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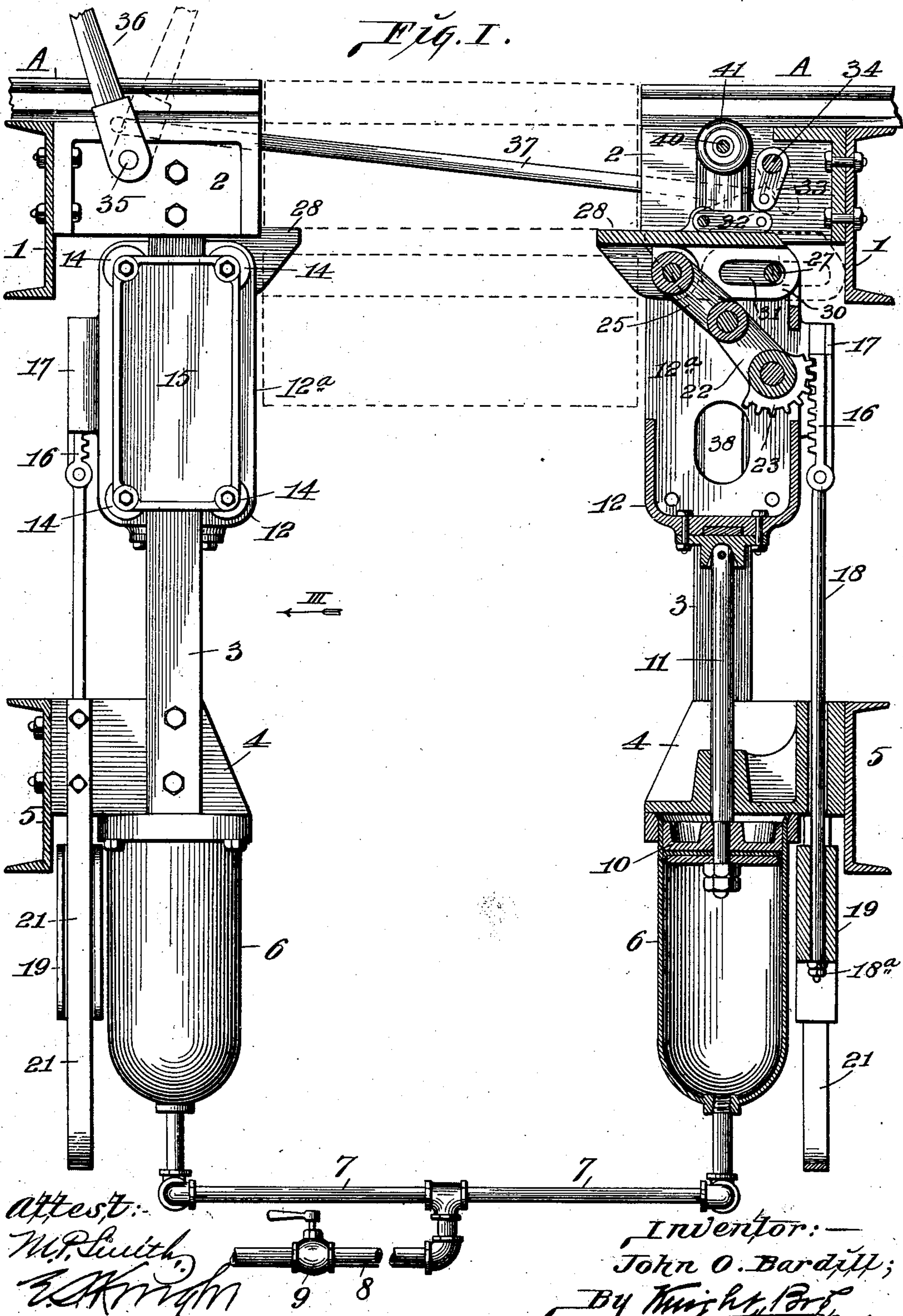
Patented May 6, 1902.

J. O. BARDILL.
CHAIR FOR MINE CAGES.

(Application filed May 4, 1901.)

(No Model.)

4 Sheets—Sheet 1.



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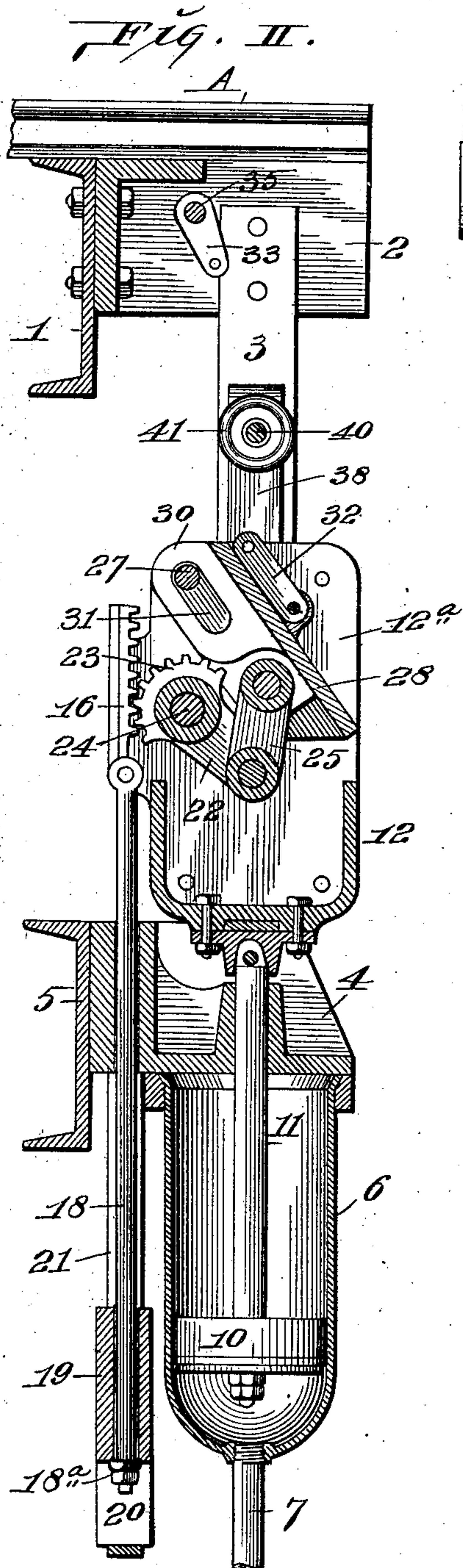
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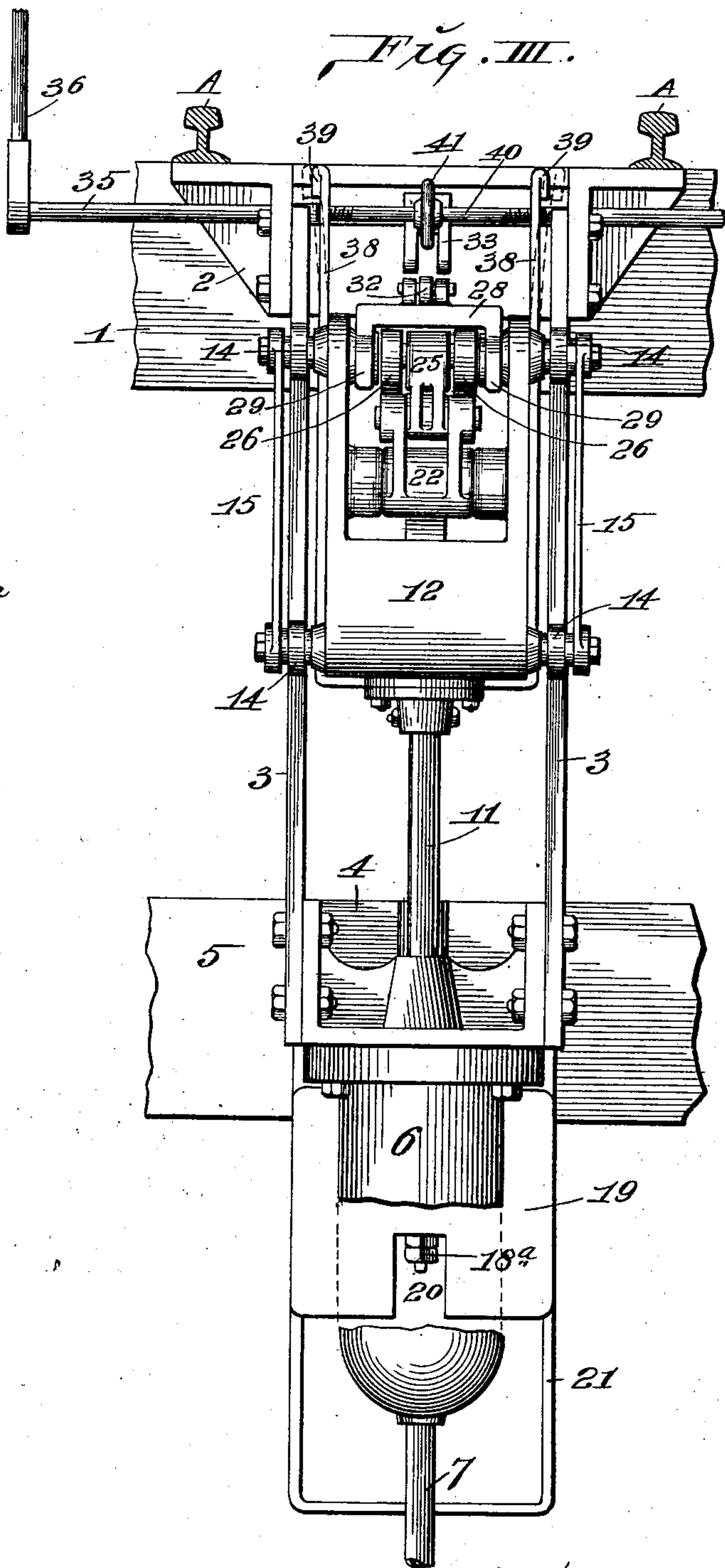
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Fig. IV.

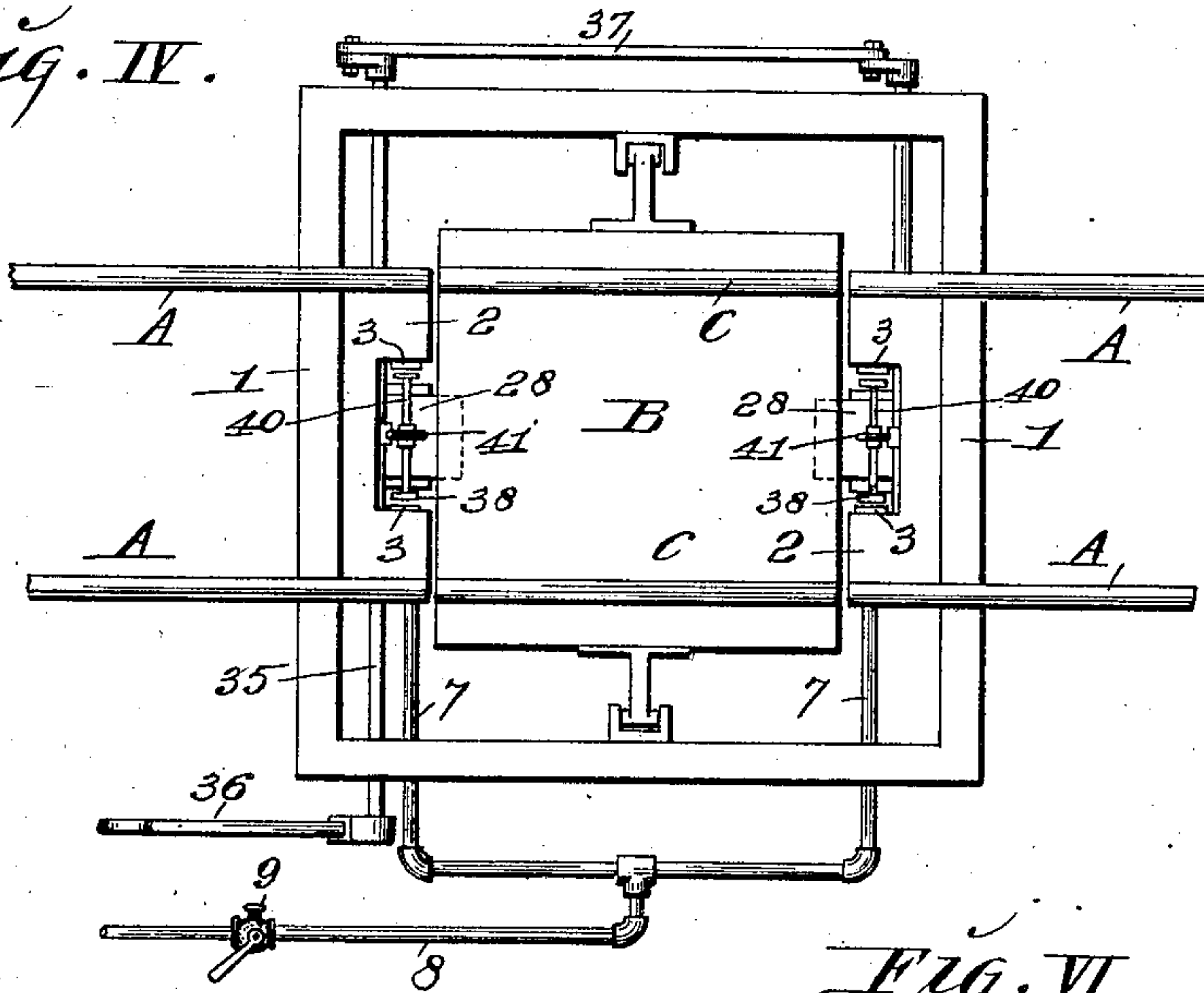


Fig. V.

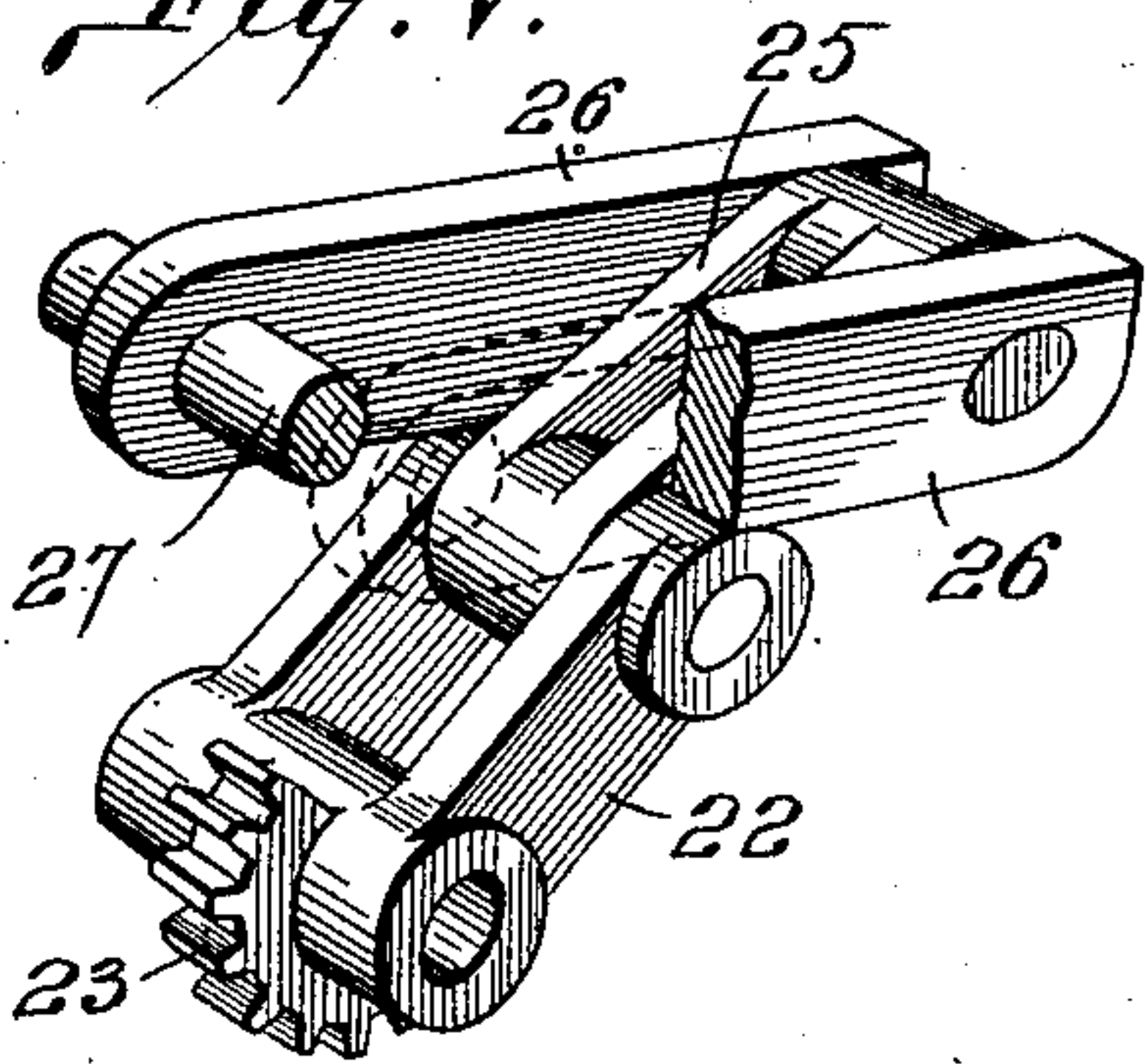


Fig. VI.

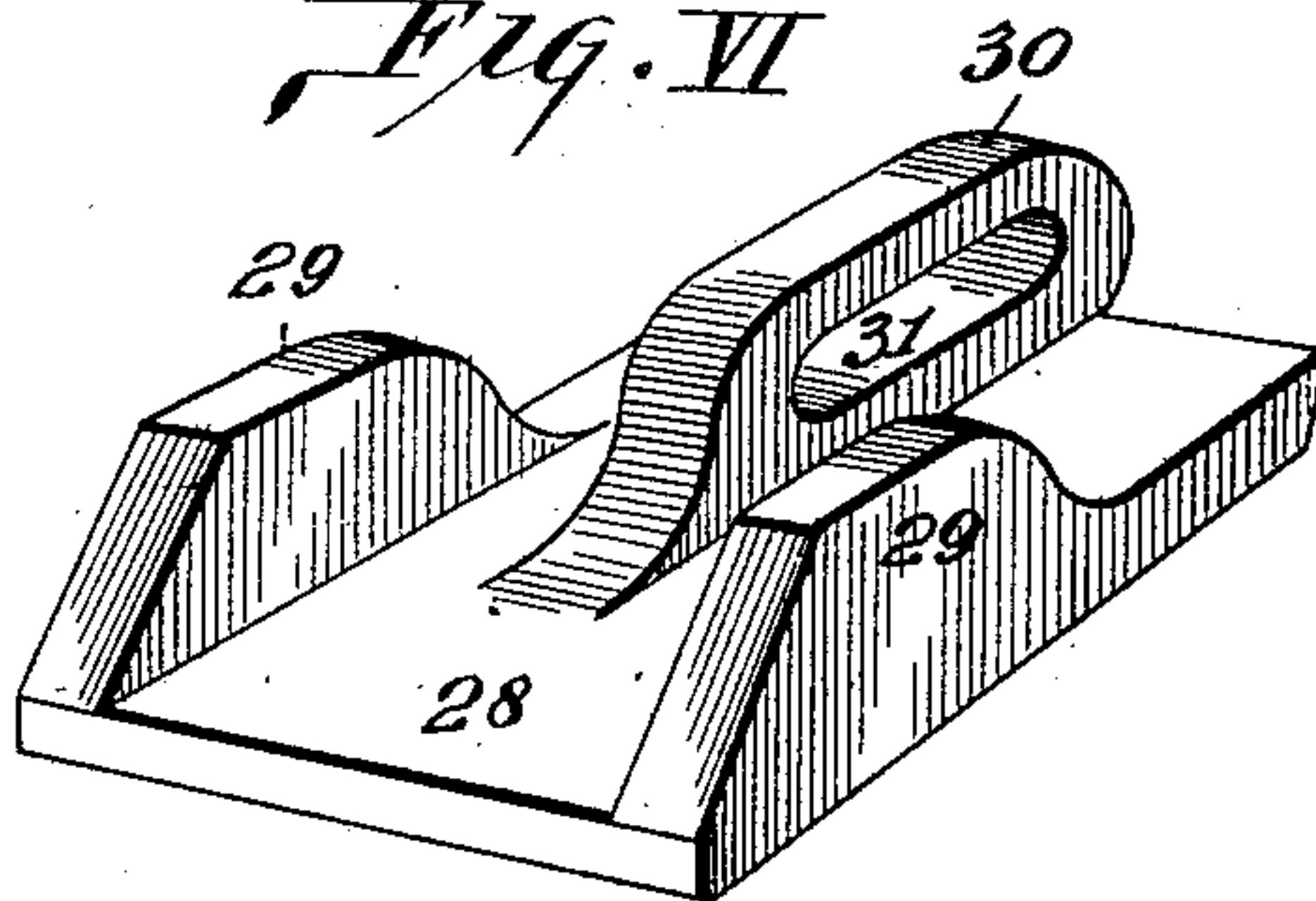
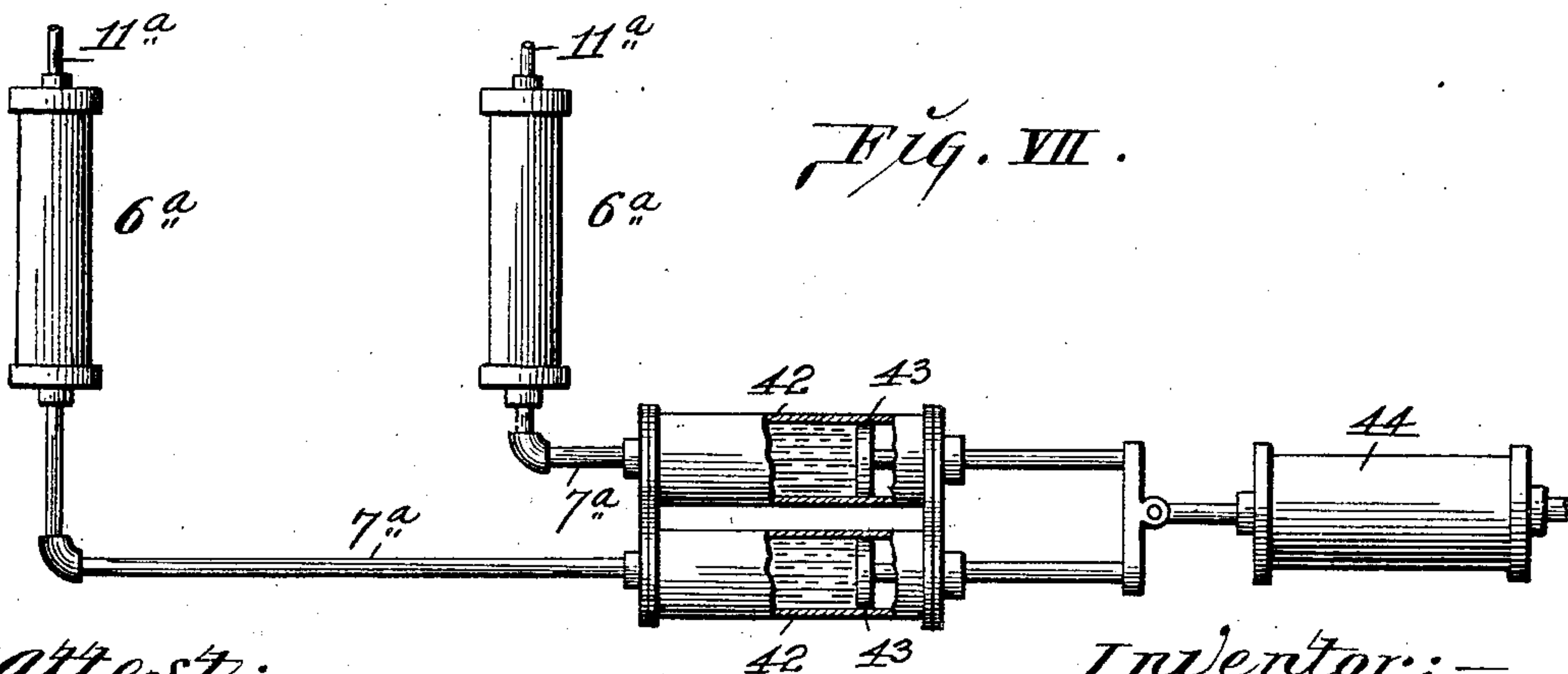


Fig. VII.



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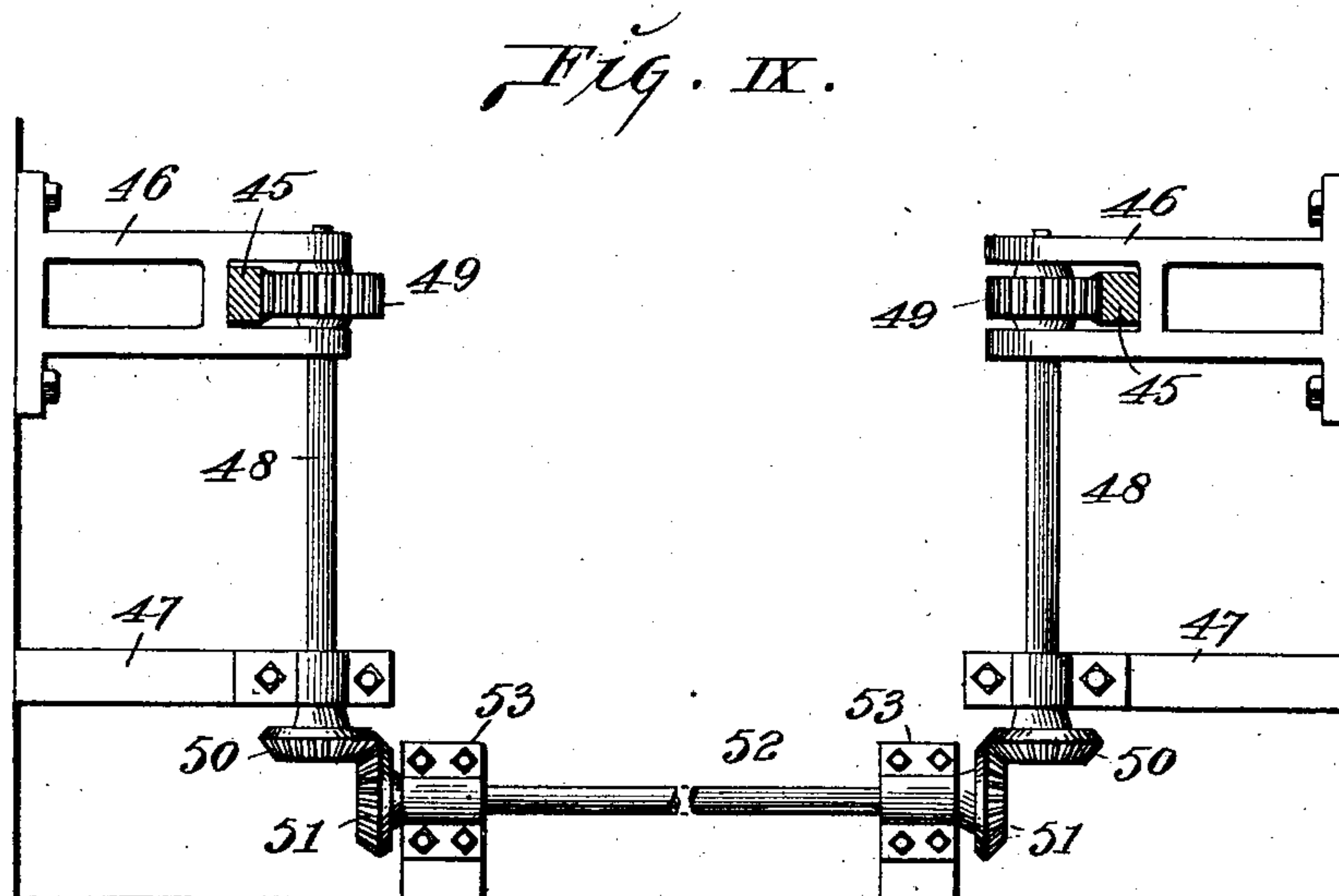
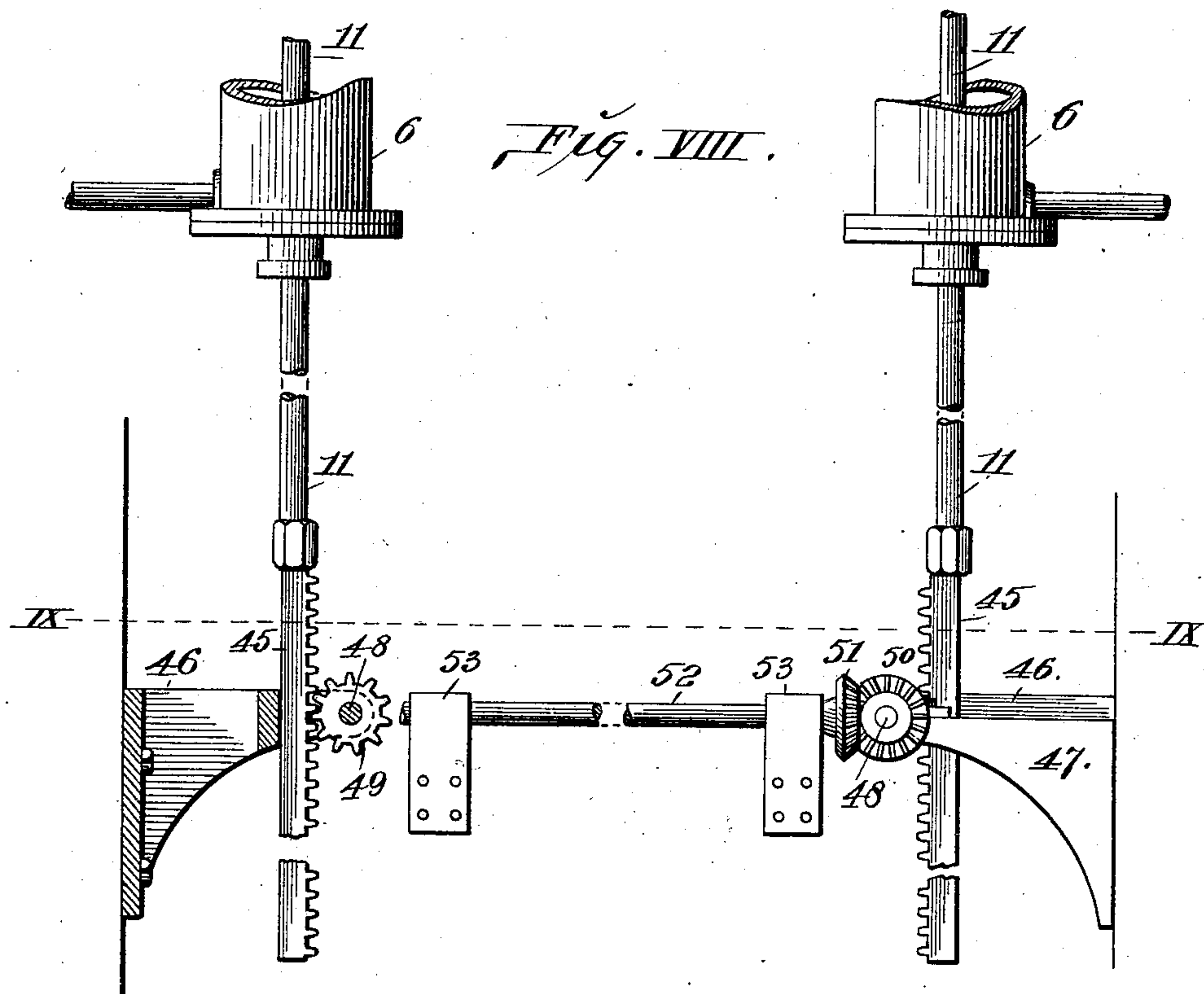
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4 Sheets—Sheet 4.



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UNITED STATES PATENT OFFICE.

JOHN O. BARDILL, OF ST. LOUIS, MISSOURI.

CHAIR FOR MINE-CAGES.

SPECIFICATION forming part of Letters Patent No. 699,135, dated May 6, 1902.

Application filed May 4, 1901. Serial No. 58,763. (No model.)

To all whom it may concern:

Be it known that I, JOHN O. BARDILL, a citizen of the United States, residing in the city of St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Chairs for Mine-Cages, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to that class of apparatus used in supporting mine-cages while the car carried thereon is removed or while said car is being moved onto the cage.

My invention consists in features of novelty hereinafter fully described, and pointed out in the claims.

Figure I is a view partly in elevation and partly in vertical section, the chairs being shown in elevated position. Fig. II is a view in vertical section of one of the chairs with the parts shown in lowered position. Fig. III is a view in elevation of one of the chairs looking in the direction indicated by the arrows in Fig. I. Fig. IV is a top or plan view. Fig. V is an enlarged perspective view of one of the segments and links by which the chair-dogs are actuated. Fig. VI is an enlarged detail perspective view looking at the under side of one of the chair-dogs. Fig. VII is a view, partly in elevation and partly in section, of cylinders used where the chairs are operated by oil or other heavy fluids as a pressure medium. Fig. VIII is a view, partly in elevation and partly in vertical section, of means for causing the uniform travel of the chair-dogs. Fig. IX is a horizontal sectional view taken on the line IX IX, Fig. VIII.

A designates track-rails that lead to the mine-shaft in which my apparatus is positioned.

B is the mine-cage, and C designates the car-rails on said cage.

Located in the shaft immediately beneath the track-rails is a rim 1, that is preferably of channel shape in cross-section, as shown in Figs. I and II. Fixed to the rim 1 is a pair of brackets 2, located opposite each other in the mine-shaft.

3 designates guide-bars connected to the brackets 2 at their upper ends and attached at their lower ends to brackets 4, that are sup-

ported by a rim 5, located in the line-shaft at a suitable distance beneath the rim 1.

6 designates pressure-medium-receiving cylinders mounted beneath and supported by the brackets 4 and to the lower ends of which are connected the branches 7 of a pipe 8, through which pressure medium, such as air or steam, is conveyed to the receiving-cylinder 6. The pressure-medium pipe 8 is provided with a two-way valve 9, that is designed to be manipulated by the operator to admit the pressure medium into the cylinders 6 at the desired time, the valve being located at a point convenient for the access of the operator either exterior or interior of the mine-shaft. In the pressure-receiving cylinders 6 are pistons 10, (see Figs. I and II,) that have connected to them the upwardly-extending piston-rods 11, which pass through the brackets 4.

12 designates housings to which the upper ends of the piston-rods 11 are jointed. The housings 12 have side walls 12^a and are arranged to move vertically between the guide-bars 3, and mounted in said housings at the upper and lower ends thereof are stub-shafts that carry guide-rollers 14, which travel against the edges of the guide-bars and are confined by side plates 15, mounted on the outer ends of the roller-carrying shafts.

16 designates rack-bars arranged in guides 17, carried by the housings 12 and adapted to move vertically in said guides. The lower ends of the rack-bars 16 are connected to vertical rods 18, that pass loosely through the brackets 4. Slidably mounted on the vertical rods 18 are weights 19, that are notched at 20, (see Fig. III,) so that the nuts 18^a on the lower ends of the vertical rods are permitted to play within the weights 19 when they are brought to rest, as will hereinafter appear.

21 designates yokes suspended from the brackets 4 and within which the weights 19 are adapted to move.

22 designates toothed segments, the teeth 23 of which are arranged in engagement with the teeth of the rack-bars 16. The segments 22 are mounted on shafts 24, that are seated in the side walls 12^a of the housing 12.

25 designates links, each pivotally connect-

ed at one end to the segments 22, while the opposite ends of the links are pivoted to a pair of carrier-bars or carriers 26, that are joined at their outer ends by a shaft 27, jour-
 5 naled in the housing side walls 12^a.

28 designates dogs mounted on the carrier-bars 26. Each of said dogs is provided with downwardly-extending flanges 29, that oc-
 10 cupy positions against the outer faces of the carrier-bars and serve as guides and retainers for the dogs. The dogs are also provided at their under sides with ears 30, containing slots 31, that receive the shafts 27. By this arrangement the dogs 28 are slidingly mount-
 15 ed on the carrier-bars 26, so as to be capable of longitudinal movement thereon.

In the practical use of the apparatus as thus far described the operation is as follows: The mine-cage is elevated to a point above the lo-
 20 cation of the dogs 28 when said dogs and the housings 12 are in their lowered positions, as seen in Fig. II. It is not necessary that the height to which the cage is elevated to be received by the dogs be one of any precision,
 25 but only that the elevation be sufficient to bring it to a point above the location of the dogs when they are first carried to a horizontal position. The pressure medium—for in-
 30 stance, compressed air—being introduced through the pipes 7 into the receiving-cylinders 6 acts against the pistons 10 and by carrying the pistons upwardly starts the vertical movement of the housings 12. At this time
 35 the weights 19 pull upon the vertical rods 18, as seen in Fig. II, and hold the rack-bars 16 from movement. As the housings 12 continue to travel upwardly the segments 22, being in
 40 mesh with the rack-bars 16, are rocked, thereby throwing their inner ends in an upward direction and moving the links 25 therewith to raise the inner ends of the carrier-bars 26,
 which swing on the shafts 27, on which they are mounted. The result is that the dogs 28
 45 are moved from the inclined position (seen in Fig. II) to the horizontal position (seen in Fig. I) as the parts move into the position seen in Fig. I. As the parts move into the positions
 50 stated the pivots connecting the segments 22 and links 25 pass the central lines between the axis of the shafts 24 of the segments 22 and the pivots connecting the links 25 and
 carrier-bars 26 reach a dead-center, so that the carrier-bars are locked from downward
 55 movement, in which position they are retained through the agency of the weights 19, that effect a downward pull on the vertical
 rods 18, and consequently hold the rack-bars 16 and segments 22 from movement. The
 60 dogs 28 having been moved into horizontal position, the ascent of the housings 12 continues and the dogs are carried upwardly beneath the cage, thereby elevating it from the
 position indicated by the lowermost dotted lines, Fig. I, to the position indicated by the
 65 uppermost dotted lines, placing the cage B at the exact position required to bring its rails C into alinement with the track-rails A, onto

which the car is to be transferred or from which the car is to be delivered. When the cage is to be lowered, the pressure medium is
 70 shut off from delivery into the cylinders 6, and the pressure medium admitted to the cylinders is permitted to escape therefrom through the two-way valve 9, so that the pis-
 tons 10 will descend and permit the housings
 75 12 to move downwardly. As the housings are lowered the weights 19 travel downwardly within the yokes 21 until they reach the lower
 ends of said yokes and rest thereon, thereby
 80 relieving the vertical rods 18 and removing the pull of said weights on the rack-bars 16. The lower ends of the vertical rods 18 then
 move downwardly through the weights 19 and by coming in contact with the yokes 21
 85 are stopped from further movement, thereby bringing the rack-bars 16 to rest. The hous-
 ings 12 at this time have not completed their descent, and as a consequence the stoppage
 of the rack-bars causes the segments 22 to be
 90 rocked, thereby moving the inner ends of said segments, throwing the links 25 downwardly into the position seen in Fig. II, carrying
 therewith the carrier-bars, 26 and lowering the dogs 28 out of the path of travel of the
 mine-cage, which may then be lowered in the
 95 shaft.

The construction of apparatus is simple and not liable to become impaired; but for the purpose of providing for the projection of the
 dogs 28 from the support of the cage in the
 100 event of any of the parts becoming out of order or the pressure-medium-supply apparatus becoming impaired I introduce means where-
 by the dogs may be projected manually. As has been described the dogs 28 are slidingly
 105 mounted on the carrier-bars 26, and consequently are capable of longitudinal movement on said carrier-bars, said movement being permitted by the slots 31 in the ears 30
 of the dogs. It will therefore be seen that
 110 when the carrier-bars 26 are in their elevated positions (seen in Figs. I and III) and the housings 12 are elevated the dogs 28 may be
 slid into the mine-shaft after the mine-cage is elevated and that in such position they
 115 will support the cage. Pivotaly connected to each dog 28 is a link 32. Each of said links 32 is adapted to receive detachable con-
 nection with crank-arms 33. (See Figs. I and II.) One of said crank-arms is carried by a
 120 rock-shaft 34, and the other is carried by a rock-shaft 35. On the rock-shaft 35 is a hand-
 lever 36, by which the shaft 35 is rocked to impart movement to the dog 28 adjacent thereto,
 and the rock-shaft 34 is rocked by a
 125 connecting-rod 37, that leads to the crank-arm carried by the rock-shaft 34.

38 designates a hanger-yoke embracing the housing 12, the upper ends of two arms of
 which yoke are bent outwardly and down-
 130 wardly to produce hooks 39. (See Fig. III.)

40 designates a rotative rod provided with a hand-wheel 41, centrally fixed thereto and
 having its ends provided with right and left

hand screw-threads and seated in threaded apertures in the arms of the yoke 38.

When the dogs 28 are to be moved manually, the housings 12 are raised to their most elevated position and are held thereat by the yoke 38, the arms of which are thrown outwardly at their upper ends by manipulation of the hand-wheel 41 to rotate the rod 40, and the right and left hand threads thereon by turning in the yoke-arms cause the arms to be moved outwardly, so that the hooks 39 of the yokes will engage the upper ends of the guide-bars 3 and sustain the housings 12 from descent. The links 32 being then connected to the crank-arms 33, the cage-supporting dogs 28 may be readily slid inwardly and outwardly at the will of the operator to support or release the mine-cage.

In Fig. VII, I have illustrated cylinder apparatus capable of use in employment of oil or other heavy fluids as a pressure medium for raising the housings 12. In this construction 6^a designates the pressure-receiving cylinders, containing pistons that carry piston-rods 11^a. The fluid pressure medium is conveyed to the cylinders 6^a through pipes 7^a from a pair of fluid-cylinders 42, containing pistons 43, that are operated in unison from a pair of cylinders 44. The oil or other heavy fluid in the two fluid-cylinders 42 is forced therefrom in unison, thereby providing and maintaining uniform pressure in the cylinders 6^a.

In Figs. VIII and IX, I have illustrated a construction whereby the housings 12 and dogs carried thereby are caused to move uniformly, so that in the existence of an unevenly-balanced load on the mine-cage the cage will be prevented from canting by reason of one of the cage-carrying dogs moving faster than the other. In the arrangement shown in said figures the piston-rods 11 extend through the lower ends of the pressure-receiving cylinders 6 and carry at their lower ends racks 45, that operate through brackets 46, secured to the walls of the mine-shaft. 48 represents shafts journaled in the brackets 46 and brackets 47, and on each of said shafts is a spur-wheel 49, arranged in mesh with the racks 45. Each shaft 48 carries a bevel-pinion 50, that has engaged therewith a beveled pinion 51. The bevel-pinions 51 are mounted on a shaft 52, positioned at right angles to the shafts 48 and journaled in boxes 53, secured to the wall of the mine-shaft.

By the use of the construction just described it will be seen that the shafts 48 being geared together in common by the pinions 50 and 51 and shaft 52 said shafts 48 are caused to rotate in uniformity and that therefore the spur-wheels 49 must consequently move in unison, which causes the racks 45 and piston-rods 11 to partake of the same uniform travel. The result is that the pairs of housings 12 and dogs 28 are caused to travel in a uniform manner.

I claim as my invention—

1. In an apparatus of the class described, the combination of dog-carrying means, dogs swingingly connected to said means, means whereby pressure medium is applied to elevate said dog-carrying means, and means whereby said dogs are moved from downwardly-inclined positions to horizontal positions, substantially as described.

2. In an apparatus of the class described, the combination of dog-carrying means, dogs swingingly connected to said means, means whereby pressure medium is applied to elevate said dog-carrying means, and means whereby said dogs are moved from horizontal positions to downwardly-inclined positions, substantially as described.

3. In an apparatus of the class described, the combination of vertically-movable dog-carrying means, means for moving said dog-carrying means vertically, carriers supported by said dog-carrying means, and dogs slidably mounted on said carriers, substantially as described.

4. In an apparatus of the class described, the combination of a pair of vertically-movable housings, a pair of dogs pivoted to said housings, means whereby said housings are elevated, and means whereby said dogs are swung on their pivots, substantially as described.

5. In an apparatus of the class described, the combination of a pair of housings, a pair of dogs pivotally connected to said housings, means whereby pressure medium is applied to elevate said housings, and independent means whereby said dogs are rocked on their pivots to raise and lower them, substantially as described.

6. In an apparatus of the class described, the combination of a pair of housings, a pair of carriers pivoted to said housings, dogs mounted on said carriers, a pair of segments carried by said housings and having link connection with said dog-carriers, and means whereby said segments are rocked to raise and lower said dog-carriers, substantially as described.

7. In an apparatus of the class described, the combination of a pair of vertically-movable housings, means for moving said housings vertically, guide-bars arranged to direct the travel of said housings, dogs carried by said housings, and means for raising and lowering said dogs, substantially as described.

8. In an apparatus of the class described, the combination of a pair of housings, means for raising and lowering said housings, a pair of carriers pivoted to said housings, dogs mounted on said carriers, segments mounted in said housings and provided with link connection to said dog-carriers, rack-bars arranged in engagement with said segments, and means for yieldingly holding said rack-bars, substantially as described.

9. In an apparatus of the class described,

the combination of a pair of vertically-movable housings, means for elevating said housings, a pair of dogs, carriers connected to said housings and on which said dogs are mounted, 5 segments rockingly mounted in said housings and having link connection with said dog-carriers, rack-bars arranged in engagement with said segments, vertically-movable rods to which said rack-bars are connected, weights 10 slidably mounted on said rods, and yokes in which said weights are arranged to travel, substantially as described.

10. In an apparatus of the class described, the combination of dog-supporting means, 15 dogs slidably supported by said means, and a vertically-movable suspended yoke whereby said dog-supporting means may be suspended, substantially as described.

11. In an apparatus of the class described, 20 the combination of dog-supporting means, dogs slidably supported by said supporting means, a yoke having hooks at its upper ends and whereby said dog-supporting means may be suspended, and means for moving said 25 hooked ends of the yoke outwardly, substantially as and for the purpose set forth.

12. In an apparatus of the class described, the combination of dog-supporting means, dogs slidably supported by said supporting 30 means, a yoke whereby said dog-supporting means may be suspended, and a rotatable rod

having right and left hand screw-threaded ends arranged in the arms of said yoke whereby said arms may be moved outwardly, substantially as and for the purpose set forth. 35

13. In an apparatus of the class described, the combination of independent dog-supporting means, dogs carried thereby, means for raising and lowering said dog-carrying means, and means whereby said dog-carrying means are caused to travel vertically in 40 unison with each other, substantially as described.

14. In an apparatus of the class described, the combination of dog-supporting means, 45 dogs carried thereby, pressure-receiving cylinders, piston-rods connected to said dog-carrying means and extending through said cylinders, pistons on said rods, racks carried by said piston-rods at their lower ends, spur- 50 wheels arranged in engagement with said racks on a pair of shafts by which said spur-wheels are carried, and a third shaft geared to the two first-named shafts, substantially as and for the purpose set forth. 55

In testimony whereof I have hereunto set my hand this 1st day of May, 1901.

JOHN O. BARDILL.

In presence of—
E. S. KNIGHT,
M. P. SMITH.