

Oct. 7, 1930.

E. F. MULLER

1,777,621

COAL CUTTING MACHINE

Filed Aug. 16, 1927

3 Sheets-Sheet 1

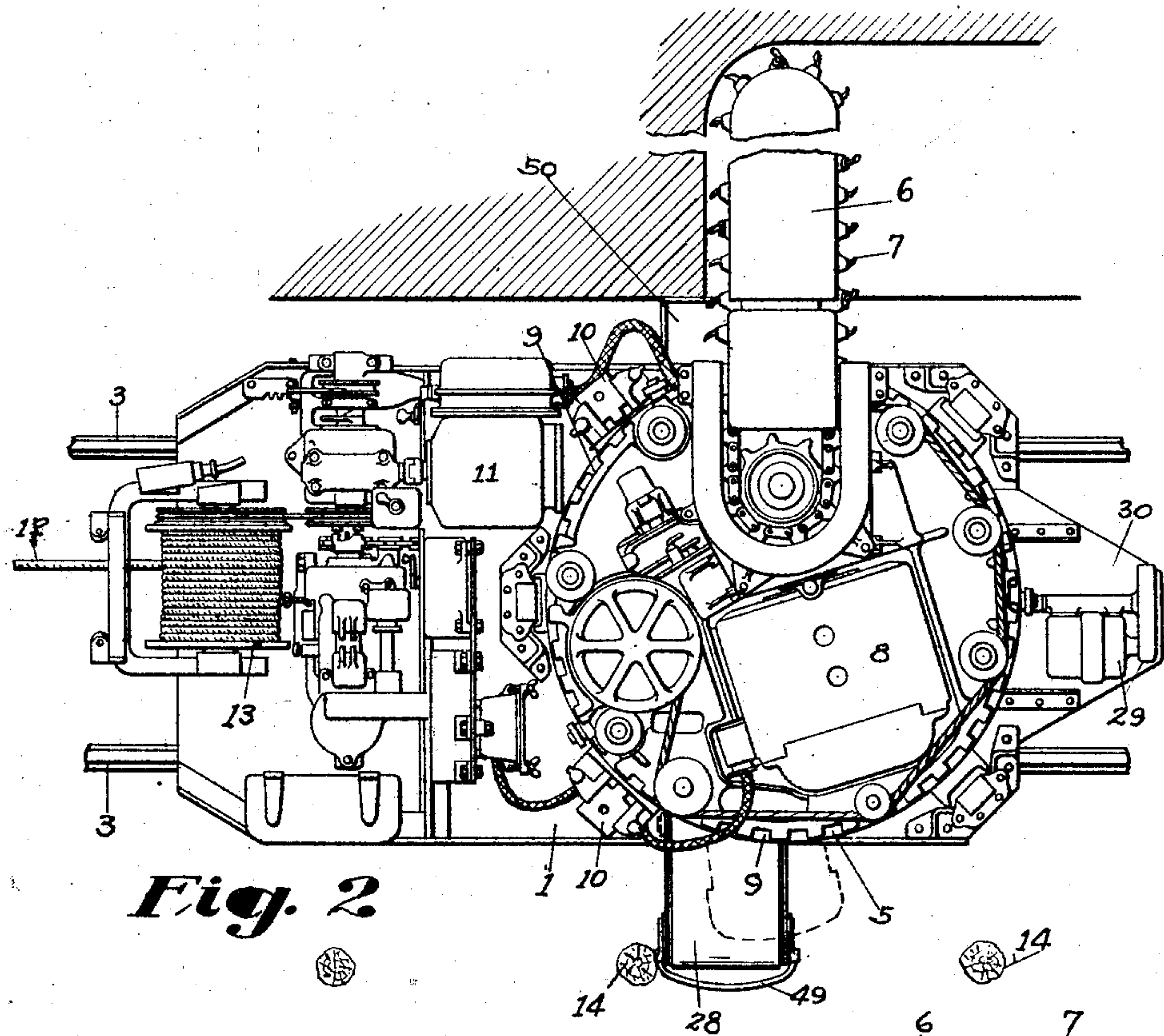


Fig. 2

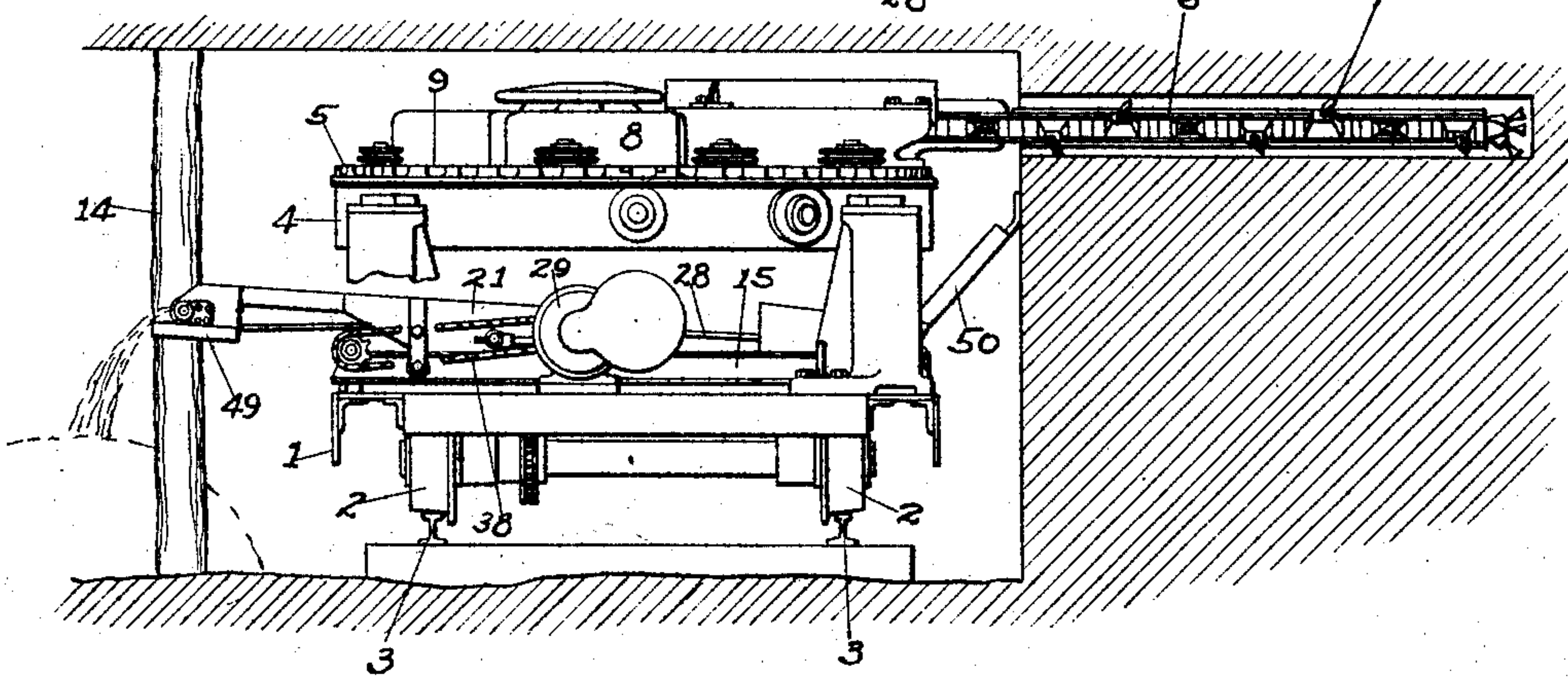


Fig. 1

Witnesses:

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3 Sheets-Sheet 2

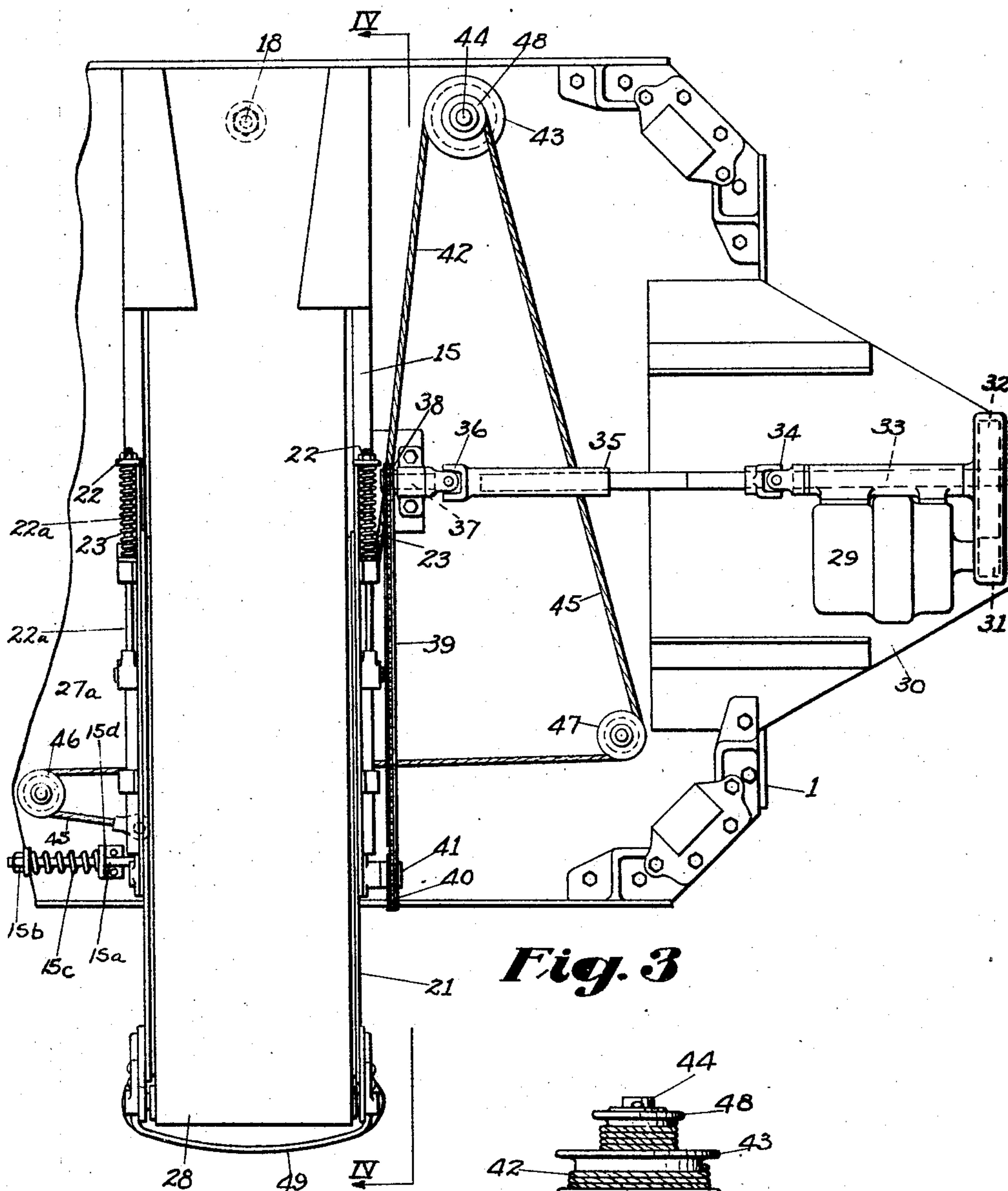


Fig. 3

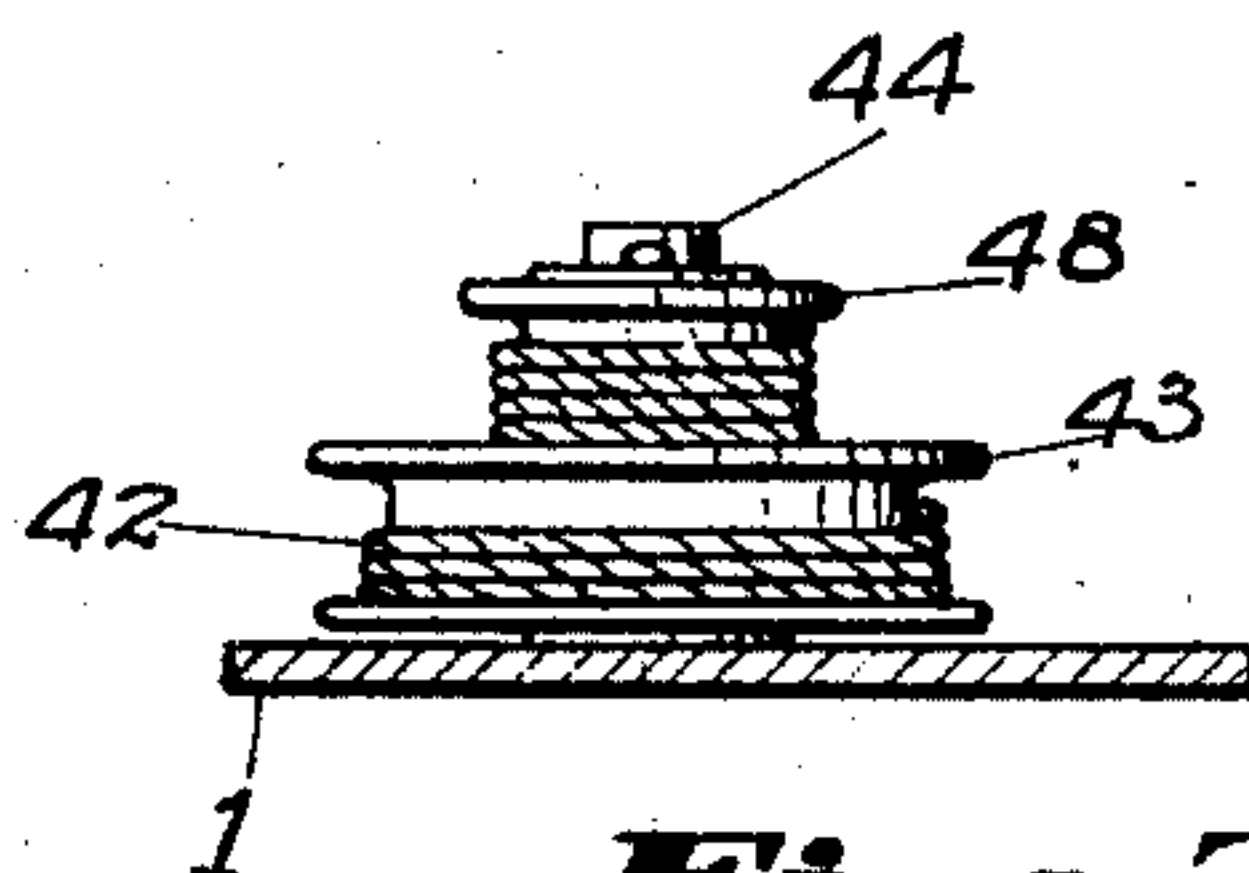


Fig. 7

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3 Sheets-Sheet 3

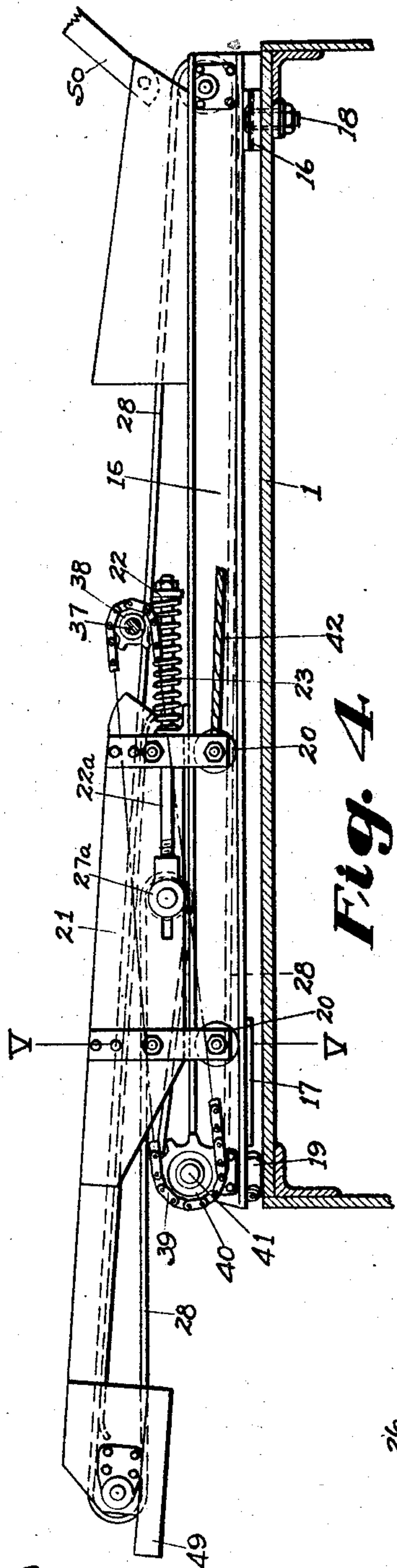


Fig. 4

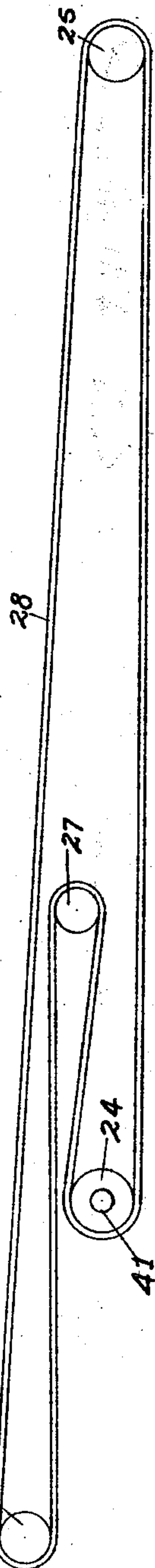


Fig. 5

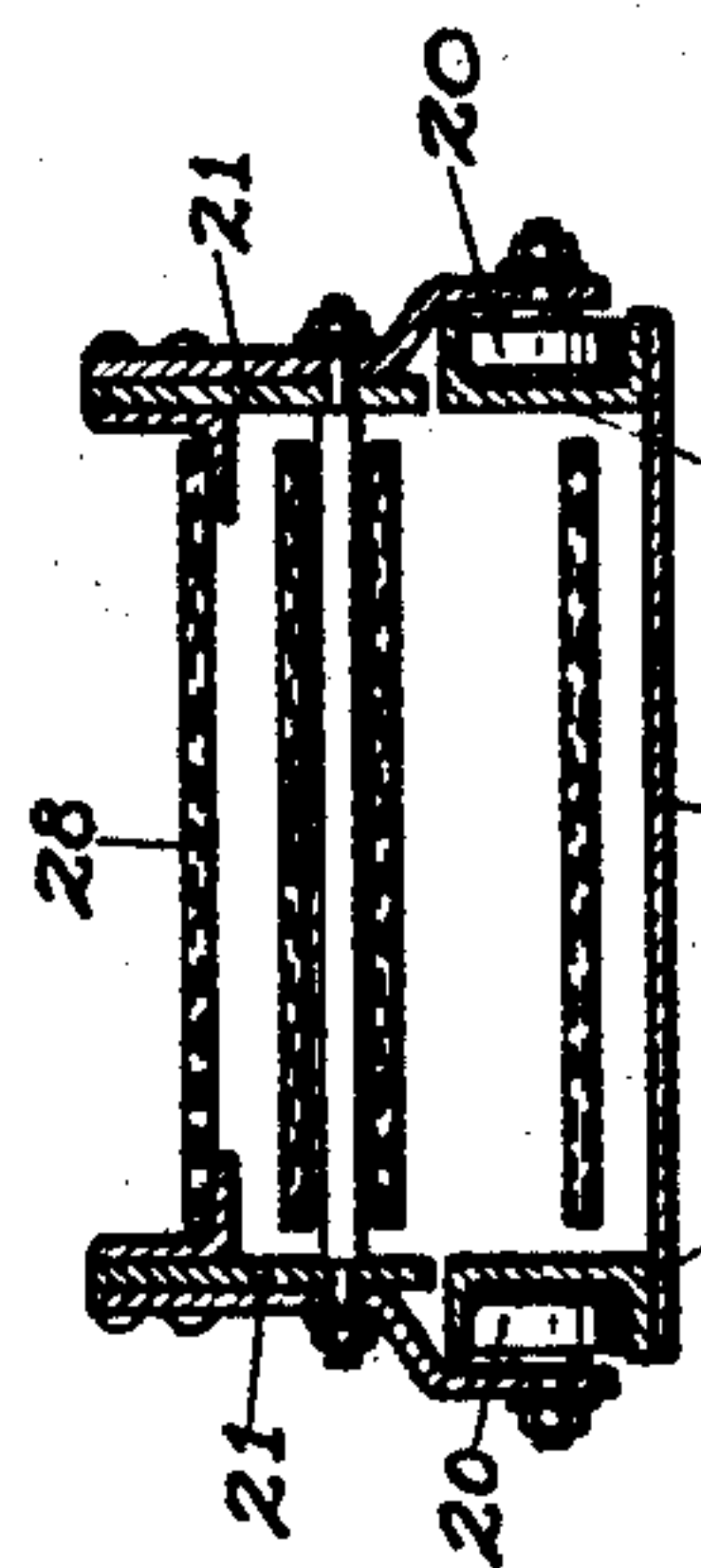


Fig. 6

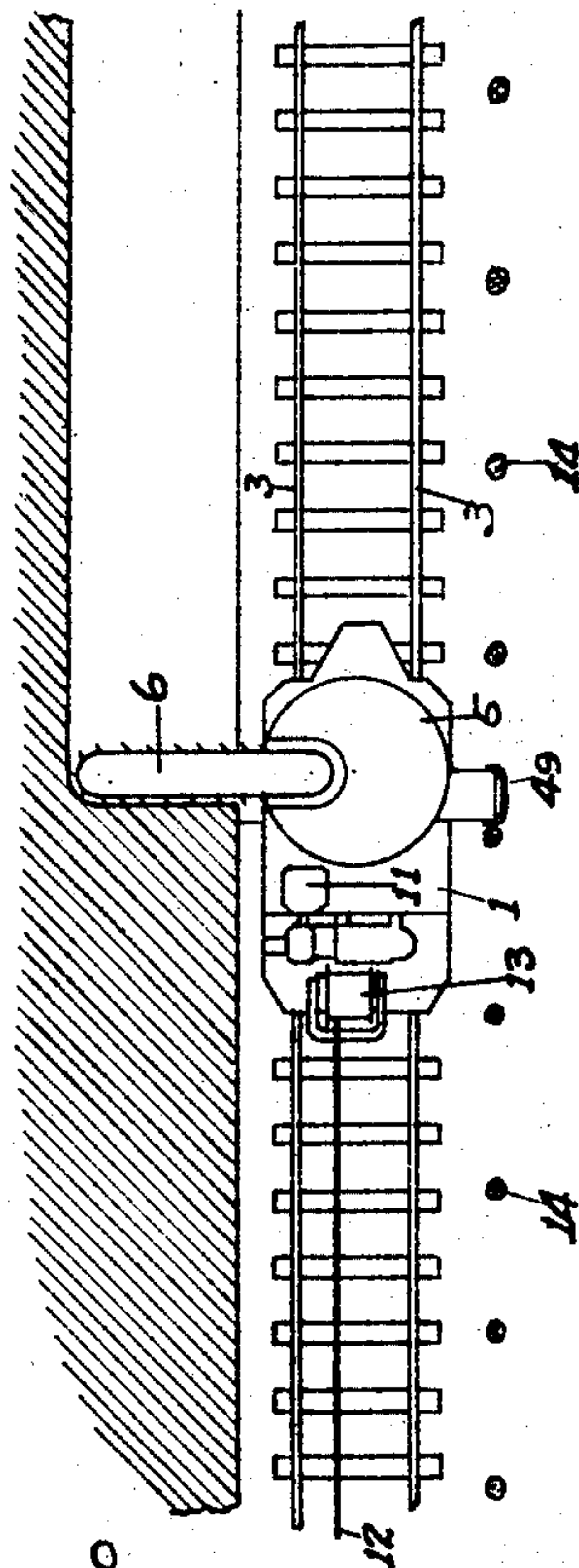


Fig. 7

Witnesses:

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UNITED STATES PATENT OFFICE

ERNST FEODOR MULLER, OF COLUMBUS, OHIO, ASSIGNOR TO THE JEFFREY MANUFACTURING COMPANY, OF COLUMBUS, OHIO, A CORPORATION OF OHIO

COAL-CUTTING MACHINE

Application filed August 16, 1927. Serial No. 213,342.

The present invention relates to certain new and useful improvements in coal cutting machine of the type adapted to travel along a coal face to cut a kerf therein and to discharge the material removed therefrom beyond the path of feeding movement of the machine.

The especial object is to provide, in a machine of the class described, automatically acting means to move the slack conveyor relative to the mining machine frame to thereby avoid roof supporting props positioned adjacent the path of feeding movement of the machine.

The means whereby I attain this object are fully set forth in the following specification and illustrated in the accompanying drawing wherein

Fig. 1 is an end elevation of a coal cutting machine of well known design equipped with the devices of my invention.

Fig. 2 is a plan view of the machine illustrated in Fig. 1.

Fig. 3 is a fragmentary plan view, on an enlarged scale, of the lower portion of the machine frame, the upper part being removed to reveal the slack conveying mechanism.

Fig. 4 is a sectional view taken along the line IV—IV of Fig. 3.

Fig. 5 is a sectional view taken along the line V—V of Fig. 4.

Fig. 6 is a diagrammatic view of the conveyor element.

Fig. 7 is a detail of the conveyor moving mechanism.

Fig. 8 is a diagram illustrating the method of operation of the machine.

Like numerals refer to similar parts in the several figures.

In the drawing I have shown, for purposes of illustration, a mining machine of the well known Arcwall type, comprising a truck frame 1 mounted upon track wheels 2 which rest upon and travel along the rails 3 of a mine track. Positioned above the truck frame 1 and vertically adjustable relative thereto, is a ring 4 upon which is rotatably supported a turntable 5. The turntable 5 constitutes the main frame of the cutting mechanism of the machine. Rigidly attached to and projecting

horizontally from the turntable 5 is a cutter arm 6 about the edges of which travels a cutter chain 7, in the usual and well known manner, to engage the coal to cut a kerf therein. A motor 8 mounted upon the turntable 5 is connected through suitable gearing to actuate the cutter chain. Feeding mechanism, also actuated by the motor 8, is arranged to cause rotation of the cutter arm 6 about the axis of the turntable 5. Formed in the edges of the turntable 5 are notches 9 adapted to be engaged by bolts 10 secured to the supporting ring 4 whereby the cutter arm 6 may be locked in any preferred angular relation to the longitudinal lines of the machine. Mounted upon the truck frame 1 is a motor 11 which is connected by suitable gearing with the track wheels 2 to propel the machine along the track rails 3 at either of two speeds, one a relatively high speed suitable for moving the machine from one working place to another, and the other a relatively low speed suitable to feed the cutting mechanism during the cutting operation. Electric current for the actuation of the motors 8 and 11 is received from a suitable source of electric current supply through a flexible conductor cable 12 which is windable upon an automatically acting cable reel 13. All of the above described devices are well understood in the mining machine art and further description or illustration is not thought to be required at this time.

In the system of coal mining for which my present invention is especially adapted the track rails 3 are laid parallel to and adjacent the coal face preparatory to beginning the mining operation. A series of roof supporting props 14 is positioned adjacent the mine track at the side remote from the coal face, to protect the mining machine and the men employed in its operation. In order to effect maximum protection the mine props 14 are placed as close to the mine track as is possible without obstructing passage of the mining machine. The mining machine is then brought into position upon the track 3, and the cutter arm 6 turned to a suitable angle to engage the coal face to form a kerf therein as the machine advances at its lower speed

of tractive propulsion. When operating in this manner the coal cuttings produced by the cutter chain 7 fall from the mouth of the kerf and, if not otherwise disposed of, accumulate upon the mine floor between the coal face and the track 3 in sufficient quantities to interfere with movement of the mining machine. I have therefore provided conveying devices upon the mining machine frame adapted to receive the cuttings as they fall from the cutter chain, transport them across the machine frame, and discharge them at a suitable distance beyond the mine track, and automatically acting means to move said conveying mechanism relative to the machine frame to avoid the successive mine props 14, and to automatically restore the conveying mechanism to its preferred operating position after passing each prop.

Mounted upon the truck frame 1 and extending transversely thereof, is a main conveyor frame comprising the side rails 15 joined together near their end by the connecting plates 16 and 17. This conveyor frame is pivotally attached to the truck frame 1, at the side of the machine adjacent the coal face, by a pivot bolt 18. Rollers 19 attached to the side rails 15 supply anti-friction supports for the conveyor at the opposite side of the truck to facilitate movement of the conveyor frame about the pivot bolt 18. A rod 15^a attached to the side rails 15 on the forward side of the conveyor frame relative to the feeding movement of the cutting apparatus, is fitted with a nut 15^b which engages a compression spring 15^c. The spring 15^c abuts against an angle 15^d fixed to the truck frame, and tends to move the conveyor frame forwardly about its pivot bolt 18, and to maintain it in its foremost position of angular adjustment. The side rails 15 are preferably formed of channel bars upon the outwardly turned flanges of which bear the traction rollers 20 which support an extension frame 21 for longitudinal movement relative to the main conveyor frame. Suitably supported in journal bearings attached to the main frame are the pulleys 24 and 25, and similar pulleys 26 and 27 are similarly mounted in the extension frame 21. Laced around the pulleys 24, 25, 26 and 27 is an endless conveyor belt 28 which is adapted to receive the cuttings as they fall from the cutter chain 7, transport them across the machine and discharge them beyond the side of the machine remote from the coal face and at a suitable distance beyond the track. A spring 23 abutting against the end of the extension frame 21 engages the nut 22 fixed to the rod 22^a which is attached to the journal bearing 27^a and tends to move the roller 27 inwardly to maintain suitable tension in the conveyor belt 28. Power for the actuation of the conveyor belt 28 is derived from a motor 29 mounted upon the extension plate

30 of the truck frame 1. The motor 29 is preferably an electric motor and received its actuating current from the flexible cable 12 through suitable conductors, and is controlled by suitable controlling devices, but as such devices are well understood in the mining machine art, and as they form no part in the present invention, their illustration and description is not thought to be required at this time. The motor 29 is provided with the customary armature pinion 31 which engages a spur gear 32 fixed to a countershaft 33 journaled in bearings formed upon the motor frame. To the countershaft 33 is fixed a universal joint 34 which drives a telescoping shaft 35 the opposite end of which is connected to a second universal joint 36 with a short shaft 37 mounted in a journal bearing attached to the frame of the conveyor. To the shaft 37 is fixed a sprocket wheel 38 connected by an endless chain 39 with a sprocket wheel 40 fixed to the shaft 41 of the driving pulley 24. By the arrangement of parts above described power may be transmitted from the motor 29 to actuate the conveyor belt 28 in all positions of its pivotal movement about the pivot bolt 18.

Attached to the extension conveyor frame 21 near its inner end and at its rearward side relative to the direction of feeding movement of the machine, is a rope 42 extending substantially parallel to the longitudinal line of the conveyor and attached to and windable upon a winding drum 43. The drum 43 is journaled for free rotation upon the stationary stud shaft 44 fixed to the truck frame 1. A second rope 45 attached to the side bar 15 of the main conveyor frame near its outer end and at the forward side of the conveyor, passes around the guide sheaves 46 and 47 and is attached to and windable upon a winding drum 48 which is rigidly connected with the drum 43 and concentric therewith. The winding drums 43 and 48 are of different diameters the proportion and arrangement of parts being such that a relatively small rearward movement of the conveyor frame about the pivot bolt 18 will draw out the rope 45 from its winding drum 48 thereby causing rotation of the drum 43 to wind the rope 42 and produce a relatively great inward movement of the extension frame 21 longitudinally of the side rails 15.

As the machine advances along the mine tracks 3 the extension frame 21 will be brought successively into contact with the roof supporting props 14 causing the conveyor frame to swing rearwardly about the pivot bolt 18.

A guard member 49 attached to the extension frame 21 serves to protect the conveyor belt 28 from contact with the roof prop 14. An apron 50 adapted to contact with the mine face and to slide therealong

as the machine advances serves to conduct the cuttings onto the conveyor belt. The apron 50 is flexibly connected to the conveyor frame so that it may adjust itself to the irregularities in the coal face.

By rearward movement of the conveyor frame relative to the truck frame the rope 45 is unwound from the drum 48 causing rotation of the drum 43 to wind the rope 42 and draw the extension frame 21 inwardly a sufficient distance to pass the roof prop 14. When the prop 14 has been passed, and the extension frame 21 is again free to move outwardly, spring 15^c together with the tendency of the extension frame to resume its projected position will restore the conveyor frame to its normal transverse position.

By the devices above described I have provided, in a mining machine of the class described, a slack conveyor adapted to receive the cuttings as they are discharged from the cutting mechanism, convey them across the machine and discharge them at a considerable distance beyond the mine track along which the machine travels, combined with automatically acting means to move said conveyor relative to the mining machine to permit it to pass obstructions such as roof props placed adjacent the mine track.

It is to be understood, however, that I do not limit myself to the precise construction here illustrated, as the devices may be subject to wide variation without departure from the spirit of my invention.

What I claim is:

1. In a coal mining machine, the combination with a frame adapted to travel along a predetermined path between a coal face and a roof supporting prop, of a kerf cutter carried by said frame adapted to engage said coal face to form a kerf therein, a conveyor carried by said frame in position to receive the cuttings produced by said kerf cutter said conveyor comprising an elongated frame and an extension frame longitudinally movable of said elongated frame and adapted when in extended position to contact with said roof supporting prop, and automatically acting means to move said extension frame longitudinally of said elongated frame to permit it to pass said prop as and for the purpose set forth.

2. In a coal mining machine, the combination with a frame adapted to travel along a predetermined path between a coal face and a roof supporting prop, of a kerf cutter carried by said frame adapted to engage said coal face to form a kerf therein, a conveyor carried by said frame in position to receive the cuttings produced by said kerf cutter said conveyor comprising an elongated frame and an extension frame longitudinally movable of said elongated frame and adapted when in extended position to contact with said roof supporting prop, and automatically acting

means to move said extension frame longitudinally of said elongated frame to permit it to pass said prop and to restore it to extended position after said prop is passed as and for the purpose set forth.

3. In an apparatus of the class described, the combination with a frame adapted to travel along a path adjacent an obstruction, of a conveyor extending transversely of said frame having an extension, and means acting automatically to withdraw said extension upon its contact with said obstruction to permit it to pass as and for the purpose set forth.

4. In an apparatus of the class described, the combination with a frame adapted to travel along a path adjacent an obstruction, of a conveyor extending transversely of said frame having an extension and means acting automatically to withdraw said extension upon its contact with said obstruction to permit it to pass and to restore it to normal operation position after said obstruction is passed as and for the purpose set forth.

5. In an apparatus of the class described, the combination with a frame adapted to travel along a path adjacent an obstruction, of a conveyor comprising an elongated frame extending transversely of the supporting frame and an extension frame movable longitudinally of said elongated frame, means tending to move the extension frame to a position subject to contact with said obstruction, and means acting automatically to withdraw said extension frame to permit it to pass said obstruction as and for the purpose set forth.

6. In a machine of the class described, the combination with a main frame adapted to longitudinal movement along a predetermined path, of a conveyor frame extending transversely of said main frame and laterally movable longitudinally thereof, an extension frame movable longitudinally of the conveyor frame, means tending to move the extension frame outwardly, and means actuated by rearward movement of the conveyor frame to move the extension frame inwardly and actuated by outward movement of the extension frame to move the conveyor frame forwardly as and for the purpose set forth.

7. In a machine of the class described, the combination with a main frame adapted to longitudinal movement along a predetermined path, of a conveyor frame extending transversely of the main frame and laterally movable longitudinally thereof, an extension frame movable longitudinally of the conveyor frame, resilient means tending to move the extension frame outwardly, and means actuated by rearward movement of the conveyor frame to move the extension frame inwardly and actuated by outward movement of the extension frame to move the

conveyor frame forwardly as and for the purpose set forth.

8. In a machine of the class described, the combination with a main frame adapted to longitudinal movement along a predetermined path, of a conveyor frame extending transversely of the main frame and pivotally attached thereto, an extension frame movable longitudinally of the conveyor frame, means tending to move the extension frame outwardly upon the conveyor frame, and means actuated by rearward pivotal movement of the conveyor frame to move the extension frame inwardly and actuated by outward movement of the extension frame to move the conveyor frame pivotally forward as and for the purpose set forth.

9. The combination with a mining machine movable along a coal face and having a cutter adapted to kerf the face during such movement, of a conveyor adapted to receive the slack during the cutting operation, said conveyor extending transversely of the machine with its delivery end projecting beyond the side thereof remote from the mine face, said conveyor being axially movable to clear its delivery end of obstructions in the path thereof, and automatically acting means to return the conveyor to normal position.

10. The combination with a mining machine movable along a coal face and having a cutter adapted to kerf the face during such movement, of a conveyor adapted to receive the slack during the cutting operation, said conveyor extending transversely of the machine with its delivery end projecting beyond the side thereof remote from the mine face, means to axially retract the delivery end of said conveyor to clear obstructions in its path, and automatically acting means to return the conveyor to normal position.

11. The combination with a mining machine movable along a coal face and having a cutter adapted to kerf the face during such movement, of a conveyor adapted to receive the slack during the cutting operation, said conveyor extending transversely of the machine with its delivery end projecting beyond the side thereof remote from the mine face, and means to contract the conveyor to clear its delivery end of obstructions in the path thereof.

12. The combination with a mining machine movable along a coal face and having a cutter adapted to kerf the face during such movement, of a conveyor adapted to receive the slack during the cutting operation, said conveyor extending transversely of the machine with its delivery end projecting beyond the side thereof remote from the mine face, and means operated by contact of the delivery end of the conveyor with obstructions in the path thereof to move said end inwardly of the machine.

13. The combination with a mining ma-

chine movable along a coal face and having a cutter adapted to kerf the face during such movement, of a conveyor adapted to receive the slack during the cutting operation, said conveyor extending transversely of the machine with its delivery end projecting beyond the side thereof remote from the mine face, a pivotal connection between the machine and conveyor about which the latter is adapted to swing upon contact of its delivery end with obstructions in the path thereof, and means operated in dependence upon such swinging movement to axially retract said delivery end.

14. The combination with a mining machine movable along a coal face and having a cutter adapted to kerf the face during such movement, of a conveyor adapted to receive the slack during the cutting operation, said conveyor extending transversely of the machine with its delivery end projecting beyond the side thereof remote from the mine face, a pivotal connection between the machine and conveyor about which the latter is adapted to swing upon contact of its delivery end with an obstruction in the path thereof, means to multiply such swinging movement, and means to axially retract said conveyor in dependence upon the multiplied movement.

15. The combination with a mining machine movable along a coal face and having a cutter adapted to kerf the face during such movement, of a conveyor adapted to receive the slack during the cutting operation, said conveyor extending transversely of the machine with its delivery end projecting beyond the side thereof remote from the mine face, a pivotal connection between the machine and conveyor about which the latter is adapted to swing upon contact of its delivery end with obstructions in the path thereof, means operated in dependence upon such swinging movement to axially retract said delivery end, and means to restore the conveyor to its normal transverse position.

16. The combination with a conveyor having a main pivotally mounted frame and an extension frame axially adjustable relative to the main frame, of connecting means between said frames whereby a swinging movement of the main frame causes a retractive movement of the extension frame.

17. The combination with a conveyor having a main pivotally mounted frame and an extension frame axially adjustable relative to the main frame, of connecting means between said frames whereby a swinging movement of the main frame causes a retractive movement of the extension frame, and multiplying means in said connecting means, for the purpose described.

In testimony whereof I have hereunto set my hand.

ERNST FEODOR MULLER.

CERTIFICATE OF CORRECTION.

Patent No. 1,777,621.

Granted October 7, 1930, to

ERNST FEODOR MULLER.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 4, line 50, claim 11, for the word "contract" read telescope; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 9th day of December, A. D. 1930.

(Seal)

**M. J. Moore,
Acting Commissioner of Patents.**