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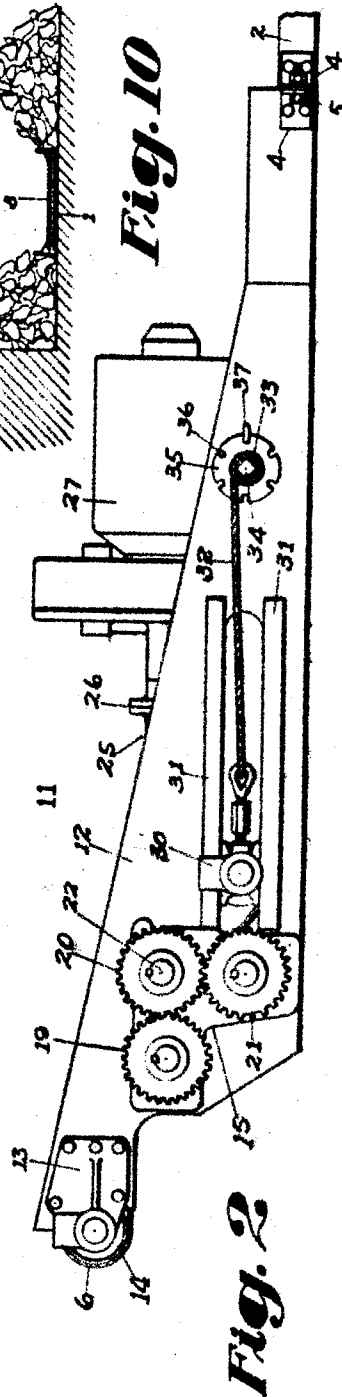
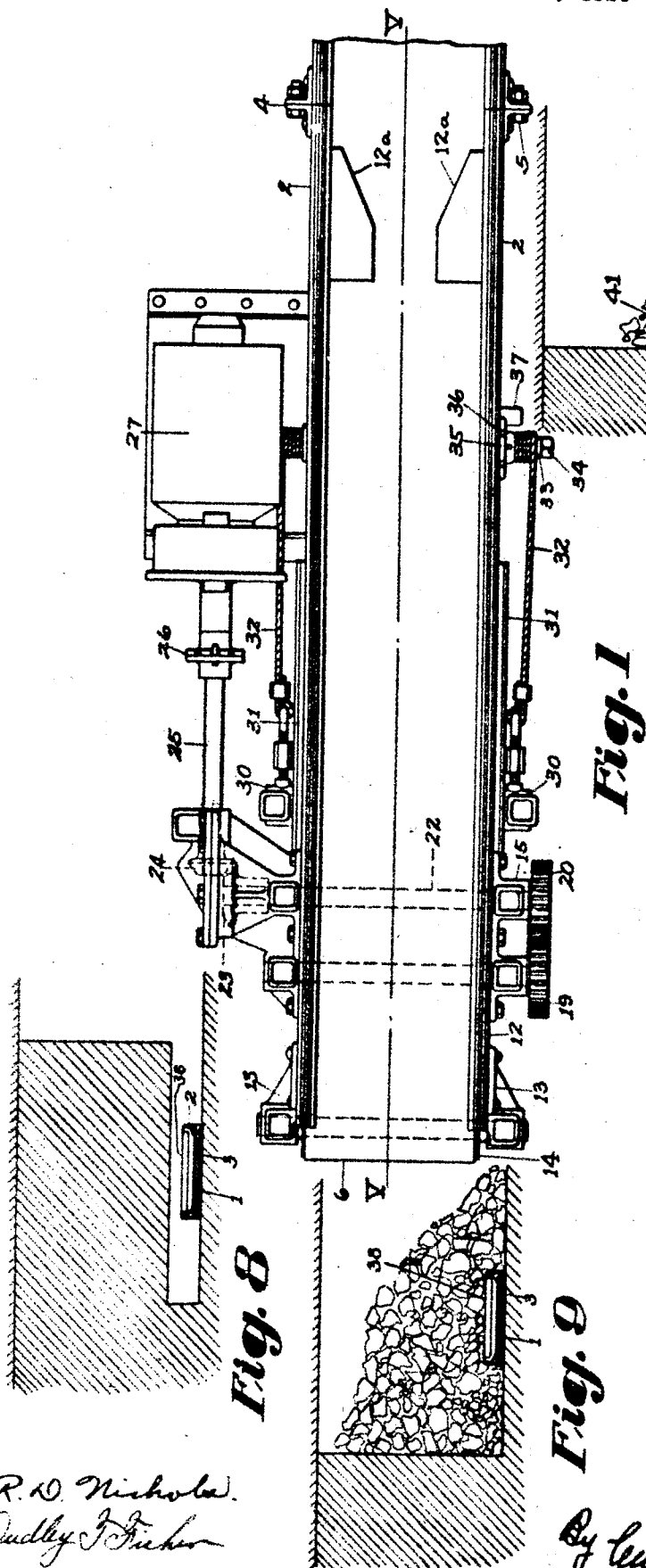
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1,770,934

METHOD OF MINING COAL

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2 Sheets-Sheet 1



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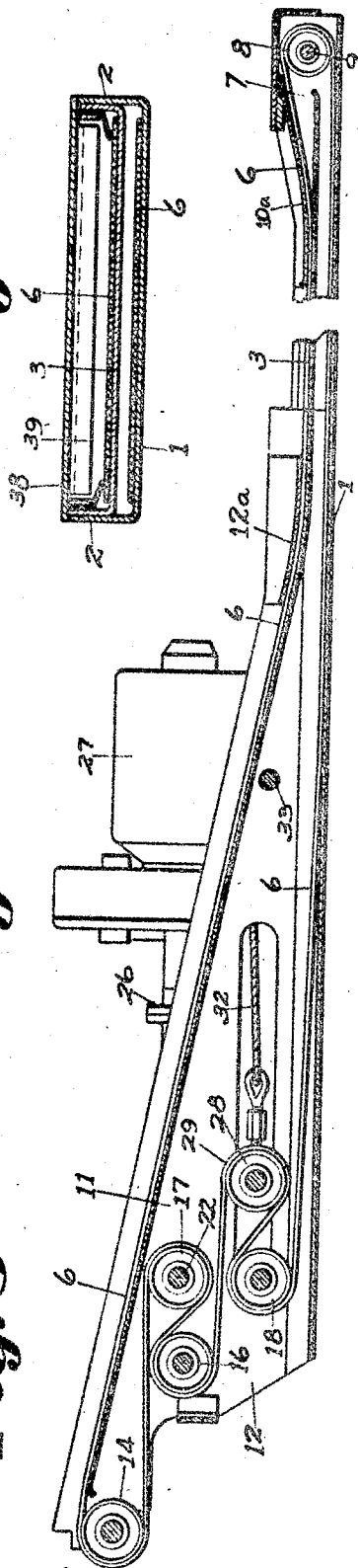
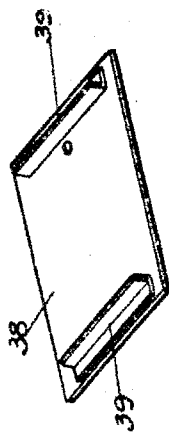
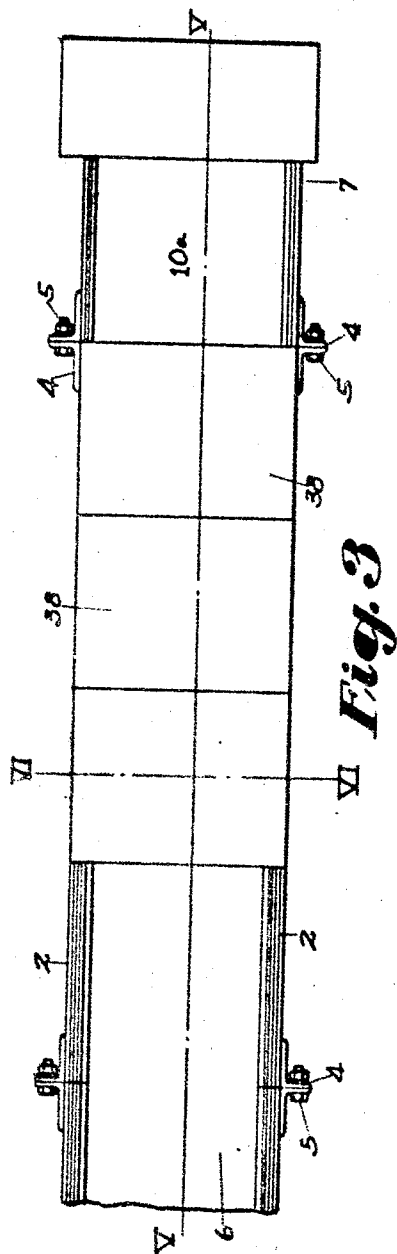
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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

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METHOD OF MINING COAL

Application filed December 3, 1926, Serial No. 152,455, and in Great Britain October 18, 1926.

The present invention relates to certain new and useful improvements in method and apparatus for mining coal comprising the dislodgment of the coal from a longwall face, receiving the coal as it is dislodged upon a conveying mechanism and conveying it away longitudinally of the face.

The especial object of this invention is to provide an improved method of longwall coal mining as above stated.

Another object is to provide a conveying mechanism especially adapted to my improved method of longwall mining.

Another object is to provide readily removable devices adapted to protect the conveyor from contact with the disrupted and dislodged coal.

These and other objects will be fully set forth in the following specification, reference being had to the accompanying drawings of which

Fig. 1 is a plan view of the head or driving portion of a conveyor adapted to the purposes of this invention.

Fig. 2 is a side elevation of the mechanism illustrated in Fig. 1.

Fig. 3 is a plan view of the foot end portion of the conveyor illustrated in Fig. 1.

Fig. 4 is a side elevation of the mechanism illustrated in Fig. 3.

Fig. 5 is a sectional view taken along the line V—V of Figs. 1 and 3.

Fig. 6 is a sectional view taken along the line VI—VI of Fig. 3.

Fig. 7 is a detail of the removable shields adapted to be used with the conveyor shown.

Fig. 8 is a diagrammatic sectional view showing the conveyor in position in a kerf preparatory to the dislodgment of the coal above the kerf.

Fig. 9 is a view similar to Fig. 3 showing the relation of the conveyor to the dislodged coal after the coal has been shot down.

Fig. 10 is a similar diagrammatic view showing the mine working after that part of the dislodged coal, immediately above the conveyor, has been removed.

Like numerals refer to similar parts in the several figures.

In the drawings, the numeral 1 refers to a

sheet metal plate, the lateral edges 2 of which are upturned to form a pan or trough adapted to rest directly upon the mine floor. The numeral 3 refers to a second plate, the lateral edges of which are turned up to form a similar trough which is inserted between the side flanges 2, and its bottom spaced from the bottom of the first mentioned trough, and these flanges are secured together by suitable rivets, forming a frame, the vertical height of which is less than that of the kerf commonly formed in a coal face by the cutter chain of a mining machine. The frame thus formed is provided at each end with outstanding flanges 4 adapted to abut against the corresponding flanges of other frame sections. These flanges 4 are pierced by suitable apertures through which project the bolts 5 to connect the several frame sections into a continuous frame of a length corresponding with that of the coal face upon which the contemplated mining operations are conducted. In the space between the plates 1 and 3 travels the return strand of an endless conveyor belt 6, the carrying strand of which slides upon the upper surface of the plate 3 in position to receive and transport material deposited thereon. Attached to one end of the main frame thus built up, is a foot section 7 composed of plates similar to those above described but sufficiently expanded to contain the foot roller 8, which is rotatably supported upon a shaft 9 fixed to the side flanges 10 of said foot section. Over this foot roller 8, the belt 6 travels from the lower to the upper strand of the conveyor, and a guide plate 10^a attached to the side flanges 10, engages the upper surface of said belt and guides it into the trough of the main frame 1.

To the end of the main conveyor frame, remote from the foot section 7, is attached a head section 11 which is suitably reinforced and expanded to support the driving mechanism of the conveyor belt 6. Secured to the side plates 12 of the head section 11 are journal bearings 13 in which is supported the head wheel 14 over which the belt 6 turns from the upper or carrying runway to the lower or return runway, and this wheel 14 is so positioned and arranged that it may

overhang a suitable receptacle, such as a mine car or a take away conveyor, into which the coal may be delivered for transportation from the mine. At the end of the head section 11 adjacent the main conveyor frame, I have provided guide plates 12^a which project inwardly from the side plates 12 and engage the upper surface of the conveyor belt 6 to guide it from the horizontal runway of the main conveyor frame to the inclined runway of the head section. While the projection of these guide plates 12^a is sufficient to hold the conveyor belt 6 to the desired line of draft, their proportions are such as to preserve a clear passageway for the superimposed material traveling with the belt 6, and the form of the adjacent edges of the guide plates 12^a is such as to offer a minimum obstruction to the passage of said superimposed material. Attached to the side plates 12 are castings 15 in each of which are formed suitable journal bearings for the support of three driving pulleys 16, 17 and 18, and these pulleys are rotatably connected together by the spur gears 19, 20 and 21 to insure their revolution at the same peripheral speed. The shaft 22, upon which the pulley 17 is mounted, extends beyond its supporting bearing, and to its end is fixed a bevel gear 23 which engages a bevel pinion 24 mounted upon the shaft 25. The shaft 25 is journaled in suitable bearings attached to the conveyor frame, and is connected by a shaft coupling 26 with the motor 27 by which the conveyor mechanism is actuated. The motor 27 may be of any preferred type suitable to the condition under which the machine operates. In the drawings, I have shown an electric motor adapted to receive its actuating current from any convenient source of electric current supply, through a flexible cable, and to be controlled by controlling devices not shown in the drawing. Since such devices are well understood in the mining art, and since they form no part in the present invention, their illustration and description is not thought to be required at this time.

The conveyor belt 6 engages all three of the driving pulleys 16, 17 and 18 to secure increased driving effort and insure against the slipping of the belt over the driving pulley, and a belt tightener pulley 28 engages a loop 29 of the belt 6 to maintain the desired tension upon said belt. The belt tightener pulley 28 is mounted in the journal boxes 30 which are slidable in guide ways 31 of the side frame 12, and to these journal boxes are attached the tensioning ropes 32 which are windable upon the tensioning shaft 33. The shaft 33 is mounted in suitable bearings of the machine frame and is formed with a square end 34 adapted to be engaged by a suitable wrench whereby the shaft may be rotated to wind the ropes 32 and thereby adjust the tension of the belt 6. A disc 35 fixed

to the shaft 33 is provided with peripheral notches 36 adapted to be engaged by a detent 37 to lock said shaft against rotation in the unwinding direction, and thereby maintain the desired tension upon the conveyor belt 6.

The conveyor above described is especially adapted to be inserted in a kerf formed in an extended coal face, in position to receive the disrupted coal as it is dislodged from the vein above the kerf. It is apparent that if the coal above such a conveyor is thrown down upon the carrying belt along the entire length of the coal face, the weight of such coal upon the conveyor belt would so overload the apparatus as to prevent its movement. To prevent such overloading I have provided the shield plates 38, as illustrated in Fig. 7, which are adapted to rest upon the upper edges of the side flanges 2 of the conveyor frame, to receive and support the dislodged coal above the belt 6. Stiffening angle bars 39 attached to the underside of the shield plates 38 serve to stiffen said plates, and these angle bars are of such length that, by engagement with the inner faces of the flanges 2, they prevent lateral displacement of the shield plates 38.

In the method of mining here contemplated, the coal is reclaimed from panels, or blocks of the vein, the width of which corresponds with the length of the working place, and spaced along one side of the working panel, is provided for the driving section 11 and its actuating motor. In the practice of this method, a kerf 40 is first formed at the base of the vein extending along the working face, and a sufficient clearance for the foot section 7 is prepared by snubbing the coal above the kerf 40 at the foot end of the face. The conveyor above described may then be positioned within the kerf 40, as shown in Fig. 8, with the shield plates 38 in position to protect the entire effective length of the conveyor belt 6. After the conveyor has been thus adjusted, the coal above the kerf may be dislodged in any preferred and suitable manner such as by blasting, causing the disrupted coal to fall directly upon the conveyor structure, as illustrated in Fig. 9. The motor 27 may then be actuated to drive the conveyor belt 6, and the shield plate 38, nearest to the driving section of the conveyor, may be removed to allow the broken coal to fall upon the belt 6 to be transported thereby to and over the head wheel 14. After all of the coal which will fall to the belt has been thus removed, the next shield plate 38 may be withdrawn, and the operation, as above described, continues progressively along the conveyor until the coal has been removed from the entire length of the coal face. A certain amount of broken coal will ordinarily remain upon the mine floor at each side of the conveyor structure, as shown at 41 and 42 of Fig. 10. After this residue has been shoveled onto the conveyor the

coal vein may be again undercut and the operation above described repeated until the entire panel has been removed.

What I claim is:

- 5 1. The method of taking material from a mine working, which consists in underkerfing a relatively long face of the working, disposing the operative section of an endless draft device under the kerfed increment to travel
10 substantially throughout the length thereof, continuously operating said draft device, and intermittently releasing portions of said kerfed increment to said operative section for removal thereby.
- 15 2. The method of taking material from a mine working, which consists in underkerfing a relatively long face of the working, disposing the operative section of an endless
20 draft device under the kerfed increment to travel substantially throughout the length thereof, continuously operating said draft device, shielding substantially the entire length of said operative section, breaking
25 said kerfed increment, and exposing said operative section by degrees to permit the broken down material to fall into the path thereof to be removed thereby.

In testimony whereof I have hereunto set my hand.

NILS D. LEVIN.