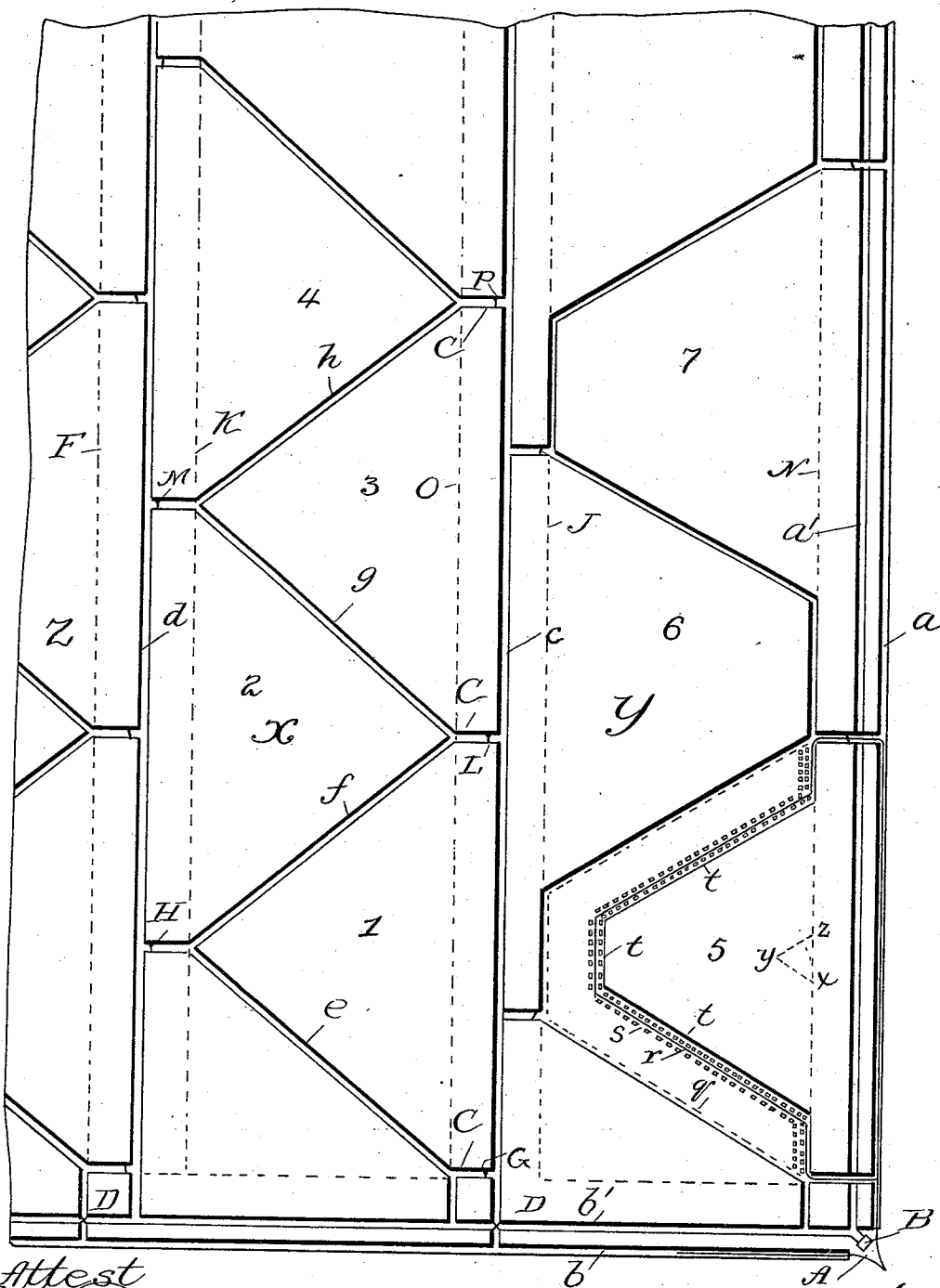


(No Model.)

D. C. BOYCE.  
ART OF MINING COAL.

No. 494,187.

Patented Mar. 28, 1893.



Attest  
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Inventor  
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by Eli Spar  
Att'y.

# UNITED STATES PATENT OFFICE.

DARWIN C. BOYCE, OF QUINNIMONT, WEST VIRGINIA.

## ART OF MINING COAL.

SPECIFICATION forming part of Letters Patent No. 494,187, dated March 28, 1893.

Application filed November 19, 1892. Serial No. 452,532. (No model.)

*To all whom it may concern:*

Be it known that I, DARWIN C. BOYCE, a citizen of the United States of America, residing at Quinnimont, in the county of Fayette and State of West Virginia, have invented certain new and useful Improvements in the Art of Mining Coal, of which the following is a specification.

My invention hereinafter set forth, is an improvement in long wall work in mining coal.

The objects sought to be accomplished are first, to avoid "brushing," or building permanent pack walls to protect and sustain the haul ways; and second, to provide for the use of more mine cars along the working face at the same time, and the more convenient working of the same.

My invention is illustrated in the accompanying drawing, in which the figure shows a plan view of the mine, worked by my improved method.

In the drawing I have shown two main sections and a part of a third, all according to the same system and alike excepting in one respect, which is, that in the left hand full sub-section, the panels are triangular, and in the right they are quadrilateral, the points of the triangle being removed. The outer courses *a*, and *b*, are used as main haul-ways and also serve for the admission of air. The inner *a'* and *b'* are preferably used solely as air courses, the air being exhausted therein to the furnace or ventilating fan B, at the mine mouth or shaft A. The haul-ways may unite as shown at A. Between the main sections X and Y is an air course and haul-way *c*, and between the main section and the like section Z, (partially shown) is another way *d*, which serves also as a haul-way and air course. These ways and courses *a*, *a'* are substantially at right angles to the others above specified.

Each of the main sections is sub-divided into panels by diagonal courses or ways, which in the left hand section X, are marked respectively *e*, *f*, *g* and *h*. These being driven

in continuous zigzag line form triangular panels 1, 2 and 3 and at the apexes they are connected to the main courses or ways by connecting courses C, which pass through the pillars between the courses or ways, and the lines F, K, O and J, N (shown as dotted) back to which the panels are worked. The short connecting air courses are provided with doors for obstructing the air, so that it may be directed to the exhaust, according to the requirements of the work in progress, through the diagonal ways. The doors are indicated at G, L, H, M and P. Over casts are located at the intersections of the air courses as indicated at D, where the courses cross. The panels of the right hand section are marked respectively 5, 6, and 7. They differ from those of section X, only in the fact that the apex of the triangle is cut off, and the air passage is at one side of the center, but these are immaterial matters. So also is the particular angle of the diagonal ways. In panel 5, for example, I have illustrated the progress of the work, according to my system. The panel is represented as partially worked. The face of the remaining part of the panel is indicated by the lines *t*; the crib work protecting the faces is indicated at *s*, and the track at *r*. The opposite faces of panels and pillar are protected by line of cribbing indicated by dotted line *q*. The panel may be developed both ways, as indicated by the line of track. The mules may enter either way shown, and leaving the unloaded cars, pass around the apex and take the loaded cars on the other side, taking them in passing and any desired number. The cribs and tracks are movable, and, since the tracks must be shifted as the work progresses, they are preferably made in sections.

Panels 1 and 3 on the left hand side, and panel 6 on the right hand side are developed through the middle entry *c*. Panels 5 and 7 on the right hand side are developed through the right hand entry *a*. Panels 2 and 4 are developed through the left hand entry *d*.

The work is carried on by coal cutting ma-

chinery moving along the faces; until the remaining portion indicated by  $x, y, z$  is too small to be perfectly worked by such machinery.

5 I claim—

The improvement in the art of mining, consisting in forming sections for main haul roads or courses, and sub-dividing these main sections by ways communicating with said main

haul roads or courses, and diagonal thereto, so substantially as described.

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

DARWIN C. BOYCE.

Witnesses:

HENRY E. COOPER,  
W. P. KEENE.