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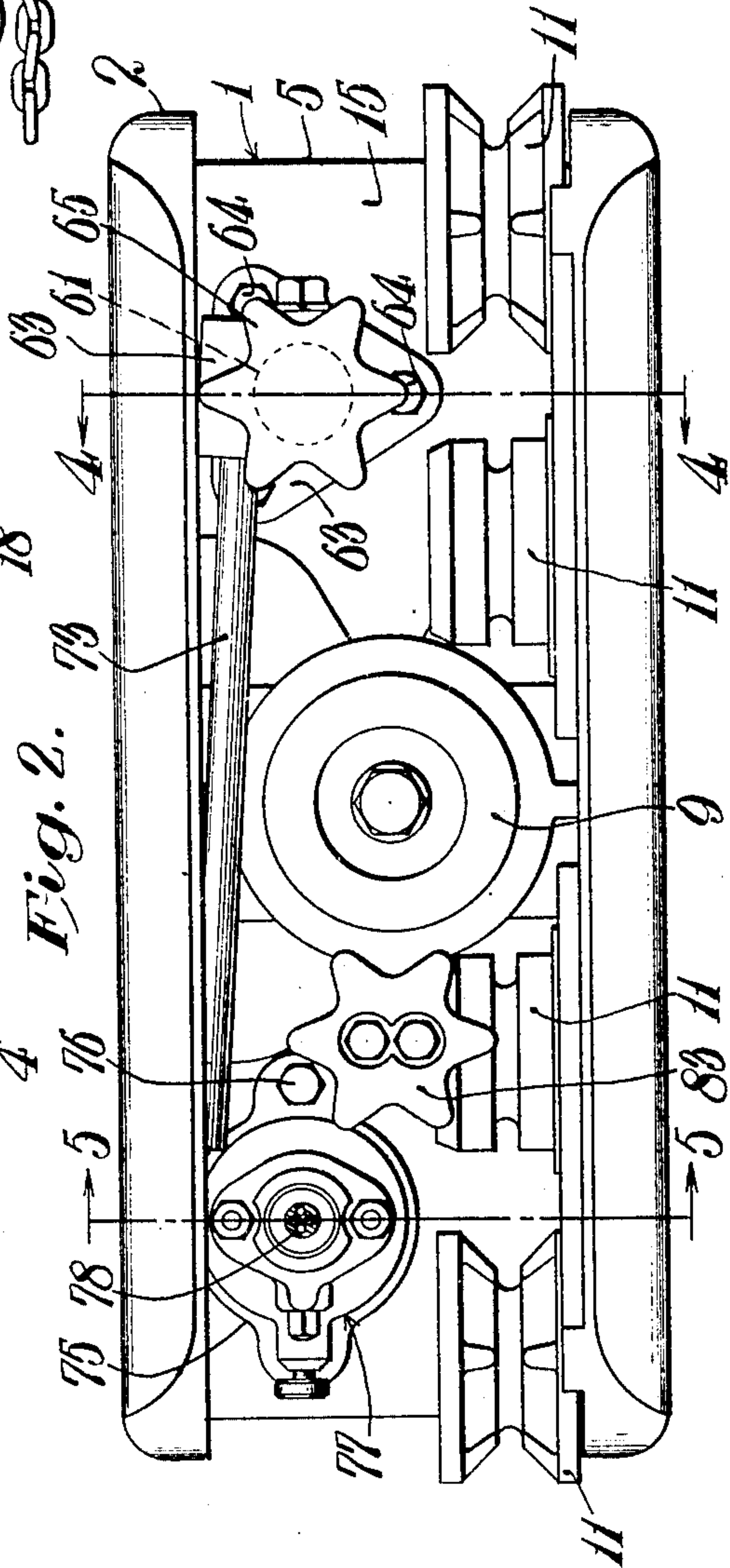
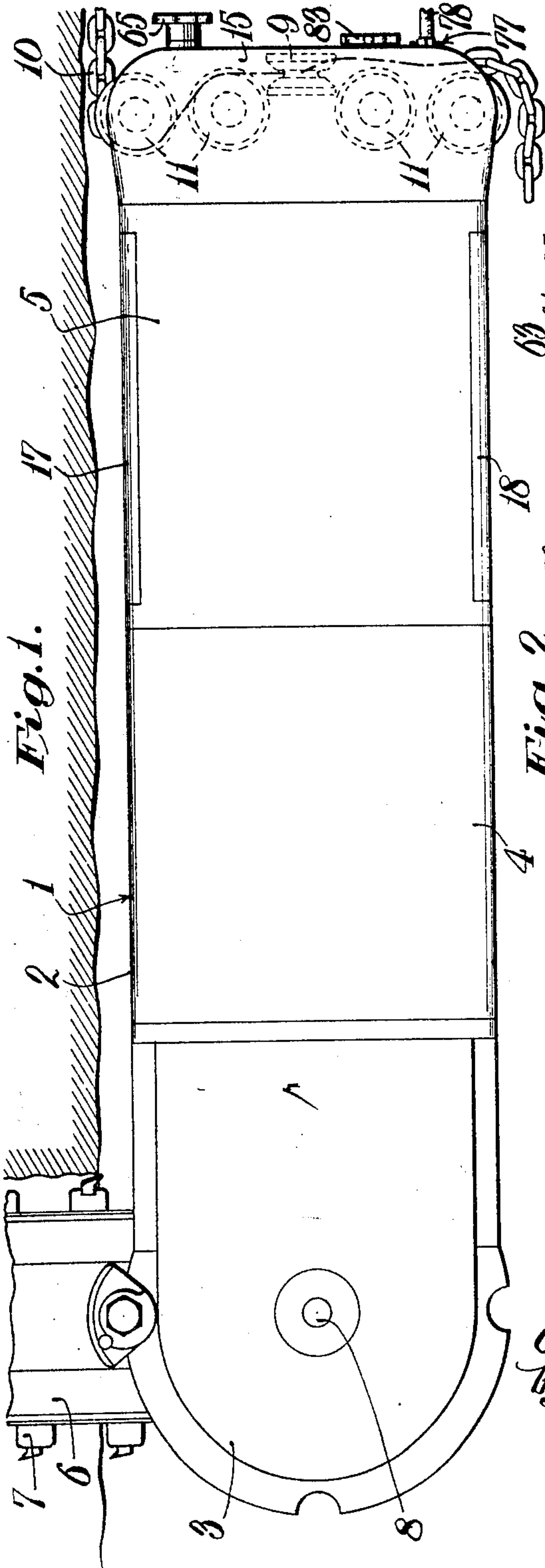
1,683,225

C. W. WYMAN

CONTROLLING APPARATUS

Filed Oct. 31, 1924

4 Sheets-Sheet 1



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Sept. 4, 1928.

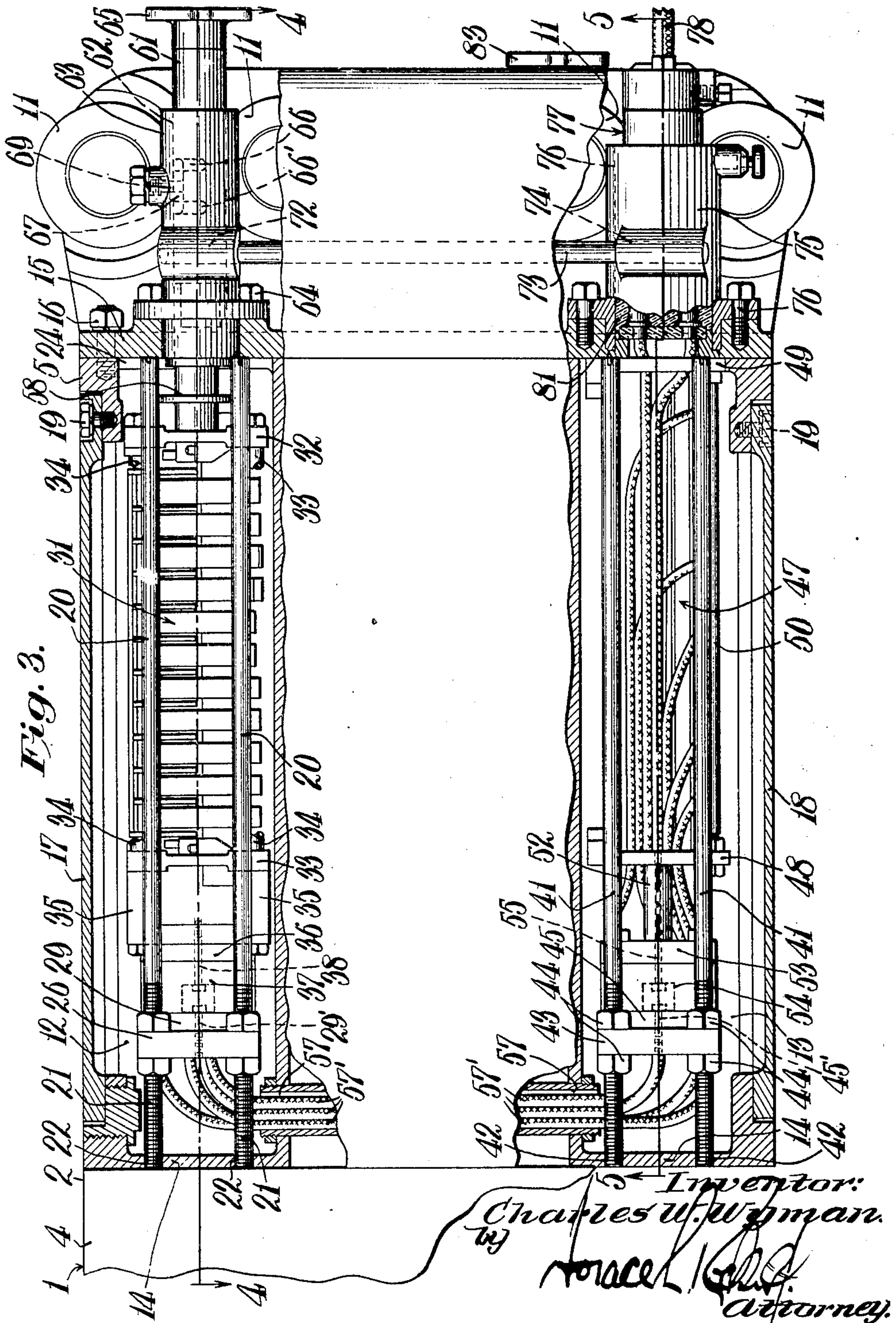
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CONTROLLING APPARATUS

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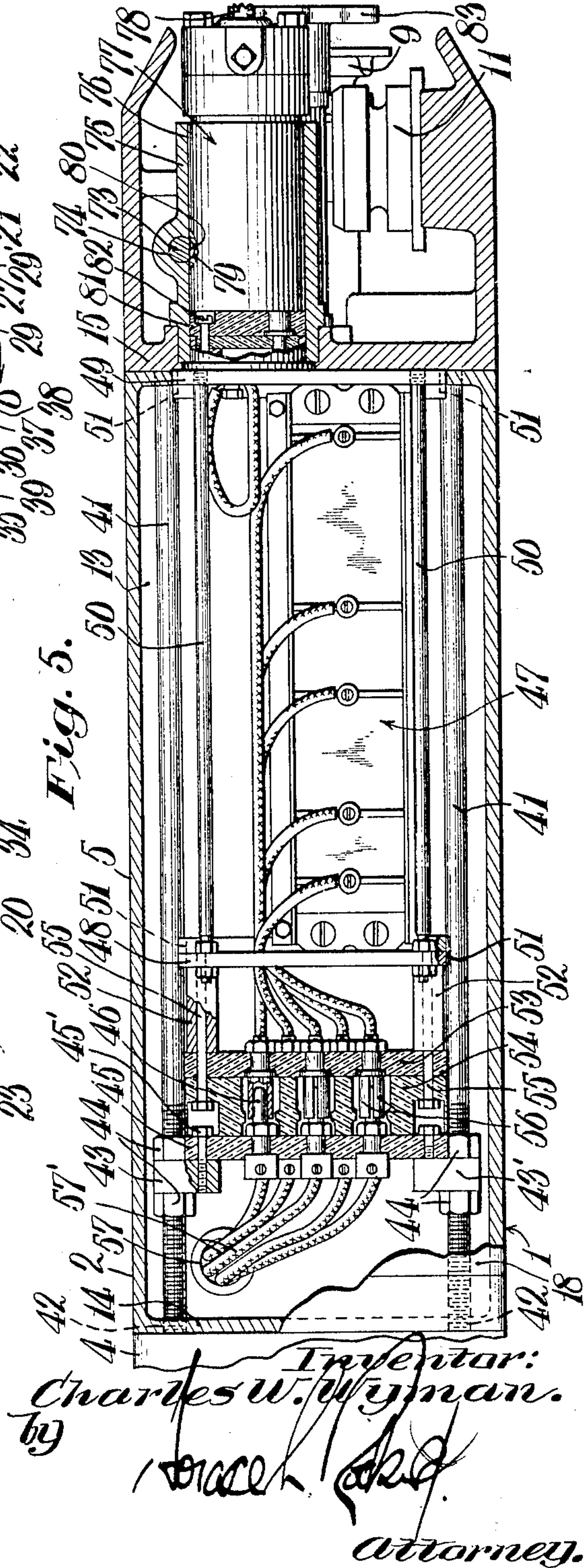
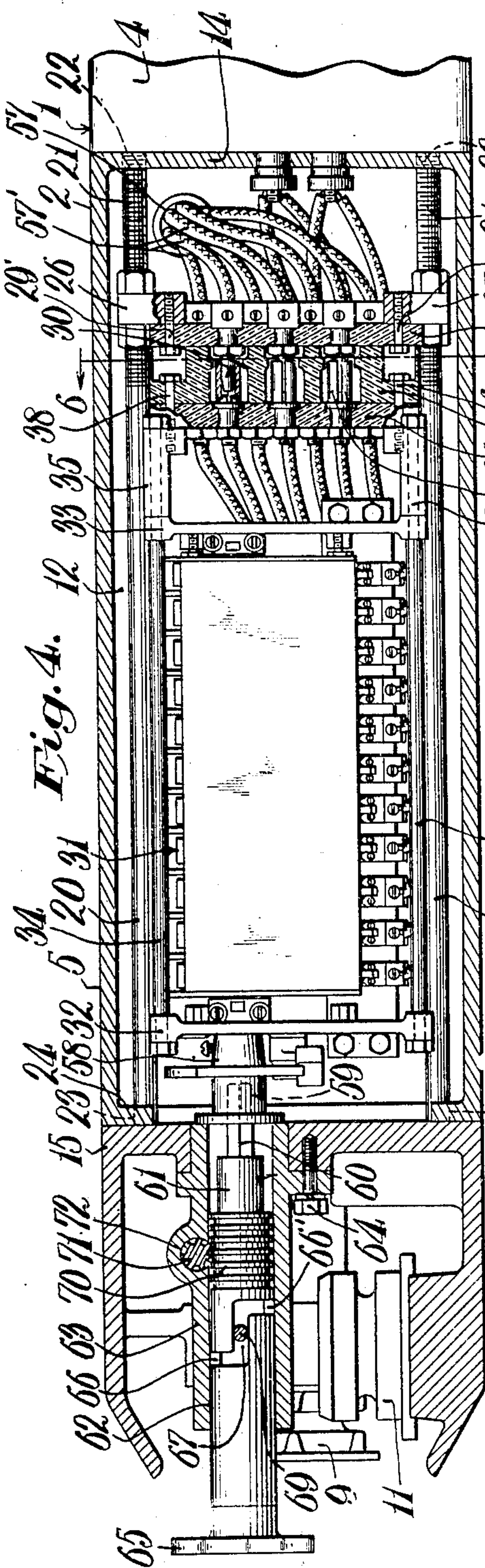
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4 Sheets-Sheet 3



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Fig. 6.

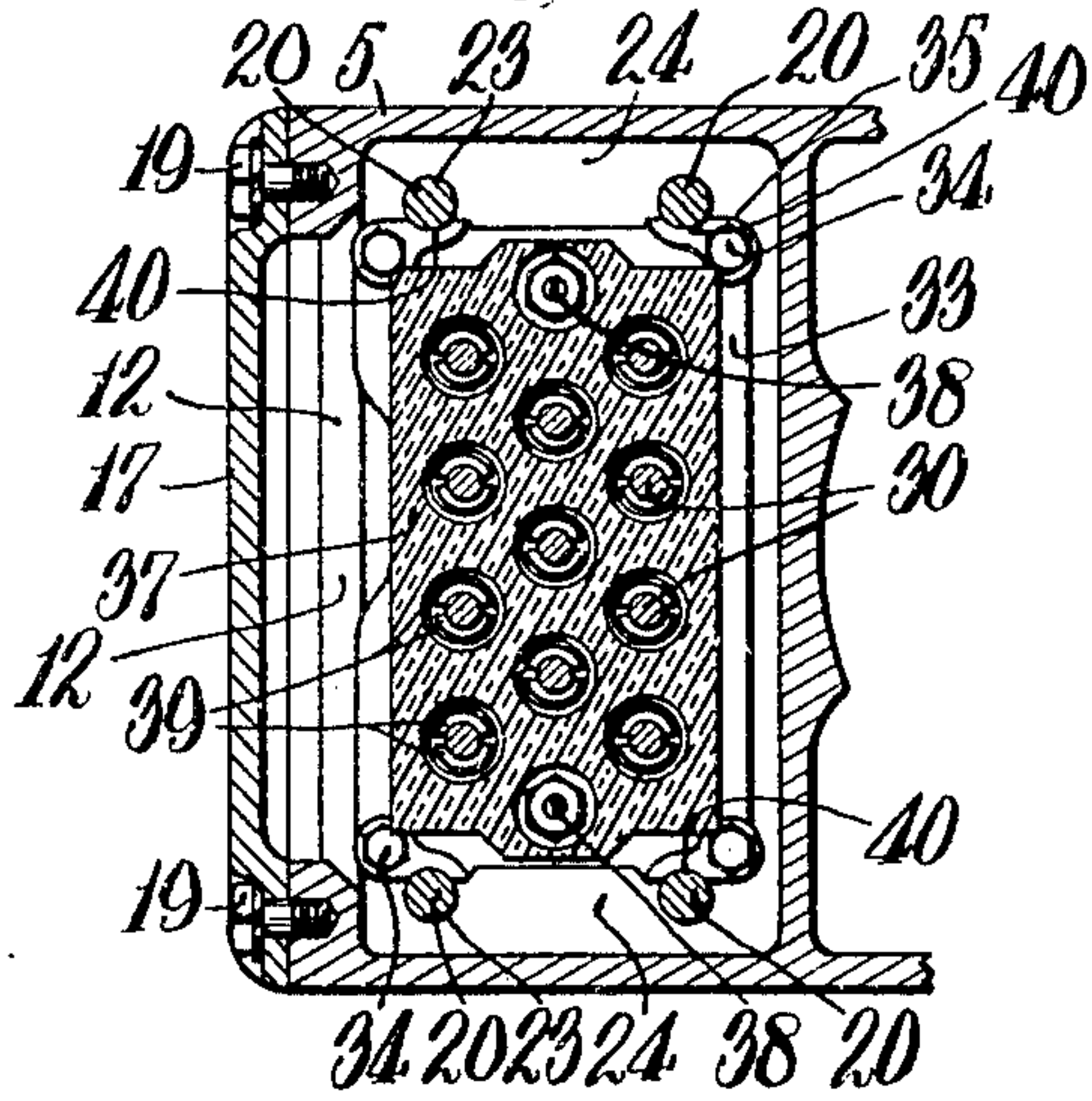
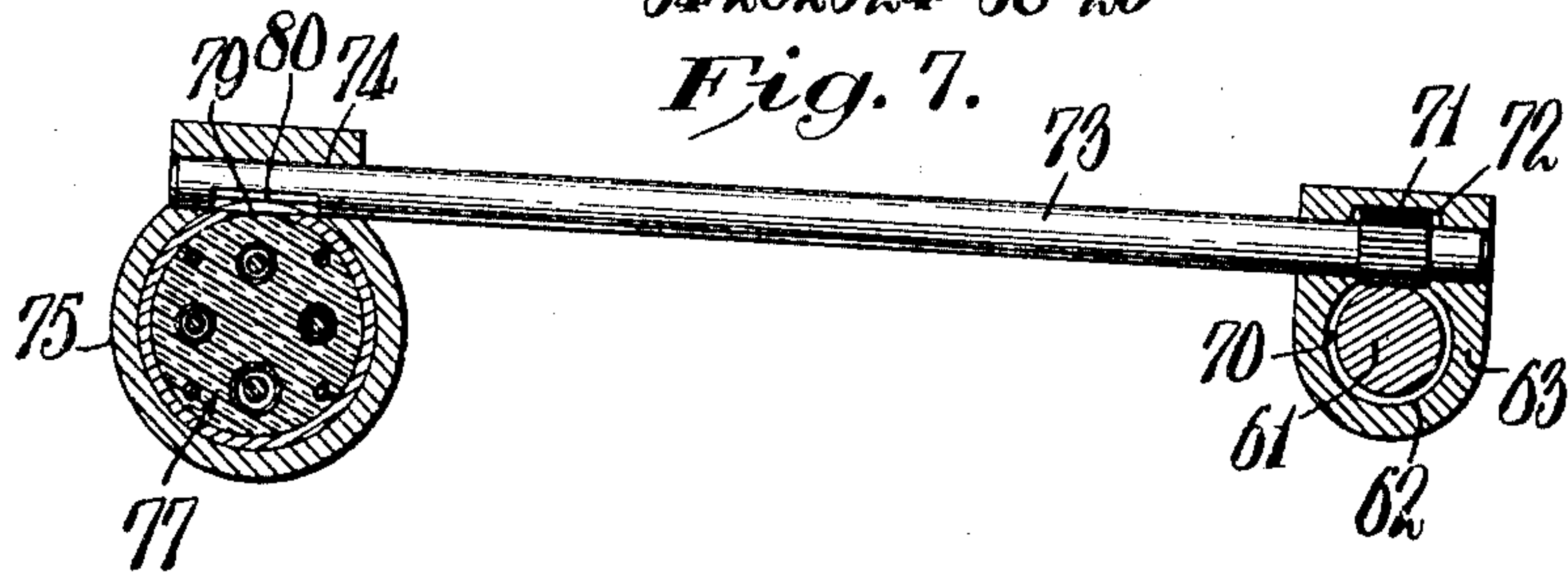


Fig. 7.



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UNITED STATES PATENT OFFICE.

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CONTROLLING APPARATUS.

Application filed October 31, 1924. Serial No. 747,065

My invention relates to controlling apparatus and more particularly to electric controlling apparatus for use in connection with mining machines.

5 An object of my invention is to provide an improved controlling apparatus. Another object of my invention is to provide an improved electric controlling apparatus for a mining machine of the so-called long
10 wall type. Still another object of my invention is to provide an improved interlocking and controlling mechanism. A still further object of my invention is to provide an improved interlocking mechanism disposed
15 between the electric controlling mechanism and a connector plug. Still another object of my invention is to provide an improved controlling mechanism permitting the operation of the motor controlled thereby in
20 opposite directions while preventing the reversal of said motor except after the parts of the controlling mechanism have been returned to a predetermined position and a controller member therefor has been manip-
25 ulated in a predetermined manner. A still further object of my invention is to provide an improved controlling mechanism provided with improved means for preventing the movement of the controller handle to
30 effect operation of the motor in a direction not desired. Still another object of my invention is to provide improved means for controlling an electric mining machine motor having an interlock with the current supply
35 connection or connector plug whereby the latter can not be inserted or withdrawn except when the controller is locked in its inoperative position. Still another object of my invention is to provide improved electric
40 controlling apparatus for a mining machine of the so-called low vein long wall type wherein the controller and rheostat may be removed in a direction longitudinally of one end of the machine frame and wherein im-
45 proved supporting means, arrangement of parts, and electrical connections are provided. These and other objects and advantages of my invention will, however, hereinafter more fully appear.

50 In the accompanying drawings I have shown for purposes of illustration one form which my invention may assume in practice.

In these drawings,—

Fig. 1 is a plan view of a mining machine 55 of the long wall type within which my improved mechanism is embodied, said machine being disposed in operative position adjacent a working face, the cutter bar being broken away to facilitate illustration. 60

Fig. 2 is an end elevational view of the controlling end of the machine shown in Fig. 1.

Fig. 3 is a plan view of a portion of the machine shown in Fig. 1, the view being 65 shown partially in section to facilitate illustration.

Fig. 4 is a longitudinal vertical sectional view taken substantially on line 4—4 of Figs. 2 and 3 illustrating the controller and 70 its operative connections.

Fig. 5 is a longitudinal vertical sectional view taken substantially on line 5—5 of Figs. 2 and 3 illustrating the rheostat and 75 its connections.

Fig. 6 is a partial transverse vertical sectional view taken substantially on line 6—6 of Fig. 4 illustrating the improved plug con-
80 nections.

Fig. 7 is a detail sectional view through 80 a portion of the improved controller and connector plug interlock.

In this illustrative form of my invention, my improved controlling apparatus and interlocking mechanism are arranged within 85 a mining machine, generally designated 1, herein of the flexibly fed, invertible long wall type comprising a main frame 2 slidable on its bottom on the mine bottom. The main frame 2 comprises a cutting mechanism 90 carrying section 3, a motor carrying section 4, and a feeding mechanism carrying section 5, the cutting mechanism carrying section 3 and the feed section 5 being disposed at opposite ends of the motor section 4 and rigidly 95 connected thereto in any suitable manner. A cutter bar 6 provided with an endless cutter bit carrying cutter chain 7 is pivotally mounted on the frame section 3 on a vertical axis indicated at 8 and the cutter chain 7 is 100 driven from the electric driving motor, not shown, which may be of either an AC or DC type, carried within the frame section 4, said cutter chain being driven through suitable transmission connections, not shown. Feeding movement of the machine relative to the

working face is adapted to be accomplished by means of a feed operating member 9, herein in the form of a chain sprocket, rotatable on a longitudinally extending axis and which is adapted to draw in the free end of a flexible feeding member 10, herein in the form of a feed chain, having its outer end fixed to a stationary extraneous abutment, not shown, in front of the machine, in a well known manner. Guiding sprockets 11 are provided for guiding the feed chain 10 relative to the feed sprocket 9 in the usual manner. The feed sprocket 9 is adapted to be driven through suitable transmission connections, not shown, carried by the frame section 5, and which connections are also driven by the mining machine driving motor.

In my improved construction it will be observed that the frame section 5 is provided with longitudinally extending chambers or compartments 12 and 13 at opposite sides thereof within which my improved controlling apparatus is arranged, see Fig. 3. One end of each of these chambers is closed by vertical transverse partitions 14 while the other end of these chambers is closed by a frame portion 15 forming a portion of the frame section 5 and upon which the feed operating member 9 is journaled and the current supply connection plug, controller handle, and interlock are carried as herein-after described. The frame 15 is rigidly held in position with respect to the frame section 5 by means of suitable screws 16. The sides of the chambers 12 and 13 are closed by means of cover plates 17 and 18 held in position by screws 19 and which plates may be removed if desired to obtain access to parts of the electrical apparatus. As illustrated, a plurality of longitudinally extending parallel rods 20 is disposed within the chamber 12 which have threaded portions 21 at one end thereof which are secured, as at 22, within the partition 14 of the frame section 5. The opposite ends of the rods 20 are held in rigid spaced relation within apertures 23 formed within vertical webs 24 formed integral with the frame section 5 at the top and bottom thereof and the ends of the rods are suitably slotted to receive a screw driver or other instrument to permit removal of the same. Vertically disposed transverse plates 26 and 27 are secured to the upper and lower rods 20, respectively. A vertically disposed plate 29, herein of suitable insulating material, is secured to the plates 26 and 27 by suitable screws 29' at the upper and lower edges thereof and this plate is adapted to carry longitudinally disposed spaced connector plugs 30, see Fig. 6.

As illustrated, a controller is provided, generally designated 31, herein of the reversible rotary drum type, substantially similar to that described and claimed in my co-pending application, Ser. No. 517,621, filed

Nov. 25, 1921, and this controller is adapted to control the electric circuits to the driving motor. As the controller per se does not form part of my present invention it will not be described specifically herein. The controller drum contacts and other controller parts are suitably carried between vertically disposed transverse frame members or brackets 32 and 33, see Figs. 3 and 4, held in rigid spaced relation by means of parallel longitudinally extending rods 34 disposed parallel with the rods 20. The rear end of these rods 34 extend through frame members 35, screws 38 holding the vertically disposed insulating plates 36 and 37 together and securing them to the frame portion 35. The insulating plates 36 and 37 have suitably secured thereto usual split spring fingers 39 which are adapted to resiliently engage the connector plugs 30 carried by the insulating plate 29 secured to the rods 20 and these spring fingers are connected to the controller by suitable lead wires. The frames or brackets 32 and 33 are each provided with arcuate guiding surfaces 40 disposed at the upper and lower ends thereof and at opposite sides thereof which are adapted to engage the cylindrical surfaces of the rods 20 and are guided thereby, see Fig. 6.

It will herein be observed that disposed within the other chamber 13 are longitudinally extending parallel rods 41, similar to the rods 20, and these rods 41 threadedly engage the partition 14 at 42 and are guided at their opposite ends within apertures similar to the apertures 23 and which are formed within a portion of the frame section 5. Secured to the rods 41 are vertical transverse plates 43 and 43' held in position by nuts 44 threaded to the rods. A vertically disposed insulating plate 45 is secured, as by screws 45', at its upper and lower ends to the plates 43 and 43'. This plate has spaced connector plugs 46, similar to the plugs 30, carried thereby. A rheostat generally designated 47, herein of well known form, is carried by vertically disposed frame members or brackets 48 and 49 held in rigid longitudinally spaced relation by means of parallel rods 50, disposed parallel with the rods 41, see Figs. 3 and 5. The brackets 48 and 49 are provided with arcuate guiding surfaces 51 at the opposite sides of their upper and lower ends, similar to the guiding surfaces 40 formed upon the brackets 32 and 33, and these surfaces are adapted to engage the surfaces of the rods 41 and to be guided thereby. The bracket 48 is provided with rearwardly extending members 52 to which vertically disposed insulating plates 53 and 54 are secured as by screws 55. These insulating plates 53 and 54 carry usual split spring fingers 56 adapted to resiliently engage the plugs 46 and these spring fingers are connected to the rheostat by

means of suitable lead wires. The frame section 5 is provided with a transverse opening 57 formed in the inner walls of the chambers 12 and 13 and through which opening suitable lead wires 57' pass having their ends suitably connected to the connector plugs 30 and 46. It will herein be noted that the frame section 15 may be removed from the frame section 5 by removal of the screws 16 and that the controller 31 and the rheostat 47 may each be bodily removed from the chambers 12 and 13 by longitudinal movement relative thereto, the controller and rheostat sliding from the chambers along the guide rods 20 and 41, the spring fingers 39 and 56 separating from the connector plugs 30 and 46, at this time.

As illustrated, the shaft of the controller drum has an enlarged hub 58 suitably secured thereto and this hub is provided with a squared opening 59 adapted to slidably receive the squared end 60 of a longitudinally extending shaft 61 disposed within a bore 62 formed within a bracket 63 secured, as by screws 64, to the frame section 15. The separable connection 59, 60 permits the removal of frame section 15 from the frame 5 without the necessity of any dismantling of the controller parts. The shaft 61 has secured at the outer end thereof an operating member or hand wheel 65 which is adapted to be manipulated by the operator and the shaft has formed in the exterior surface thereof intermediate its ends circumferential grooves 66 and 66' which are connected together by means of a longitudinally extending straight slot 67. A screw threadedly engages the bracket 63 and is provided with an inwardly projecting pin 69 adapted to cooperate with the grooves 65 and 66 and the slot 67. The shaft 61 is further provided with vertically disposed teeth 70 with which a gear 71 cooperates disposed within a bore 72 formed within the upper portion of the bracket 63. The gear 71 is formed on a slightly inclined transversely extending shaft 73 which passes above the feed sprocket 9, see Fig. 2 and this shaft is journaled at its end opposite from the end which carries the gear 71, within a bore 74 formed within a bracket member 75 secured as by bolts 76' to the frame section 15 adjacent the end of the chamber 13. The bracket 75 is provided with a longitudinally extending bore 76 within which a power supply connector plug, generally designated 77 of well known form, is disposed through which power medium is transmitted from a suitable supply cable 78 through the various electrical circuits. It will herein be observed that the rod 73 cooperates with a grooved arcuate portion 79 formed on the exterior of the plug 77 and is provided with a flattened or cut away portion 80. The connector plug 77 has a separable connec-

tion with an insulating plate 81 which permits free removal of the frame 15 from the frame 5; and this insulating plate is likewise disposed within the bore 76 and secured as by screws 82 to the rheostat supporting bracket 49. This plug 77 is adapted to be pulled outwardly from the bore 76 relative to the plate 81, suitable connector plugs and spring fingers, not shown, being interposed therebetween.

As heretofore described a pin 69 is disposed within the longitudinal slot 67 formed within the controller operating shaft 61 and when in such a position the controller drum is disposed in its inoperative or neutral position, the connector plug interlock being released at this time, see Fig. 5. If it is desired to rotate the controller drum in one direction or the other, the operator must grasp the handle 65 and slide the shaft 61 longitudinally either inwardly or outwardly until the pin 69 comes in contact with the ends of the slot 67 adjacent one or the other of the circumferential grooves 66 and 66'. This sliding movement of the shaft 61 simultaneously causes the teeth 70 formed thereon to rotate the gear 71 formed upon the transverse interlock shaft 73. This operation causes the shaft and the flattened portion 80 formed thereon adjacent the connector plug 77 to be rotated, thus causing the shaft 73 to interlock with the connector plug preventing removal of the latter during either operative position of the controller drum. To remove the plug 77 the handle 65 must again be rotated until the pin 69 registers with the slot 67 and slid into its neutral position as shown in Fig. 4, again rotating the shaft 73 and the notch 80 into the position as shown in Fig. 5, thereby releasing the interlock. It will also be observed that if the controller is rotated into operative position while the connector plug 77 is removed, the rod 73 prevents the insertion of the plug within the bore 76 until the controller drum is again returned to its neutral or inoperative position. A usual operating handle 83 is provided for controlling the operation of the feed sprocket 9.

As a result of my invention it will herein be noted that an improved controlling apparatus for a mining machine is provided wherein the controller and rheostat may be bodily removed from the end of the machine frame by longitudinal movement relative thereto and that improved guiding and supporting means are provided therefor. It will further be noted that improved interlocking means is provided between the power supply connector plug and the controller drum wherein the latter must be in its neutral or inoperative position prior to the removal of the plug and wherein the supply connector plug is locked in position during operation of the controller, consequently preventing

arcings and resultant disastrous explosions. It will also be noted that improved controlling apparatus is provided, especially adapted to use with a mining machine of the low vein long wall type and which is of an exceedingly simple and compact character which may be removed from the machine with facility especially when the machine is operating in close quarters adjacent the working face and the mine props.

While I have in this application specifically described one form which my invention may assume in practice, it will be understood that this form of the same is shown for purposes of illustration and that the invention may be modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. In an electric controlling mechanism, a casing having a chamber, supporting members disposed within said chamber, electrical controlling apparatus disposed in said chamber comprising relatively movable elements for effecting current control and end brackets, and means for slidably guiding said apparatus as a whole along said supporting members with said brackets engaging the latter:

2. In an electric controlling mechanism, a casing having a chamber, supporting rods disposed within said chamber, a controller disposed in said chamber comprising relatively movable elements for effecting current control, and means for slidably guiding said controller as a whole along said rods.

3. In an electric controlling mechanism, a casing having a chamber, supporting rods disposed within said chamber, a controller disposed in said chamber comprising relatively movable elements for effecting current control and a plurality of end brackets, and means for slidably guiding said controller as a whole along said rods with said brackets engaging the latter.

4. In an electric controlling mechanism, a casing having a chamber, supporting rods secured within said chamber, a controller disposed in said chamber comprising relatively movable elements for effecting current control, end brackets, and rods connecting said brackets, and means for slidably guiding said controller as a whole along said supporting rods with said brackets engaging the latter.

5. In an electric controlling mechanism, a plurality of supporting rods, a controller comprising end brackets and parallel connecting rods, and a controller drum journaled at its opposite ends in said brackets, and means for slidably guiding said controller as a whole along said supporting rods.

6. In an electric controlling mechanism,

a chamber, rods disposed in said chamber, plug connections secured to said rods, a controller, and means for slidably guiding said controller along the rods relative to said plug connections.

7. In an electric controlling mechanism, a chamber, rods disposed in said chamber, plug connections secured to said rods, a controller including spring fingers engageable with said plug connections, and means for slidably guiding said controller along said rods relative to said plug connections.

8. In an electric controlling mechanism, a controller and operating means therefor, a connector plug, and manual operating means including a transversely extending rod and cooperating gear elements for controlling the operation of said controller and movement of said plug.

9. In an electric controlling apparatus, a frame, a controller, a connector plug, and means including cooperating gear elements and a member extending transversely of said frame for interlocking said controller and connector plug.

10. In an electric controlling mechanism, a reversible controller, a connector plug, and manually operable controlling means including a transversely extending rod for controlling the direction in which said reversible controller may be moved and insertion and removal of said plug.

11. In an electric controlling mechanism, a controller, a connector plug and controlling means for said controller and for said plug including a slidable operating element for said controller and normally movable to effect release of or locking of either said controller or said connector plug as desired.

12. In a mining machine, a machine frame providing a chamber having closed walls and one end opening through one end of said mining machine frame, electric controlling apparatus for the machine disposed in said chamber, and means for permitting the removal of said controlling apparatus from said end of the machine longitudinally of said chamber through the open end thereof.

13. In a mining machine, a machine frame providing a chamber having closed walls and one end opening through one end of said mining machine frame, electric controlling apparatus for the machine disposed in said chamber, and means including parallel guide members for permitting the removal of said controlling apparatus from said end of the machine longitudinally of said chamber through the open end thereof.

14. In a mining machine, chambers formed on opposite sides thereof, electric controlling mechanism disposed in one of said chambers, a power medium supply connector plug disposed adjacent the other chamber, and interlocking means between

said controlling mechanism and said connector plug.

15. In a mining machine, chambers formed on opposite sides thereof, electric controlling mechanism disposed in one of said chambers, a power medium supply connector plug disposed adjacent the other chamber, and interlocking means including a transversely extending rod between said controlling mechanism and said connector plug.

16. In a mining machine, chambers formed on opposite sides thereof, electric controlling mechanism disposed in one of said chambers, a power medium supply connector plug disposed adjacent the other chamber, and interlocking means including an inclined transversely disposed rotatable element between said controlling mechanism and said connector plug.

17. In a mining machine, a machine frame providing a plurality of longitudinally extending chambers each having closed walls and one end opening through one end of said mining machine frame, electrical apparatus disposed within each of said chambers, and means permitting the sliding of said electrical apparatus longitudinally of the frame from said chambers through the open ends thereof.

18. In a mining machine, a machine frame having closed walls and an open end, electric controlling apparatus disposed within said frame including a controller and a rheostat, and means for permitting the removal of said controller and rheostat longitudinally from one end of said machine through the open end of said frame.

19. In a mining machine, a machine frame having closed walls and an open end, electric controlling apparatus disposed within said frame including a controller and a rheostat, and means including parallel guide members for permitting the removal of said controller and rheostat longitudinally from one end of said machine through the open end of said frame.

20. In a mining machine, a machine frame providing spaced longitudinally extending chambers each having closed walls and one end opening through one end of said mining machine frame, a controller disposed in one of said chambers and a rheostat in the other, and means for permitting the removal of said controller and rheostat longitudinally through the open ends of said chambers from said end of the mining machine.

21. In a mining machine, a machine frame providing laterally spaced longitudinally extending chambers each having closed walls and one end opening through one end of said mining machine frame, a controller disposed in one of said chambers and a rheostat in the other, supporting brackets for said controller and rheostat, and means in-

cluding rods cooperating with said brackets for permitting the removal of said controller and rheostat longitudinally through the open ends of said chambers at one end of said machine frame.

22. In a mining machine, a machine frame comprising a removable section and another section provided with parallel longitudinally extending chambers each of said chambers having closed walls and an open end normally closed by said removable section, an electrical controlling apparatus disposed in each of said chambers, and means for permitting the removal of said apparatus longitudinally from said chambers through the open ends thereof at one end of said machine upon removal of said frame section.

23. In an electric controlling mechanism, a rotatable controller shaft adapted on rotation in opposite directions from a given position to produce different circuits, and means including reciprocable means arranged coaxially with said shaft for selectively controlling the direction in which said shaft may be rotated.

24. In an electric controlling mechanism, a controller shaft rotatable about a fixed axis and adapted on rotation in opposite directions from a given position to produce different circuits, and means including rectilinearly reciprocable means arranged coaxially with said shaft for selectively controlling the direction in which said shaft may be rotated.

25. In an electric controlling mechanism, a rotatable controller shaft adapted on rotation in opposite directions from a given position to produce different circuits, and means including rotatable means reciprocable rectilinearly in a line parallel to a line parallel to said shaft for selectively controlling the direction in which said shaft may be rotated.

26. In an electric controlling mechanism, a rotatable controller shaft adapted on rotation in opposite directions from a given position to produce different circuits, and means including a member having a plurality of longitudinally offset oppositely extending peripheral grooves rotatable with said shaft, and a stationary element engaging in said grooves for controlling the direction in which said rotatable shaft may be rotated.

27. In an electric controlling mechanism, a rotatable and reciprocable shaft adapted on rotation in opposite directions from a given position to produce different circuits, and means including movable means reciprocable rectilinearly with said shaft for selectively controlling the direction in which said shaft may be rotated.

28. In an electric controlling mechanism, a shaft mounted for rotation on a fixed axis and adapted on rotation in opposite direc-

tions from a given position to produce different circuits, and means including a longitudinally reciprocable member rotatable with said shaft and a stationary abutment member for controlling the direction in which said shaft may be rotated.

29. In an electric controlling mechanism, a controller operating member manually rotatable to operate the controller, a connector plug, and means including a rotatable member lying on the same side of and disposed transversely of each of the same for controlling the operation of the controller operating member and the removal of the connector plug.

30. In an electric controlling mechanism, a controller operating member, a connector plug, and independently manually operable means controlling the operation of said member and the removal of said plug including a substantially horizontal rotatable shaft operative in different positions to permit operation of the controller operating member and the withdrawal of said plug.

31. In an electric controlling mechanism, a rotatable member, and means for controlling the direction of rotation of said member including a member rotatable therewith and having a pair of spaced oppositely extending grooves therein connected by a groove extending longitudinally of said member, a member extending into said groove, and means for moving one of said members

relative to the other to control the direction of rotation of said first mentioned member.

32. In an electric controlling mechanism, a rotatable member, and means for controlling the direction of rotation of said member including a member rotatable therewith and having a pair of spaced oppositely extending grooves therein connected by a groove extending longitudinally of said member, a member extending into said groove, and means for moving said second mentioned member oppositely longitudinally to effect control of the movement of said first mentioned member.

33. In an electric controlling mechanism, a controller and operating means therefor, a connector plug, and manually operating means including a member having rotatable and reciprocable movement for controlling the operation of said controller and movement of said plug.

34. In an electric controlling mechanism a controller and operating means therefor, a connector plug, and manual operating means including a member having rotatable and reciprocable movement and a transversely extending rod for controlling the operation of said controller and movement of said plug.

In testimony whereof I affix my signature

CHARLES W. WYMAN.