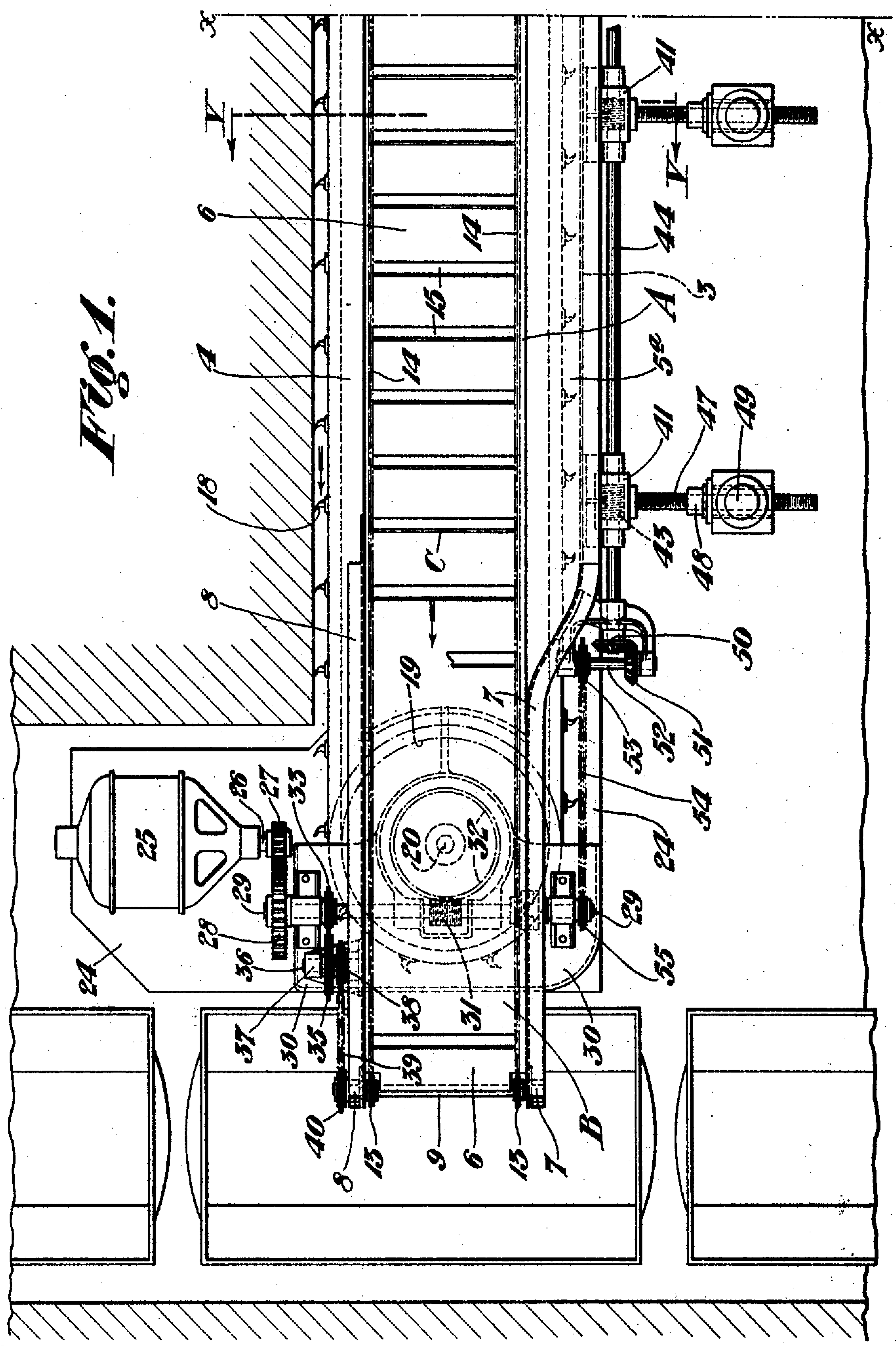
May 11, 1926. **E. O'TOOLE** 1,583,992

MINING MACHINE

Filed Dec. 13, 1924 6 Sheets-Sheet 1

Fig. 1.



Witnesses:
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MINING MACHINE

Filed Dec. 13, 1924 6 Sheets-Sheet 2

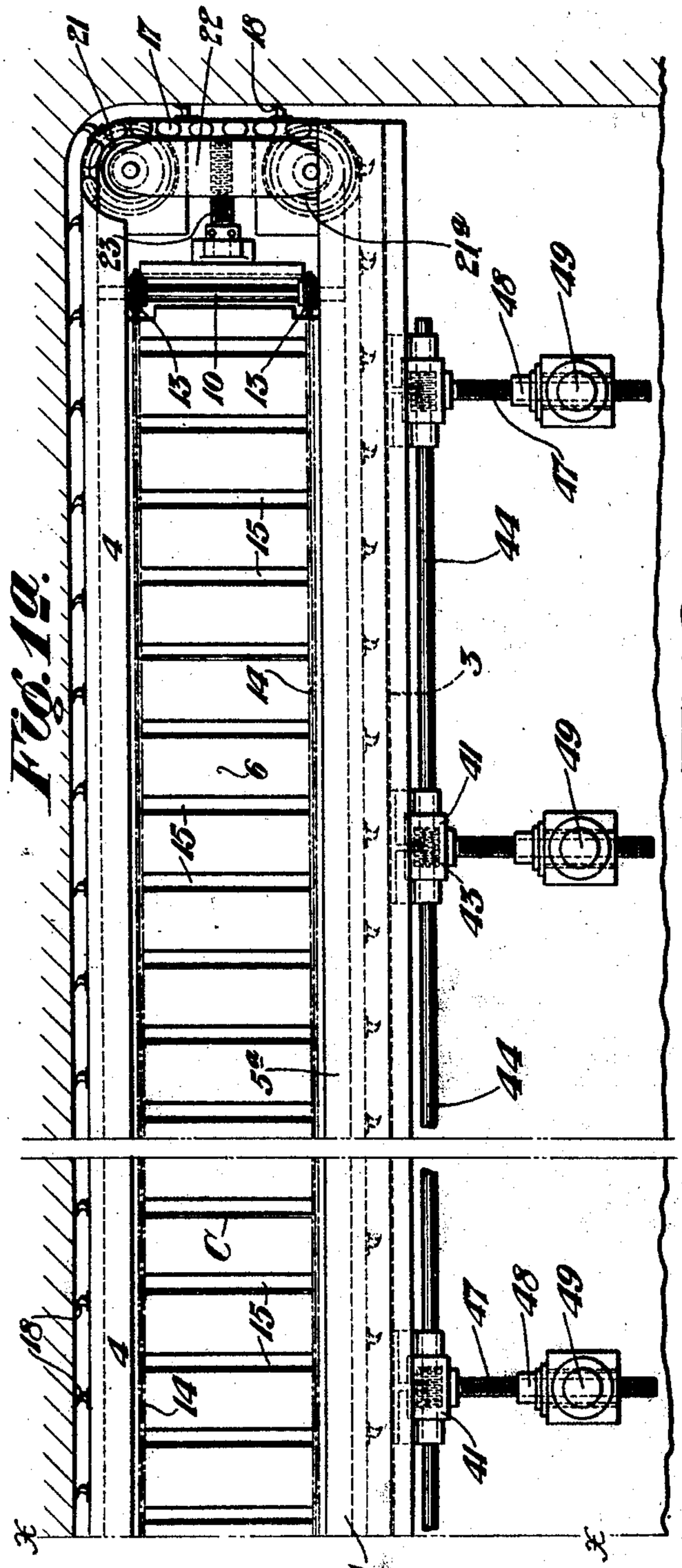

Fig. 1a.

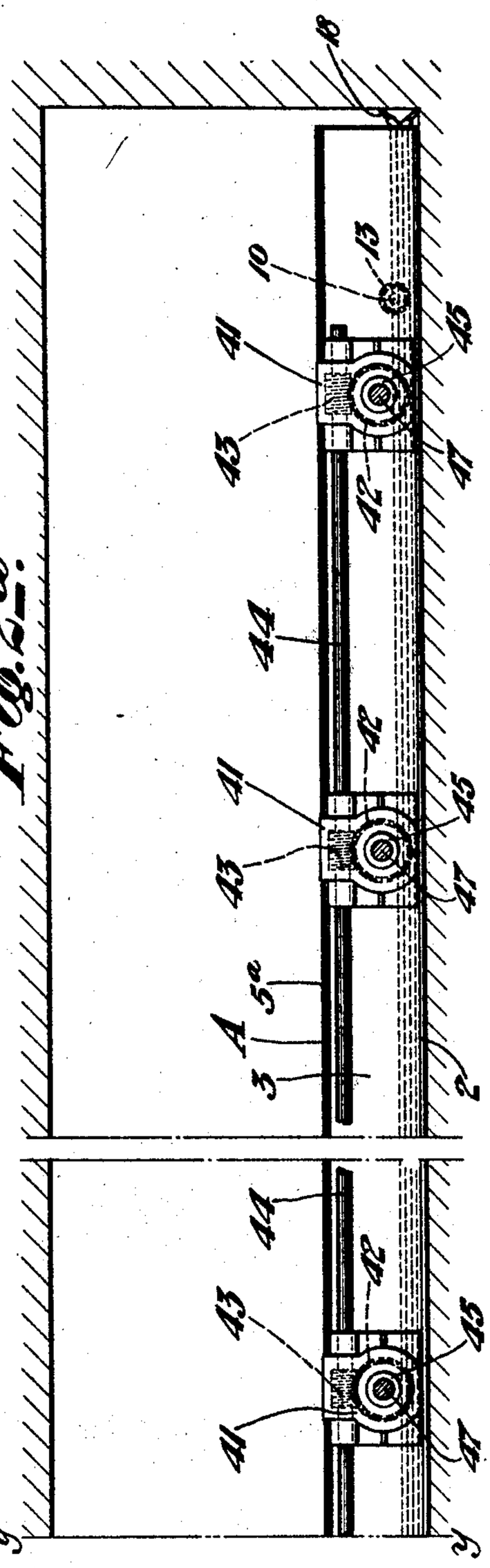

Fig. 2a.

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6 Sheets-Sheet 3

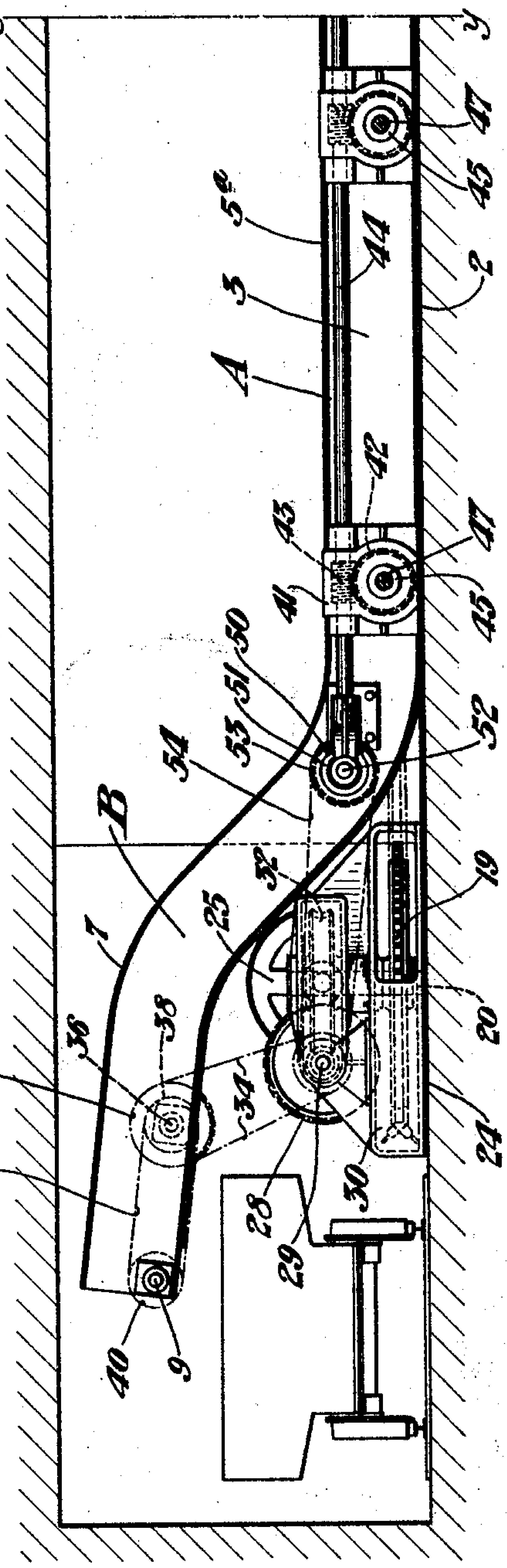

Fig. 2.

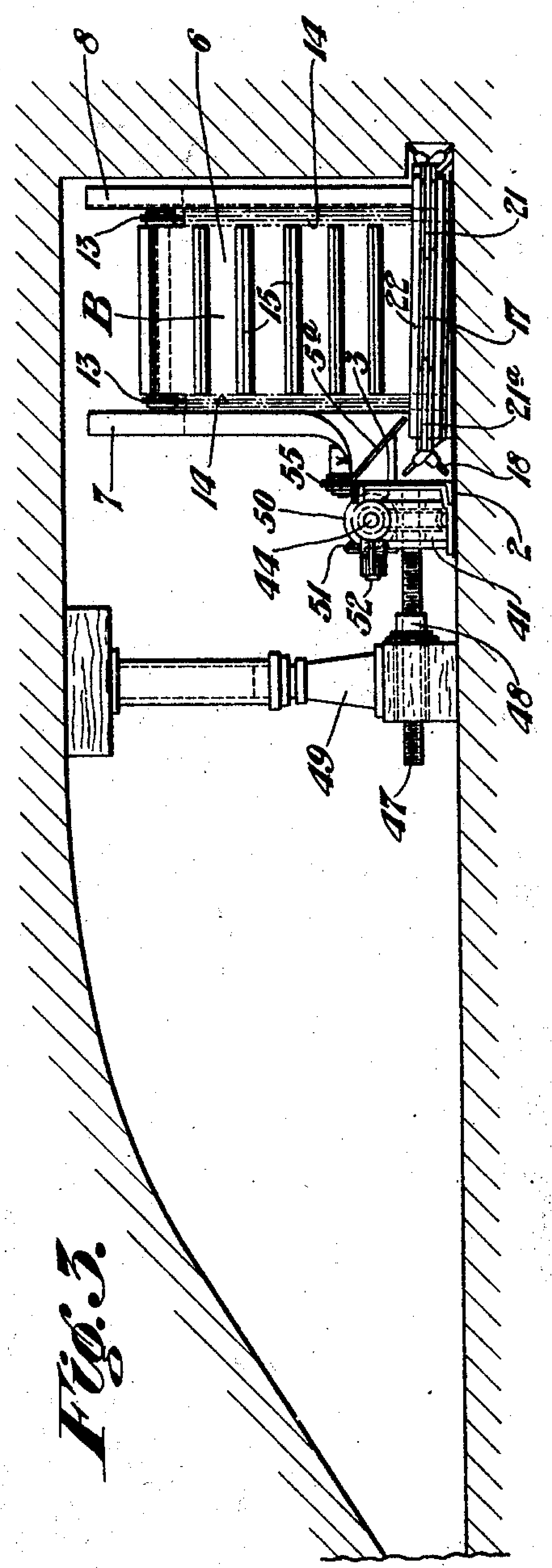

Fig. 3.

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MINING MACHINE

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6 Sheets-Sheet 4

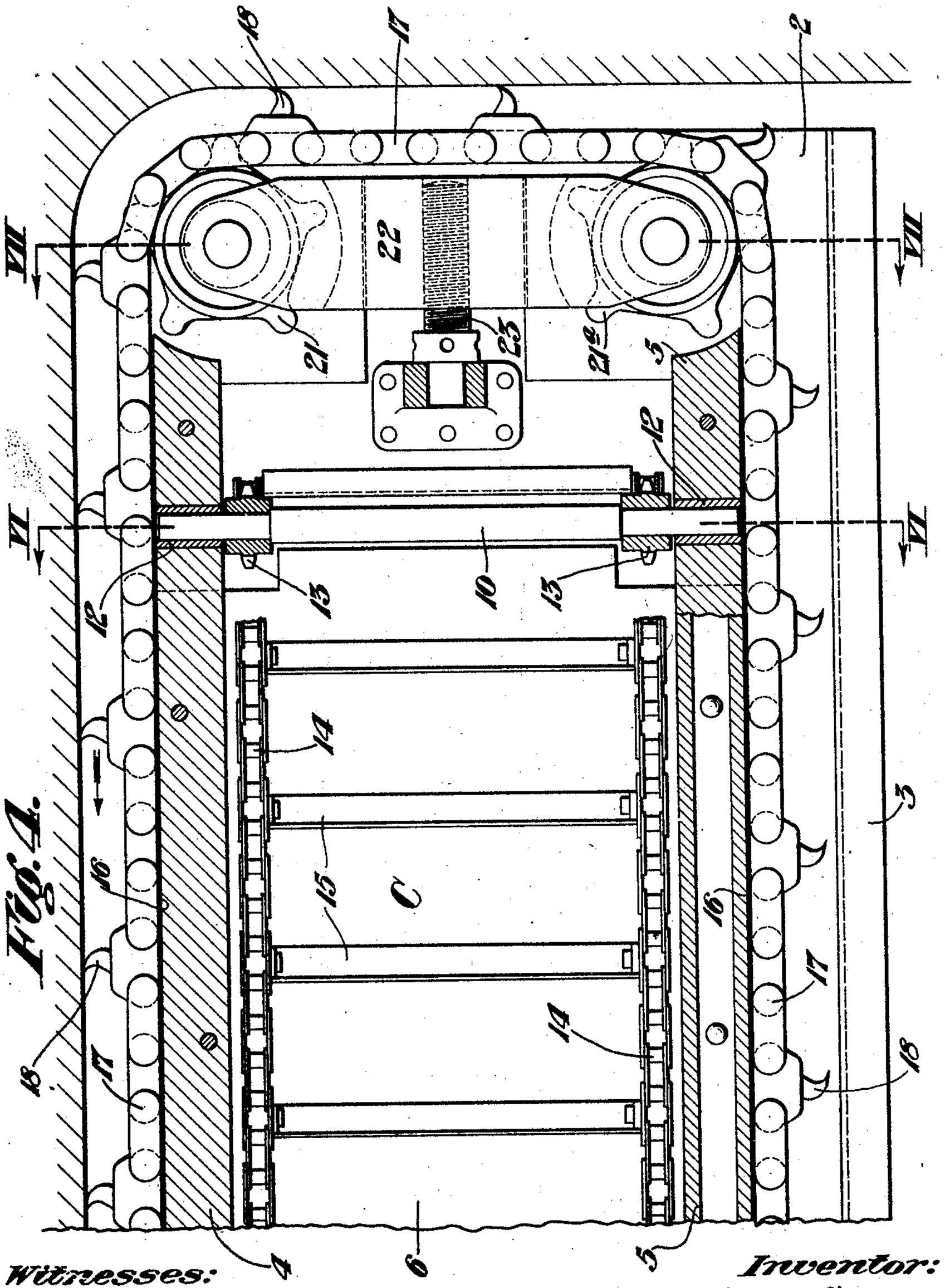

Fig. 4.

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May 11, 1926. 1,583,992

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MINING MACHINE

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Fig. 5.

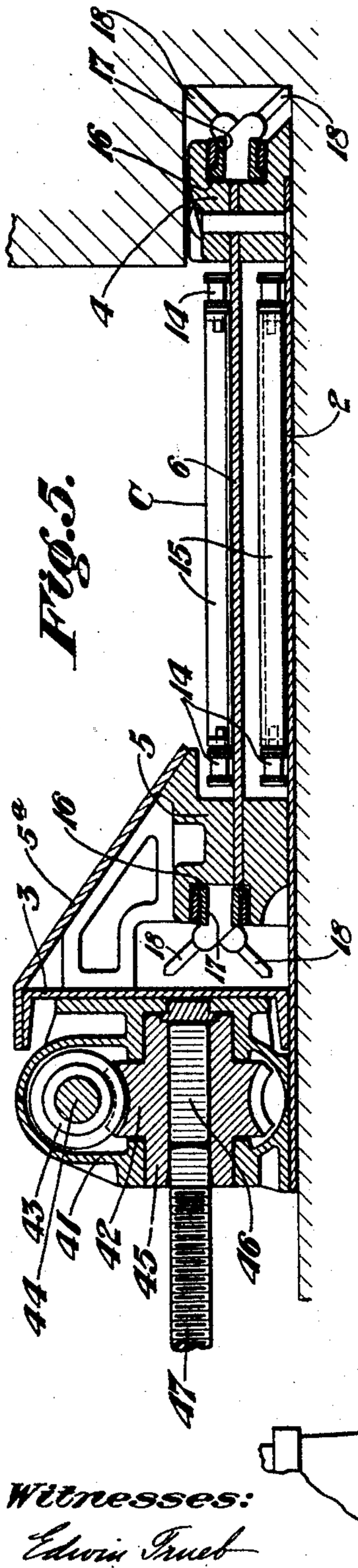


Fig. 6.

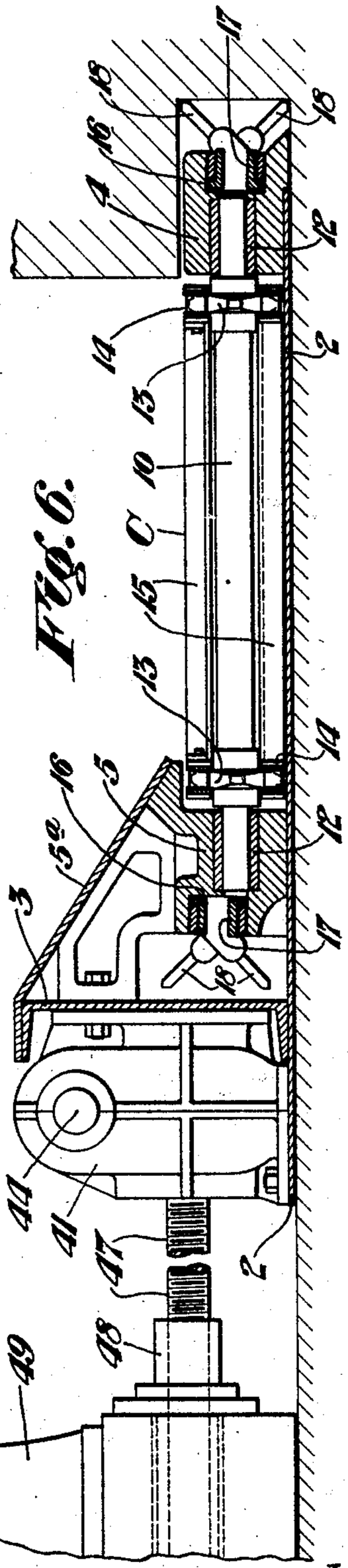
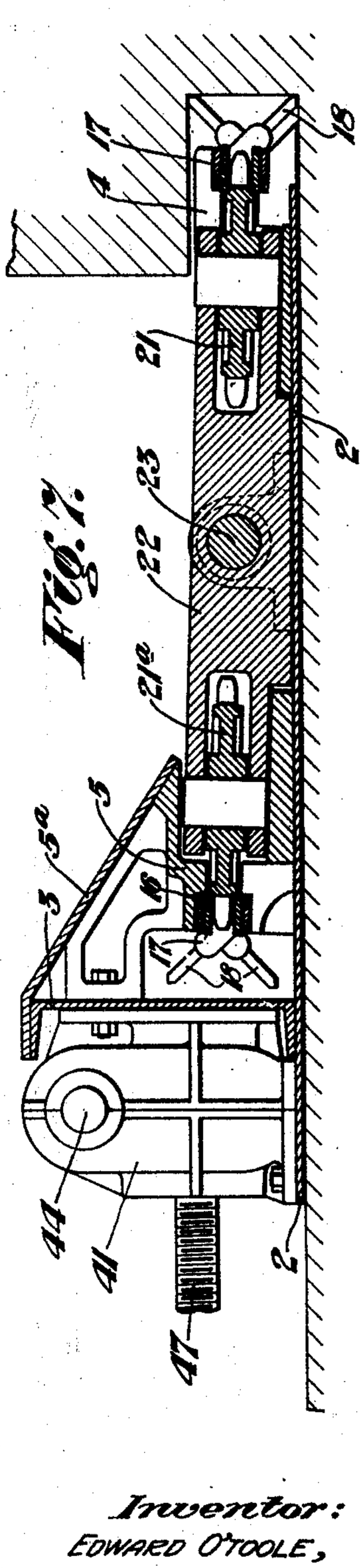


Fig. 7.



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MINING MACHINE

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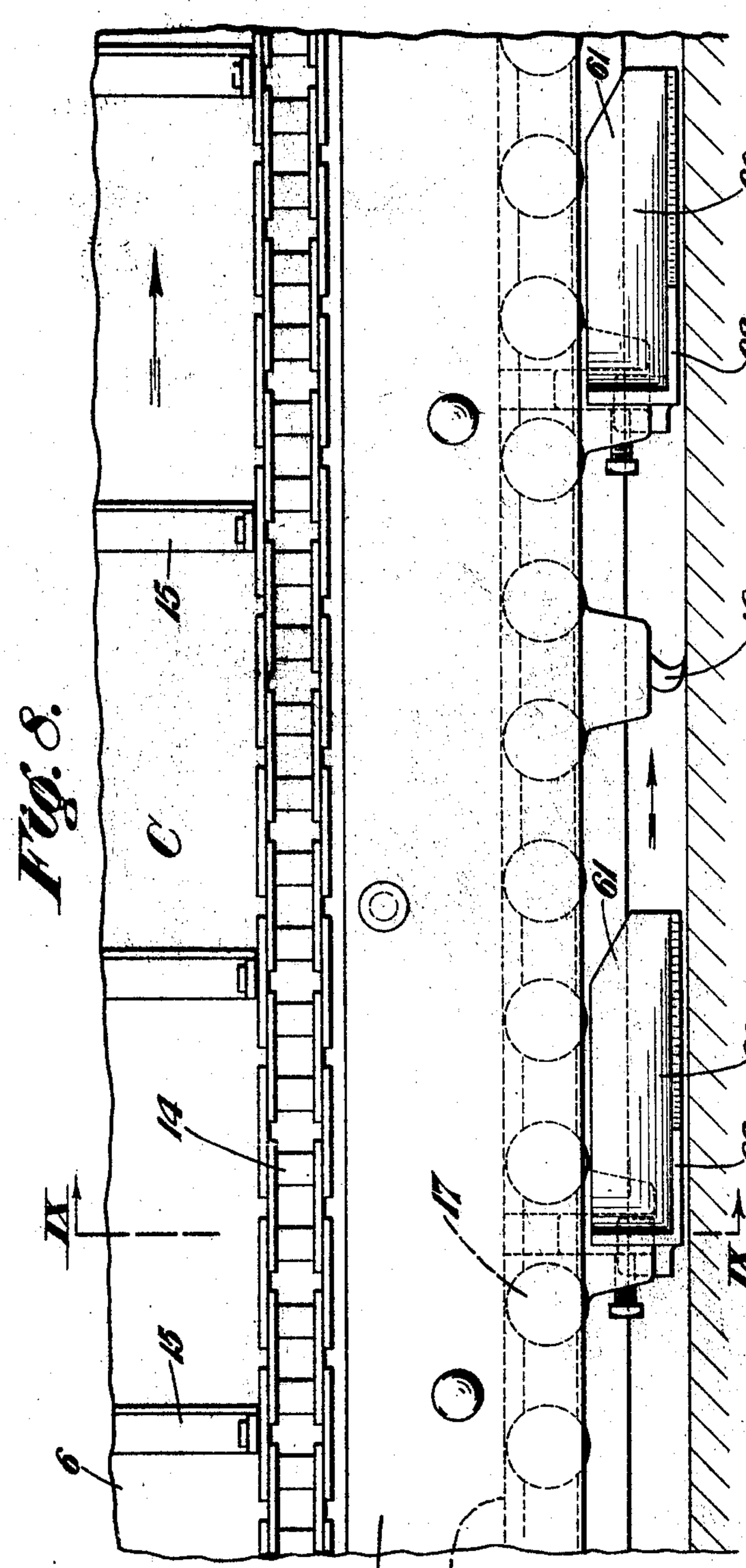

Fig. 8.

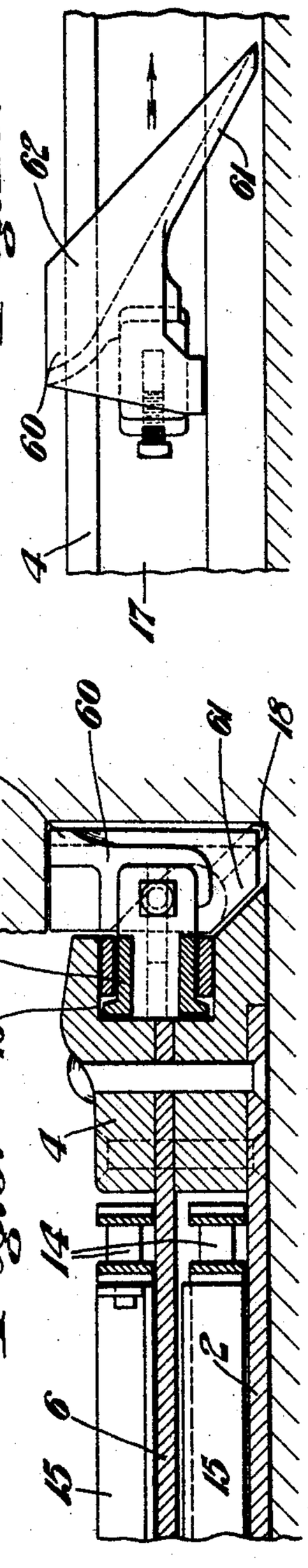

Fig. 10.

Fig. 9.

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Patented May 11, 1926. 1,583,992

UNITED STATES PATENT OFFICE.

EDWARD O'TOOLE, OF GARY, WEST VIRGINIA.

MINING MACHINE.

Application filed December 13, 1924. Serial No. 755,694.

This invention relates to mining machines and more particularly to a combined mining and loading machine of the longwall type, and has for its object the provision of a machine of this type in which the loading conveyer will be closer to the forward edge of the machine than in machines of the prior art, therefore materially facilitating the loading of the mined material.

Mining machines constructed in accordance with this invention are adapted to undercut the material to be mined and to be continuously moved into the kerf formed by undercutting, and the material is adapted to break down onto the machine, due to roof pressure, and be conveyed away from the face and loaded into cars or other conveyers as may be desired. Due to the construction of the present form of machine, the conveyer will receive the material as it is broken down from the face of the mine and will convey it away, therefore preventing piling of the material on the machine, and also eliminating the necessity of moving the machine forward through the broken down material, which will greatly facilitate the forward movement of the machine.

In the drawings:

Figures 1 and 1[a] show a plan of a machine constructed in accordance with this invention, the figures being divided on the line X—X.

Figures 2 and 2[a] show a rear elevation of the machine of Figures 1 and 1[a] divided on the line Y—Y.

Figure 3 is an end elevation of the head end of the machine.

Figure 4 is an enlarged plan of the tail end of the machine.

Figure 5 is a transverse sectional elevation on the line V—V of Figure 1.

Figure 6 is a transverse sectional elevation on the line VI—VI of Figure 4.

Figure 7 is a transverse sectional elevation on the line VII—VII of Figure 4.

Figure 8 is a fragmentary plan of the forward edge of the machine showing the cutting chain equipped with plows for elevating mined material onto the machine.

Figure 9 is a transverse sectional elevation on the line IX—IX of Figure 8.

Figure 10 is a fragmentary front elevation showing one of the plow members.

Referring more particularly to the drawings, the letter A designates the main frame of the machine as a whole, which is composed of a bottom plate 2, a main channel beam 3 extending longitudinally along the rear edge of the plate 2, and a pair of spaced cutter chain guide bars, 4 and 5. The cutter chain guide bar 4 is mounted along the forward edge of the bottom plate 2, while the guide bar 5 is spaced materially to the rear of the bar 4, so that its rear face is spaced only a short distance from the forward face of the beam 3. A suitable cover plate extends from the top of the beam 3 to the top of the guide bar 5, so as to form a closed housing for the return strand of the cutter chain.

The guide bars 4 and 5 are divided longitudinally along a horizontal axis and a conveyer plate 6 is secured therebetween.

The main frame A is provided at its head or loading end with an upwardly inclined extension B composed of side channel beam members 7 and 8, which support the head end of the conveyer plate 6 and the head conveyer shaft 9, which is journaled in suitable bearings in said side beam members.

A conveyer tail shaft 10, is journaled in suitable bearings 12, adjacent the forward end of the guide bars 4 and 5. The shafts 9 and 10 are provided with suitable sprockets 13 and a flight conveyer C, composed of side chains 14 and flights 15, is trained over said sprockets so that the conveying portion or strand thereof, passes along the upper face of the plate 6, and the return portion or strand passes under the plate 6.

The forward face of the guide bar 4 and the rear face of the guide bar 5 is provided with a guide slot 16, in which a cutter chain 17, of any well known construction, is adapted to ride. The cutter chain 17 is provided with the usual cutter bits 18, and is trained over a head sprocket 19 mounted on a vertical shaft 20 and over a pair of tail or idler sprockets 21 and 21[a], mounted in an adjustable take up block 22, which is adapted to be adjusted by the screw 23 to take up slack in the cutter chain.

The base plate 2 is provided with an extension 24 at the head end of the machine which serves as a base for the power and drive unit of the machine. A motor 25 is mounted on the base plate extension 24, and has its armature shaft 26 provided with a pinion 27 which is in mesh with a gear 28 on a transverse shaft 29 journaled in a hous-

ing 30. A worm 31 is mounted on the shaft 29, and meshes with a worm-wheel shaft 20, which shaft carries the cutter chain head sprocket 19.

The shaft 29 also is provided with a sprocket 33 which is connected by a chain 34 to a sprocket 35 on a stub shaft 36 mounted on a suitable bearing bracket 37. The shaft 36 is also provided with a sprocket 38 which is connected by a chain 39 to a power sprocket 40 on the conveyer head shaft 9.

From the above it will be seen that a single motor operates both the cutter chain 17 and the conveyer C, and also that, due to the novel arrangement of parts, the conveyer is located between the cutting and return strands of the cutter chain, so that the material being mined will fall directly on the conveyer as the cutter chain forms the kerf.

A plurality of worm and worm-wheel casings 41 are secured at spaced intervals along the rear face of the channel member 3, and suitable worm-wheels 42 are journaled therein which are meshed with worms 43 on a power shaft 44 extending along the rear of the machine and journaled in suitable bearings at each end of each of the plurality of boxes or casings 41.

The spindles 45 of the worm-wheels 42 are provided with centrally arranged squared openings adapted to receive a filler bar 46 and the squared forward end of a screw threaded advancing or feed bar 47. The bars 47 have screw threaded connections with nuts 48 carried by the bases of a series of hydraulic jacks 49, arranged to the rear of the machine for supporting the roof of the mine. It will be readily seen that the rotation of the worm-wheels 42 by the shaft 44 and worms 43 will rotate the bars 47 and thus cause said bars to rotate in the nuts 48 and be fed forward. The force of the forward feeding bars 47 will be delivered through the filler bars 46 to the channel 3 of the frame A of the machine and thus force the machine forwardly into the material being mined.

The power shaft 44 is provided at its head end with a beveled gear 50 which meshes with a beveled gear 51 on a stub shaft 52. The shaft 52 is also provided with a sprocket 53, which is connected by a chain 54 with a sprocket 55 on the shaft 29, so that the single motor 25, also drives the shaft 44 to advance the machine.

While I have shown and described the use of the bars 47 and nuts 48 for advancing the machine, it will be understood that any other form of advancing mechanism may be used.

The main novel feature of this invention lies in mounting of the conveyer between the cutting and return strands of the cutter chain. This conveyer arrangement permits the conveyer to be adjacent the forward edge of the machine, and therefore, it will be in the most advantageous position to receive the mined material as it is broken down.

The machine is particularly designed for mining coal and it is well known that coal will remain in position while a kerf is cut thereunder for a material distance. It will therefore be apparent that since the machine of this invention will be advanced as the kerf is formed, that the conveyer, or at least a portion thereof, will be moved into the kerf before the coal breaks down, and therefore will be in position to directly receive the coal as it falls.

In Figures 8, 9 and 10, I have shown the cutter chain provided with a series of plows 60, which are mounted in some of the cutter bit sockets, and serve to elevate any mined material from in front of the machine up over the front edge thereof, onto the conveyer.

The plows 60 are provided with an inclined bottom wall 61 which is inclined downwardly and forwardly in the direction of travel of the cutter chain, and a retaining flange 62, which prevents the material being lifted by the plows, from falling from the plows.

The plows 60 may be used to clean out the kerf as it is formed, that is, to remove the bug dust formed by the cutter bits and any other loose material, or they may be used to load material from a pile such as is caused by falls in a mine.

While I have described and claimed a specific embodiment of my invention, it will be understood that I do not wish to be limited thereto, since various modifications in design and construction of the various parts may be made without departing from the scope of my invention as defined in the appended claims.

I claim:

1. In a mining machine of the longwall type having a main frame including a bottom plate, a pair of spaced cutter chain guide bars, one of said guide bars being mounted along the forward edge of said bottom plate and the other of said bars being spaced materially to the rear of said first named bar, a cutter chain trained over sprockets adjacent each end of said frame and around the outside faces of said guide bars, said guide bars being divided longitudinally along a horizontal plane, a conveyer plate extending between said bars and having its longitudinal edges secured between the parts of said bars, and an endless conveyer trained over suitable sprockets between said guide bars and adapted to travel longitudinally of said frame, said conveyer having a width substantially equal to the space between said guide bars.

2. A mining machine of the longwall type, comprising a main frame composed of a bottom plate, a main beam along the rear edge

of said plate, and a pair of spaced cutter chain guide bars, one of said guide bars being mounted along the forward edge of said bottom plate and the other of said bars being spaced materially to the rear of said first named bar with its rear or outside face spaced a short distance from the forward face of said main beam, a cutter chain trained over sprockets adjacent each end of said frame and adapted to travel in suitable guide grooves in the outside faces of said guide bars, and an endless conveyer mounted between said guide bars and having a width substantially equal to the space between said guide bars.

3. A mining machine of the longwall type comprising an elongated main frame, a cutting chain extending longitudinally of said frame and trained over sprockets adjacent each end of said frame, said sprockets being arranged so as to separate the cutting and return strands of said cutting chain a material distance, an endless conveyer mounted between the cutting and return strands of said cutting chain, and means carried by said cutting chain adapted to elevate mined material above the forward edge of said frame so that said material will be moved onto said conveyer as said machine is advanced.

4. A mining machine of the longwall type comprising an elongated main frame, a cutting chain extending longitudinally of said frame and trained over sprockets adjacent each end of said frame, said sprockets being arranged so as to separate the cutting and return strands of said cutting chain a material distance, an endless conveyer mounted between the cutting and return strands of said cutting chain, and plow members secured in some of the tool sockets of said cutting chain, adapted to elevate mined material above the forward edge of said frame so that said material will be moved onto said conveyer as said machine is advanced.

5. A mining machine of the longwall type comprising an elongated main frame, a cutting chain extending longitudinally of said frame and trained over sprockets adjacent each end of said frame, an endless conveyer mounted on said frame and extending longitudinally thereof, to the rear of the cutting strand of said cutting chain, and a plurality of plow members secured in some of the tool sockets of said cutting chain adapted to elevate mined material above the forward edge of said frame, so that said material will be moved onto said conveyer as said machine is advanced.

6. A mining machine of the longwall type comprising an elongated frame adapted to extend parallel with a longwall face being mined, a pair of spaced cutter chain guide bars forming part of said frame and extending along substantially the entire length thereof, a cutter chain trained around said guide bars and adapted to simultaneously undercut the entire longwall face, and an endless conveyer mounted between said guide bars and extending from end to end of said frame, said conveyer having a width substantially equal to the space between said guide bars, whereby material undercut by said cutter chain will fall directly onto said conveyer.

7. A mining machine of the longwall type comprising an elongated frame adapted to extend parallel with a longwall face being mined, said frame including a bottom plate, and a pair of spaced cutter chain guide bars extending along substantially the entire length of said frame, one of said guide bars being mounted along the forward longitudinal edge of said bottom plate and the other of said bars being spaced materially to the rear of said first named bar, a cutter chain trained over sprockets adjacent each end of said frame and around the outside faces of said guide bars and adapted to simultaneously undercut the entire longwall face, and an endless conveyer mounted between said guide bars and extending from end to end of said frame, said conveyer having a width substantially equal to the space between said guide bars, whereby material undercut by said cutter chain will fall directly onto said conveyer.

8. A mining machine of the longwall type comprising an elongated frame adapted to extend parallel with a longwall face being mined, said frame including a bottom plate, and a pair of spaced cutter chain guide bars extending along substantially the entire length of said frame, one of said guide bars being mounted along the forward longitudinal edge of said bottom plate and the other of said bars being spaced materially to the rear of said first named bar, a cutter chain trained over sprockets adjacent each end of said frame and around the outside faces of said guide bars and adapted to simultaneously undercut the entire longwall face, a conveyer plate extending between and secured to said guide bars, and an endless conveyer trained over suitable sprockets between said guide bars and extending from end to end of said frame, said conveyer having a width substantially equal to the space between said guide bars, whereby material undercut by said cutter chain will fall directly onto said conveyer.

In testimony whereof I have hereunto set my hand.

EDWARD O'TOOLE.