



Nov. 25, 1924.

1,517,095

E. O'TOOLE

MINING APPARATUS

Filed Dec. 6, 1923

4 Sheets-Sheet 2

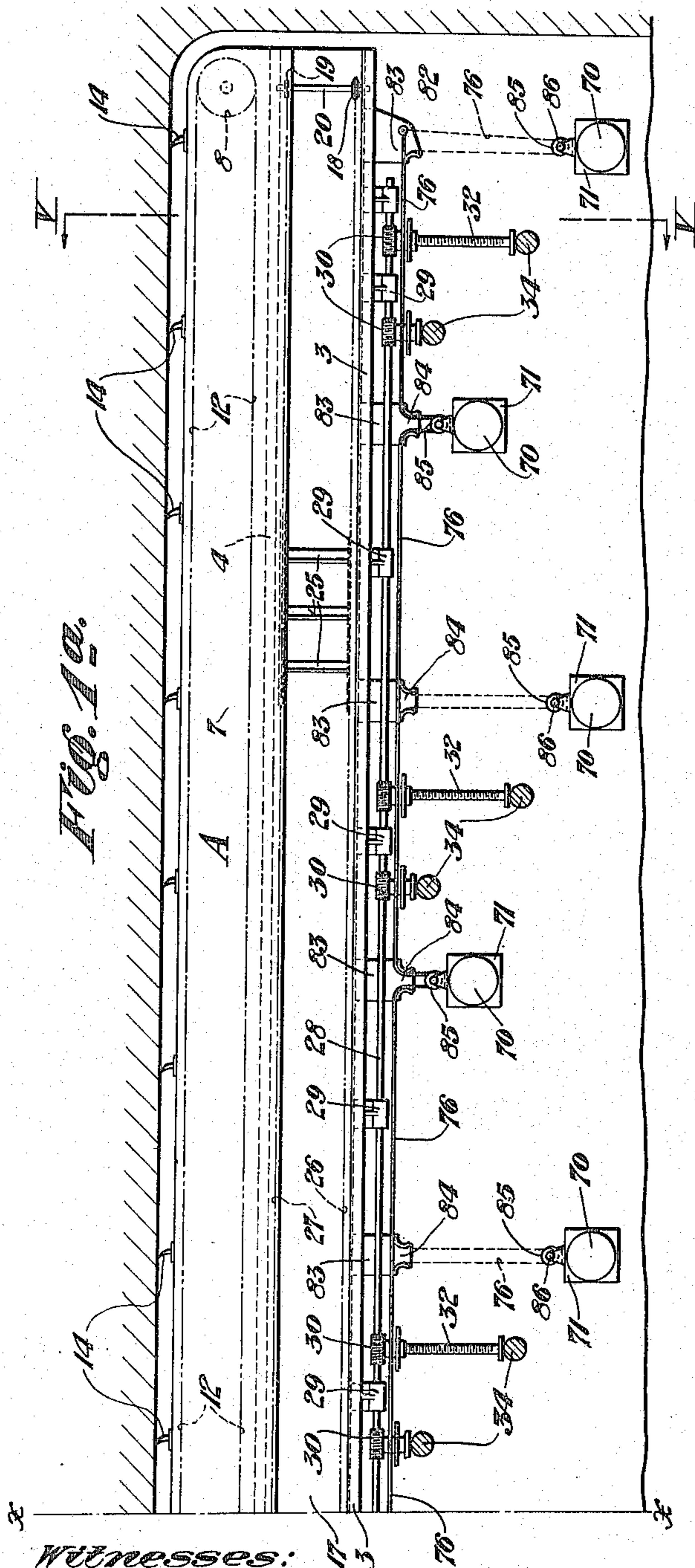


FIG. 1a.

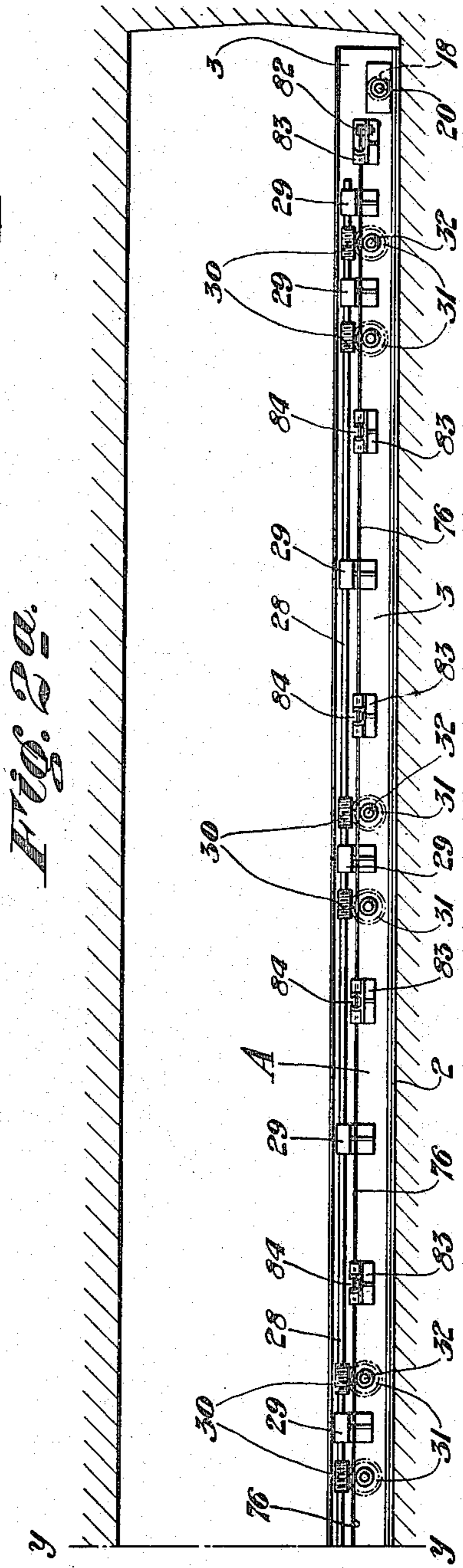


FIG. 2a.

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4 Sheets-Sheet 3

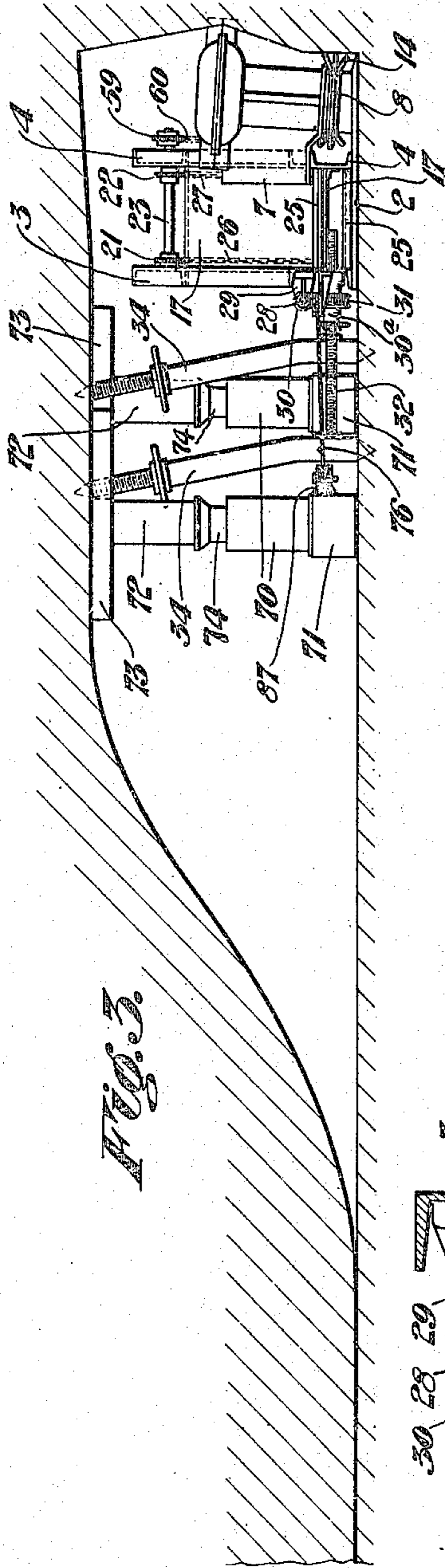


FIG. 3.

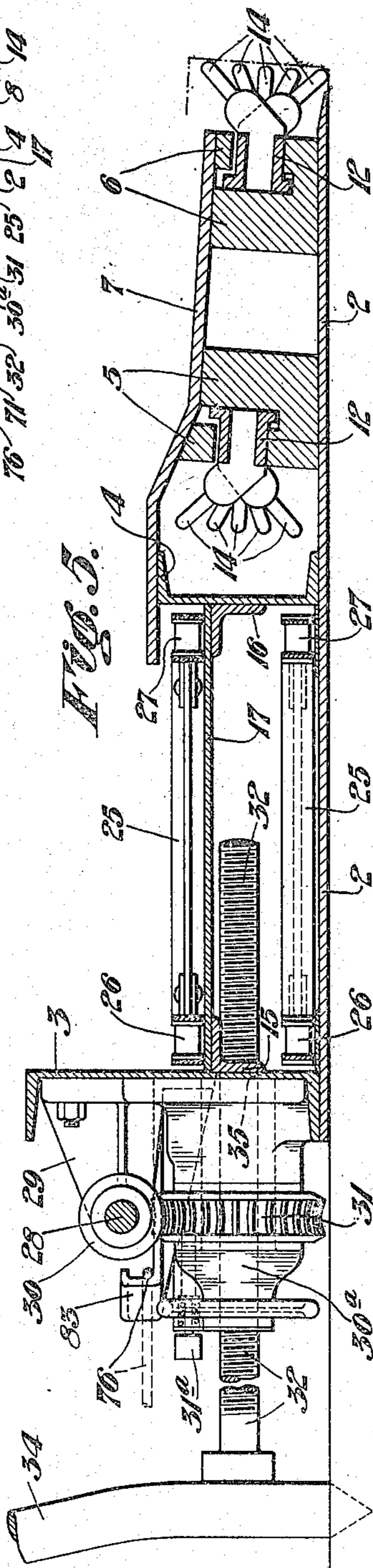


FIG. 5.

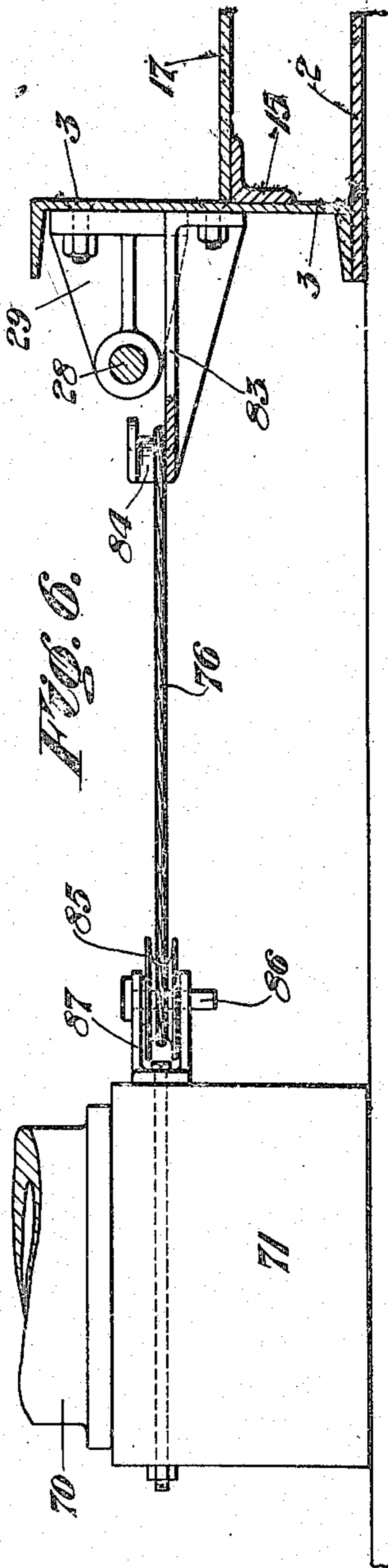


FIG. 6.

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Nov. 25, 1924.

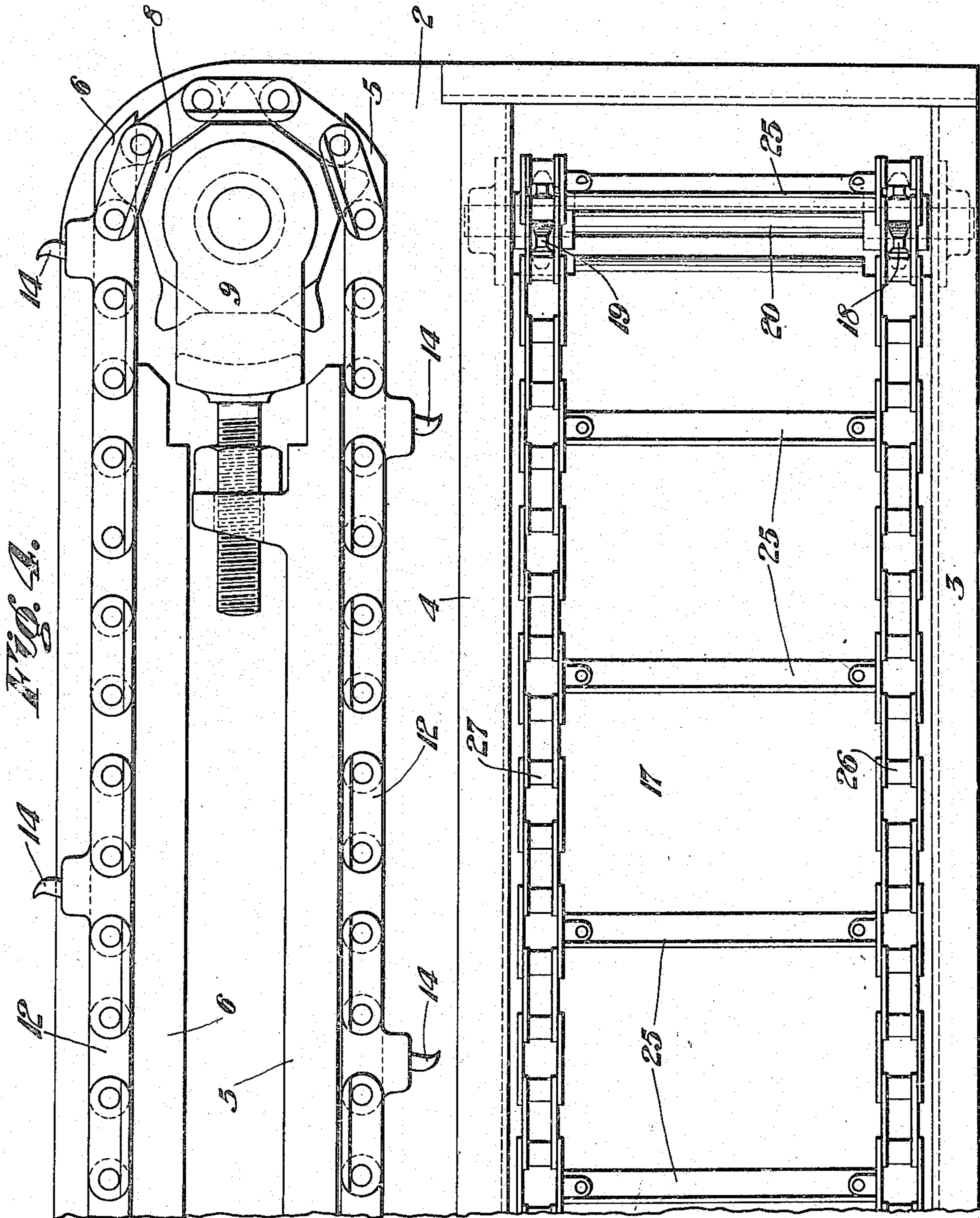
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MINING APPARATUS

Filed Dec. 6, 1923

4 Sheets-Sheet 4



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# UNITED STATES PATENT OFFICE.

EDWARD O'TOOLE, OF GARY, WEST VIRGINIA.

MINING APPARATUS.

Application filed December 6, 1923. Serial No. 678,363.

*To all whom it may concern:*

Be it known that I, EDWARD O'TOOLE, a citizen of the United States, and resident of Gary, in the county of McDowell and State of West Virginia, have invented certain new and useful Improvements in Mining Apparatus, of which the following is a specification.

This invention relates to mining machines and while not limited thereto relates more particularly to mining machines of the long-wall type, such as shown, described and claimed in my copending application Serial No. 620,246, filed February 20, 1923.

The object of the present invention is to provide machines of this class with power means for moving the roof supports, used with such machines, forward as the mining progresses.

Another object is to provide novel roof support moving mechanism, in combination with a mining machine, such mechanism having the novel combination and construction of parts hereinafter described and illustrated in the accompanying drawings.

In the drawings, Figure 1 is a partial top plan of the machine in working position.

Figure 1<sup>a</sup> is a continuation of the plan of Figure 1 from the line X—X.

Figure 2 is a partial rear elevation of the machine.

Figure 2<sup>a</sup> is a continuation of the elevation of Figure 2 from the line Y—Y.

Figure 3 is an end elevation of the machine.

Figure 4 is an enlarged plan of the butt end of the machine with housing and other enclosing parts removed for clearness.

Figure 5 is an enlarged sectional elevation on the line V—V of Figure 1<sup>a</sup>.

Figure 6 is a fragmentary elevation on an enlarged scale, showing the manner in which the cable is secured to a jack in pulling it into a new position.

Referring more particularly to the drawings, the letter A designates the frame of the machine as a whole, which is composed of a base or bottom plate 2, rear and front channel members 3 and 4, respectively, cutter chain guides 5 and 6, and housing or cover plate 7.

A cutter chain idler sprocket 8 is mounted on a bearing 9 between the base plate 2 and cover plate 7 at the butt end of the machine.

A cutter chain drive sprocket 10 is mounted on a drive shaft 11 adjacent the delivery end of the machine.

A cutter chain 12 having the usual cutting bits 14 is trained over the sprockets 8 and 10 and serves to cut a kerf in the material being mined.

Angle brackets 15 and 16 are secured to the rear and front channel members 3 and 4, respectively, and serve as a support for a conveyer plate 17.

A pair of idler sprockets 18 and 19 are mounted on a shaft 20 journaled in the channel members 3 and 4 adjacent the butt end of the machine, and a pair of drive sprockets 21 and 22 are mounted on a shaft 23 journaled in the channel members 3 and 4 at the delivery end of the machines. The channel frame members 3 and 4 are inclined upwardly on an angle and extend beyond the main body of the machine for a short distance at the delivery end of the machine to provide for delivery of the material into the cars B or other conveying devices.

A flight conveyer composed of T-shaped flight members 25 secured to conveyer chain members 26 and 27 is trained over the sprockets 18—19 and 21—22 so that it rides on the upper side of the conveyer plate 17 and serves to pull or convey the mined material along said plate.

A drive shaft 28 is journaled in bearings 29 mounted on the channel 3 along the rear side of the machine, and carries a plurality of worm gears 30 adapted to mesh with worm wheels 31 freely movable on feed-in or advancing bars 32. The worm gears 30 and feed-in bars 32 are arranged in pairs so that one bar may be advancing while the other bar is being moved in a forward position. The bars 32 are screw threaded and are provided with nuts 30<sup>a</sup> adapted to be locked to the worm wheels 31 by locking pins 31<sup>a</sup>. The bars 32 are adapted to have their rear ends engaged against suitable removable jacks or posts 34 mounted between the roof and bottom of the mine and their forward ends projected through suitable openings or apertures 35 in the rear channel member 3.

The main frame of the machine is provided with a motor base 38 on which is mounted the drive motor 39 for the cutter and conveyer. The motor 39 is coupled to



a counter-shaft 40 which carries a worm gear 41 meshed with a worm wheel 42 secured on the upper end of and adapted to drive the sprocket shaft 11 of the cutter chain drive.

The shaft 40 is provided intermediate its ends with a bevel gear 44 in mesh with a beveled gear 45 on a stub shaft 46 journaled in bearings 46<sup>a</sup> on the base 38. The shaft 46 is provided with drive sprockets 47 and 48. The sprocket 47 is in line with a sprocket 49 on the drive shaft 28 and a sprocket drive chain 50 is trained over the sprockets 47 and 49 to drive the shaft 28. A stub shaft 51 is journaled in bearing 52 on the base 38 and is provided on one end with a sprocket 53 and the other end with a beveled gear 54. A sprocket chain 55 is trained over the sprocket 48 on the shaft 46 and sprocket 53 on shaft 51 so as to drive the shaft 51 and gear 54.

The gear 54 is in mesh with a second beveled gear 56 on a stub shaft 57 journaled in the forward channel member of the frame. The shaft 57 carries a sprocket 58 which is in line with a drive sprocket 59 on the conveyer drive shaft 23 and a sprocket chain 60 is trained over the sprockets 58 and 59 so that the conveyer is also driven from the motor 39.

In operation the motor 39 is started and the cutter chain is driven through its drive sprocket 10 by the shaft 40, worm 41, worm wheel 42 and shaft 11. Simultaneous with the operation of the cutter chain the feed-in bars are operated by shaft 28 which shaft receives its power from the motor 39 through shaft 40, gears 44, 45, shaft 46, sprockets 47 and 49 and sprocket chain 50. Also simultaneous with the above operations the conveyer is operated from the motor 39 through shaft 40, gears 44, 45, sprocket 48, chain 55, sprocket 53, shaft 51, gears 54, 56, shaft 57, sprocket 58, chain 60 and sprocket 59.

As the machine cuts under the coal, the machine is fed forward into the kerf formed by the cutting chain, and the coal breaks down onto the housing plate 7 and is pushed onto the conveyer portion of the machine.

In Figures 1, 1<sup>a</sup>, 2 and 2<sup>a</sup> and 3, I have shown a plurality of jack members 70 arranged in two rows to the rear of the machine, the jacks of one row being in staggered relation to the jacks of the other row.

The jacks 70 are mounted on base blocks 71 and posts and cap pieces 72 and 73 are carried on the jack extension pieces 74. The jacks 70, base blocks 71, posts 72 and cap pieces 73 are preferably secured together in any well known manner to prevent their separation when being moved bodily during the mining operation.

The jacks 70 and their associated parts are adapted to be mechanically moved by suitable power means mounted on the ma-

chine A, which consists essentially of a drum 75, cable 76 and motor 77 for operating the drum 75.

The drum 75 is mounted on a suitable platform 78 extending rearwardly from the main frame of the machine and is driven by the motor 77 through a speed reducing mechanism 79 and clutch 80 of any standard construction.

The rope or cable 76 has one end secured to the drum 75 and is wrapped several times around the drum, and has its other end secured to the main frame of the machine at the butt end as at 82.

The rear channel member 3 of the machine frame A is provided at spaced intervals with cable supporting brackets 83, one bracket being provided for each of the jacks 70 used with the machine. The brackets 83 are substantially U-shaped and have their rear wall cut away forming an opening 84 to permit a loop of the cable 76 to be drawn therethrough.

As the machine advances through the coal the jacks 70 must be advanced to support the new formed roof and to let the gob form to the rear of the machine. In order to facilitate the movement of the jacks and their associated parts, the cable 76 will be pulled out and secured to suitable sheaves 85 detachably mounted on pins 86 in brackets 87 on the base blocks 71 of the jacks. When the cable loop has been secured to the jacks the motor 77 will be started to operate the drum 75 and take up the cable, thus pulling in the loop and moving the attached jack forwardly toward the machine. Either one or a plurality of jacks may be moved at the same time, as desired.

In the operation of the machine the jacks in the back row are loosened and moved forward of the front row, and so on as the machine progresses and the gob forms immediately behind the supports. By forming the gob immediately behind the supports and in such close proximity to the machine, the shearing forces on the under-cut coal are sufficient to break down the coal on the machine as it is under-cut.

Heretofore when jacks have been used to support the mine roof it has been necessary to move them manually, and since jacks of sufficient strength to support a mine roof are very heavy, a great amount of manual labor was necessary to move them, all of which is eliminated by the present invention.

It will be understood that various changes in design and construction of details may be made without departing from the scope of my invention as defined in the appended claims.

I claim—

1. The combination with a mining machine and a plurality of movable roof supports located to the rear of said machine, of



means on said machine adapted to be detachably secured to selected ones of said supports for moving said supports toward said machine.

5 2. The combination with a mining machine and a plurality of movable roof supports located to the rear of said machine, of a cable and cable operating means on said machine, said cable being adapted to be  
10 detachably secured to selected ones of said supports for moving said supports toward said machine.

3. The combination with a mining machine and a plurality of movable roof supports located to the rear of said machine, of  
15 a drum and drum operating mechanism mounted adjacent one end of said machine, a cable having one end secured to the end of said machine opposite from said drum  
20 and the other end secured to and wrapped on said drum, means at spaced intervals along said machine for permitting said cable to be drawn back toward said supports in loops, means for detachably securing said

loops of the cable to said supports, whereby  
25 when said drum is operated to take up said cable said supports will be moved toward said machine.

4. The combination with a mining machine and a plurality of movable roof supports located to the rear of said machine, of  
30 a drum and drum operating mechanism mounted adjacent one end of said machine, a cable having one end secured to the end of said machine opposite from said drum and  
35 the other end secured to and wrapped on said drum, cable guides secured at spaced intervals along said machine for permitting said cable to be drawn therethrough and  
40 back toward said supports in loops, means for detachably securing said loops of the cable to said supports, whereby when said drum is operated to take up said cable the supports connected to said cable will be  
45 moved toward said machine.

In testimony whereof I have hereunto set my hand.

EDWARD O'TOOLE.