

W. A. CASWELL.  
DOOR OPERATING MECHANISM FOR DUMP CARS.  
APPLICATION FILED APR. 5, 1907.

959,459.

Patented May 31, 1910.

6 SHEETS—SHEET 1.

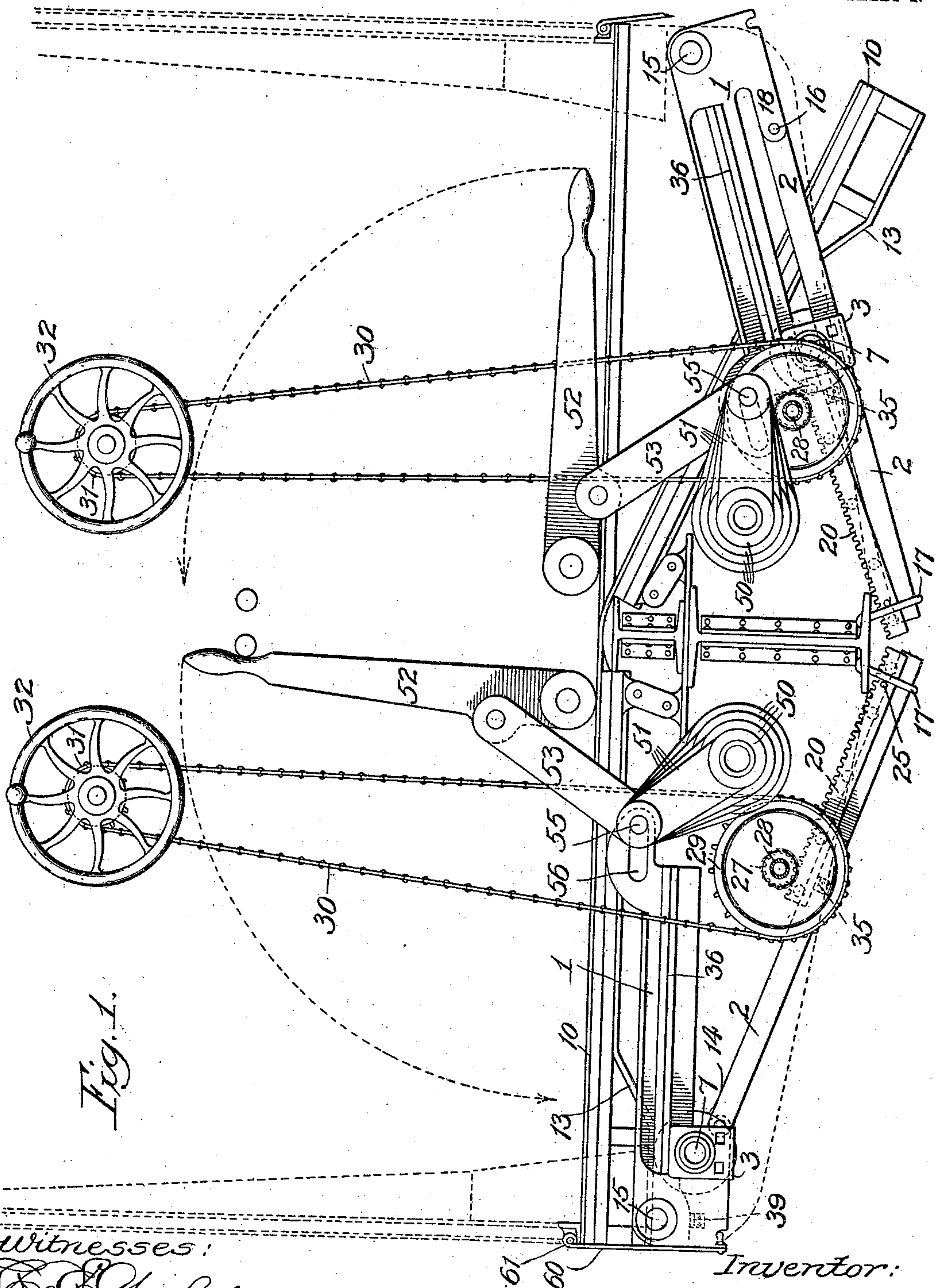


Fig. 1.

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*John Enders.*

Inventor:

*William A. Caswell,*  
*By Thomas F. Sheridan*  
*Atty.*



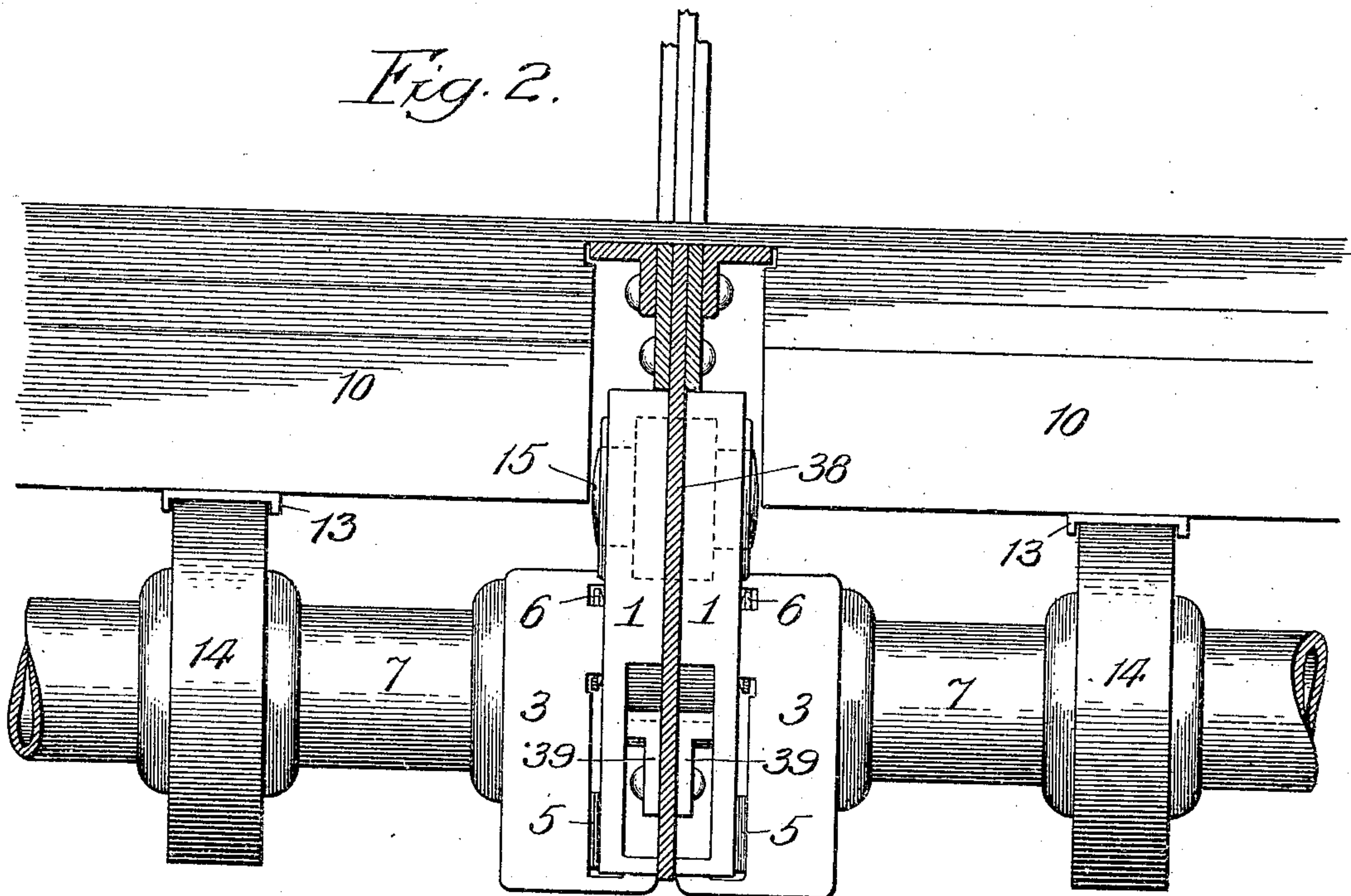
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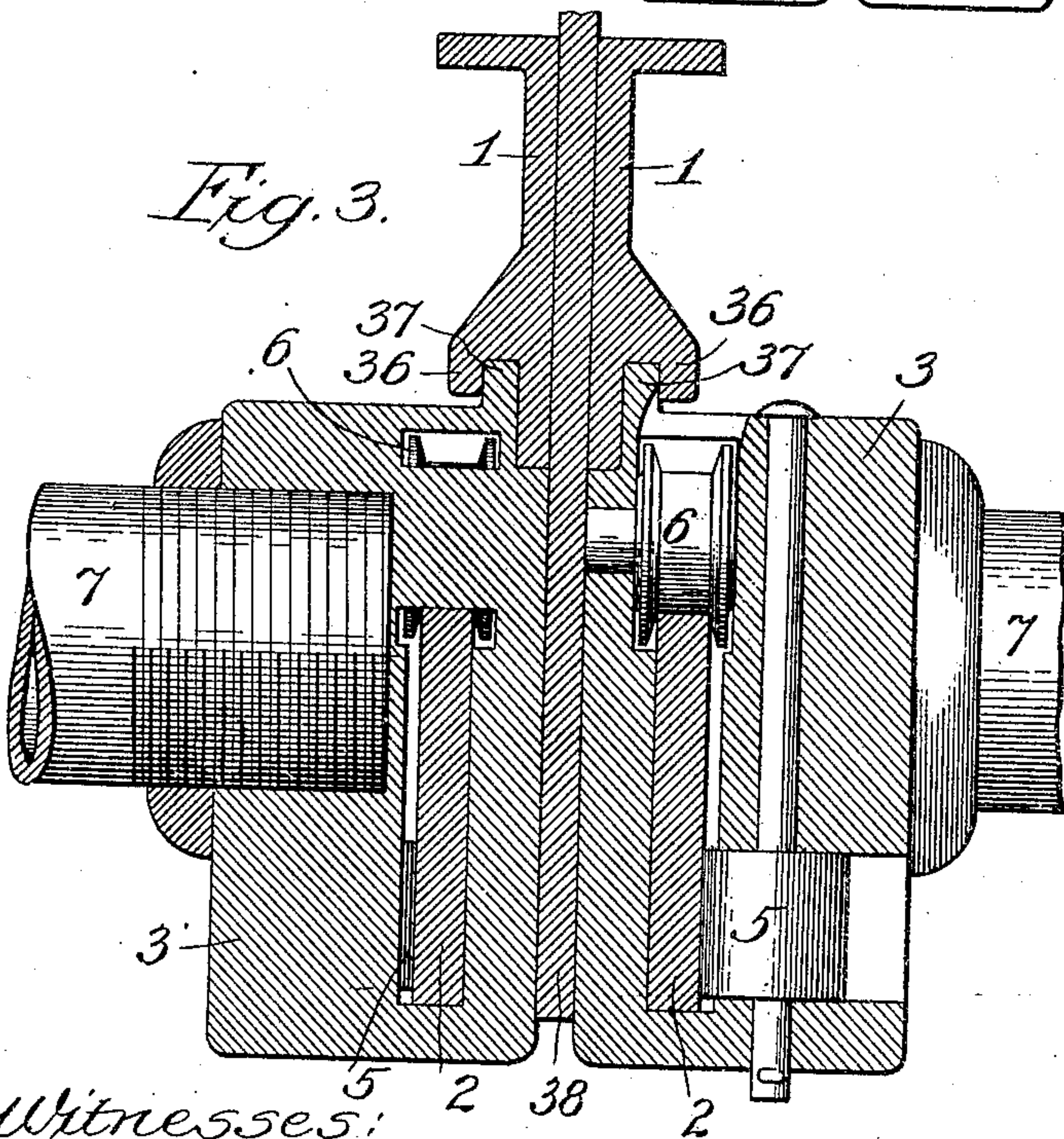
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5 SHEETS—SHEET 2.

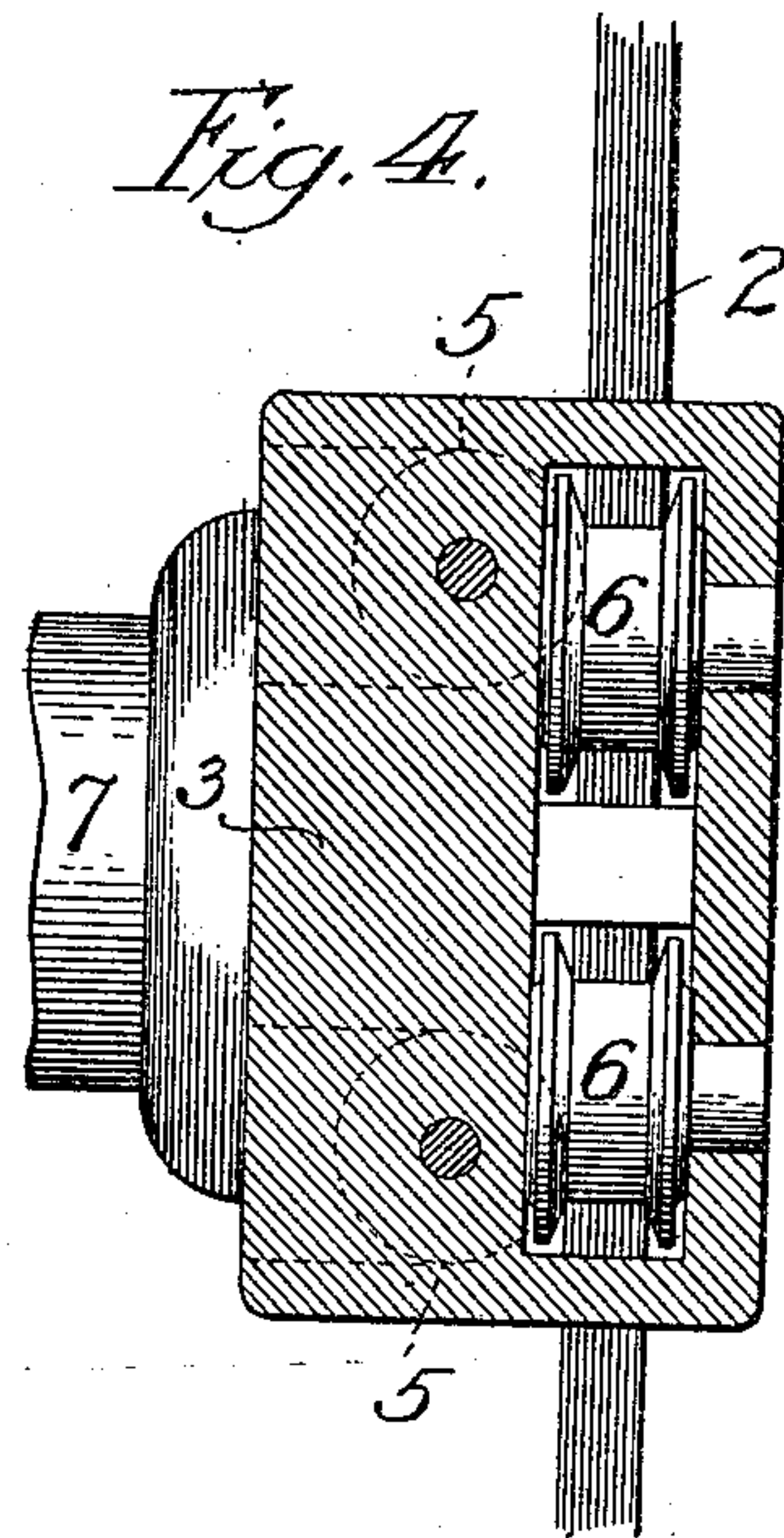
*Fig. 2.*



*Fig. 3.*



*Fig. 4.*



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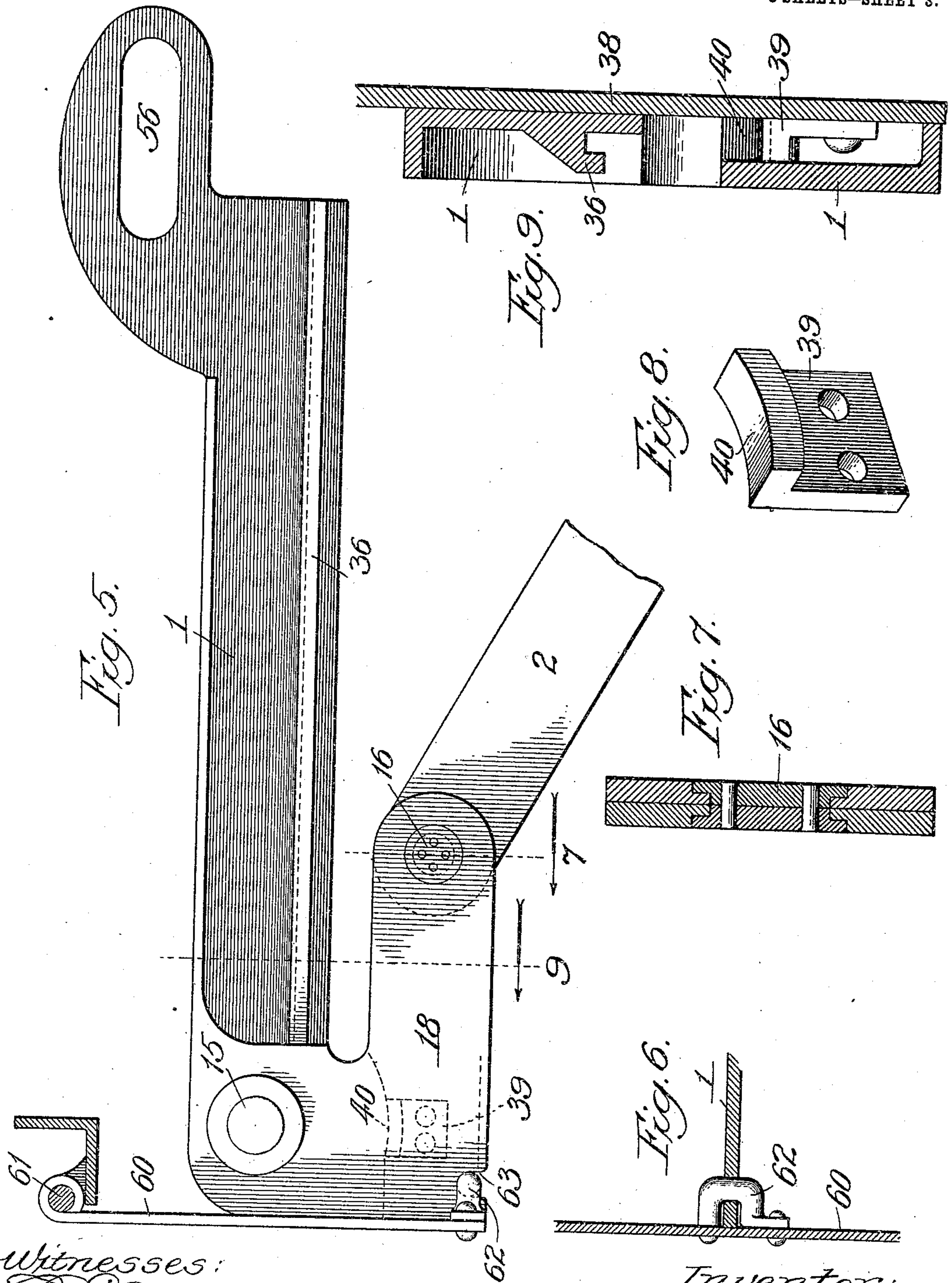


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5 SHEETS—SHEET 3.



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E. B. Gaylord.  
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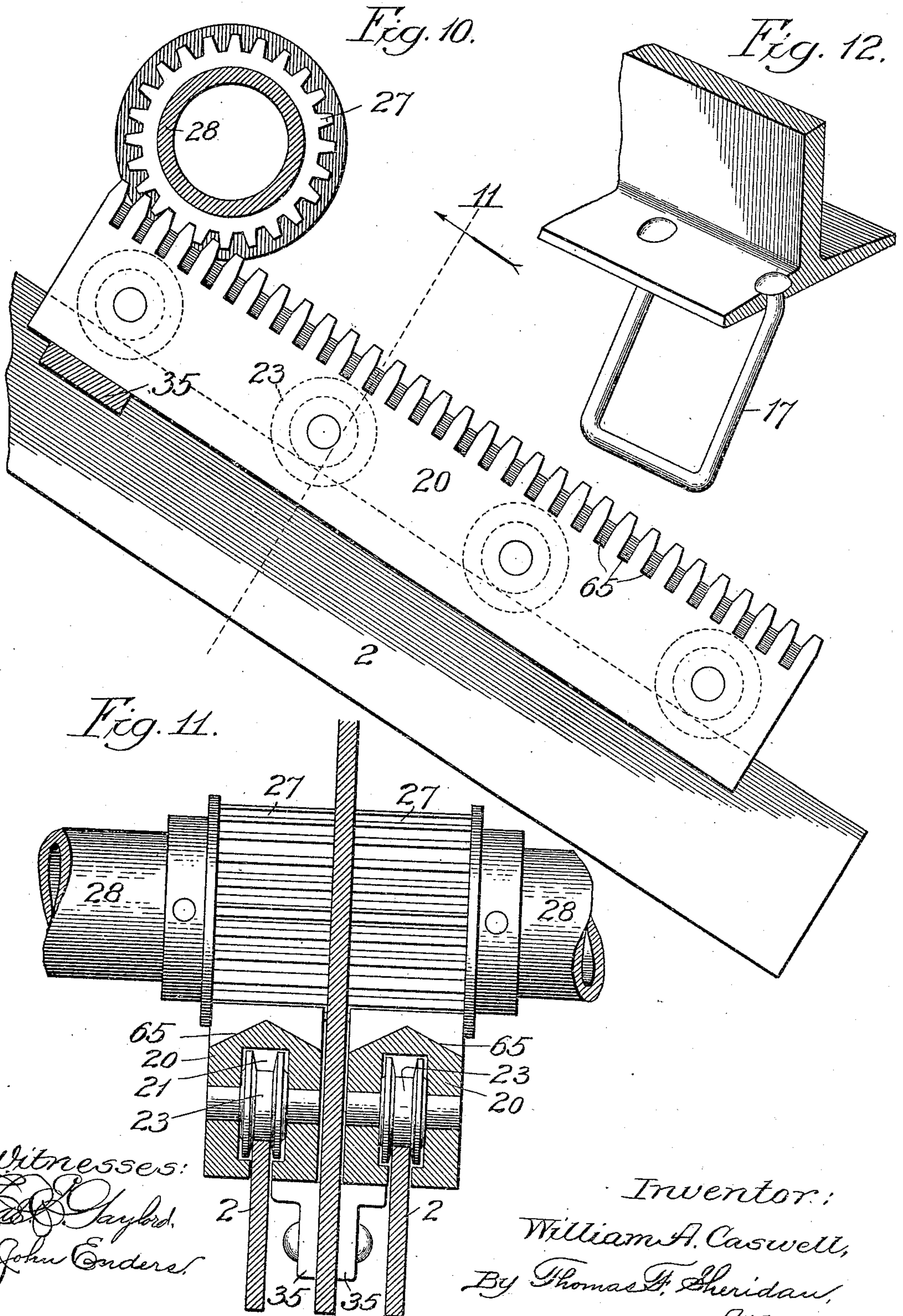
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5 SHEETS—SHEET 5.

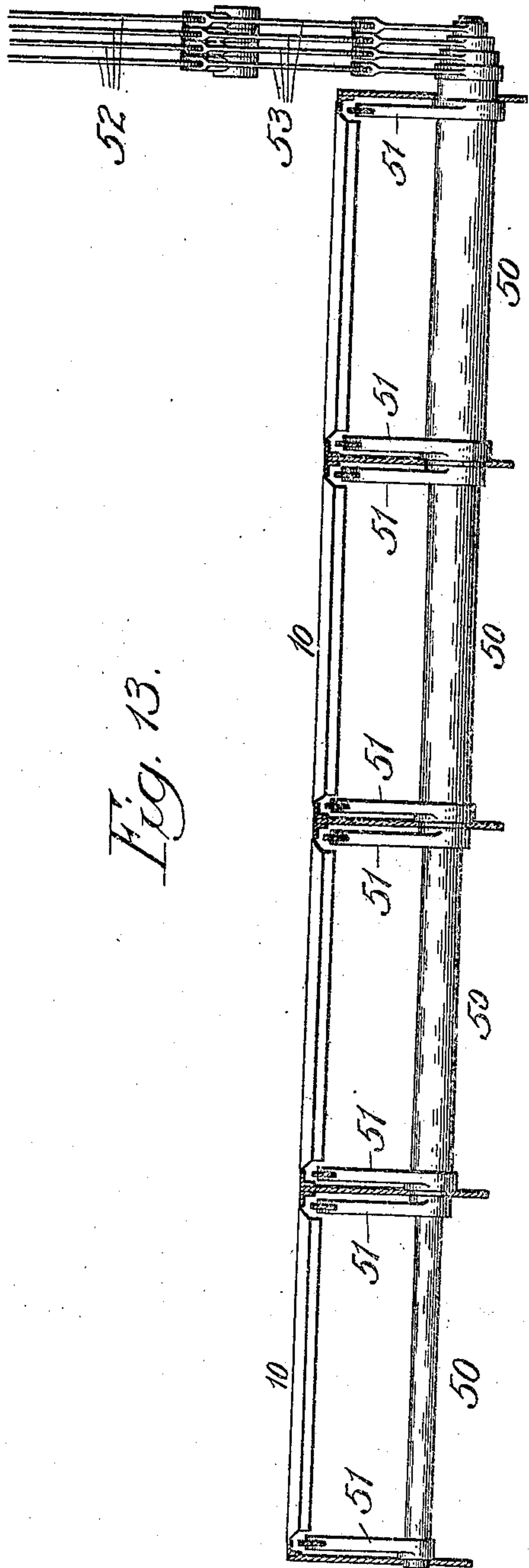


Fig. 13.

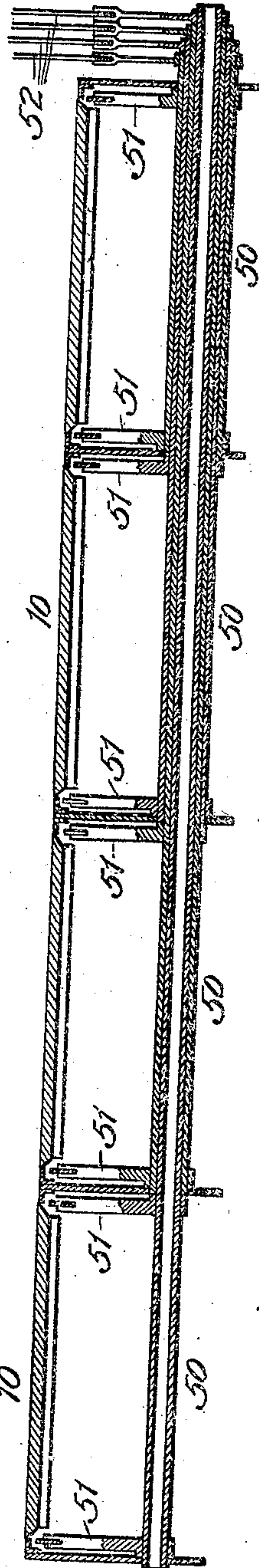


Fig. 14.

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# UNITED STATES PATENT OFFICE.

WILLIAM A. CASWELL, OF CHICAGO, ILLINOIS, ASSIGNOR TO NATIONAL DUMP CAR COMPANY, A CORPORATION OF MAINE.

DOOR-OPERATING MECHANISM FOR DUMP-CARS.

959,459.

Specification of Letters Patent.

Patented May 31, 1910.

Application filed April 5, 1907. Serial No. 366,580.

*To all whom it may concern:*

Be it known that I, WILLIAM A. CASWELL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Door-Operating Mechanism for Dump-Cars, of which the following is a specification.

My invention consists in new and useful improvements in operating mechanism for the drop doors of dump cars, the precise nature of which improvements will appear from the following specification and claims, taken in connection with the drawings forming part of this application.

In the drawings—Figure 1 is a transverse sectional view of a car equipped with door operating mechanism constructed in accordance with my inventions. Fig. 2 is a view of the door operating mechanism viewed from the side of the car and showing the cross girder in section. Fig. 3 is a sectional view in elevation through the door operating arms and connected mechanism. Fig. 4 is a sectional plan view of part of the structure shown in Fig. 3. Fig. 5 is a detail view of one of the door operating arms. Fig. 6 is a detail view of the fastening means for the cover plate. Fig. 7 is a sectional view on the line 7 of Fig. 5. Fig. 8 is a detail of a bracket for supporting the door operating arm. Fig. 9 is a sectional view on the line 9 of Fig. 5, looking in the direction of the arrow. Fig. 10 is a detail of the rack operating mechanism. Fig. 11 is a transverse sectional view of the structure shown in Fig. 10. Fig. 12 is a detail view of the supporting means for the pivoted track members. Fig. 13 is a side view of the telescoping shafts and connected mechanism. Fig. 14 is a sectional view of the telescoping shafts and connected mechanism.

As shown in Fig. 1 of the drawings, the dumping doors 10 are provided on their under surfaces with tracks 13, adapted to be engaged by the rollers 14 on the reciprocating door operating shaft 7. Each door operating arm consists of an upper portion 1 pivoted to the cross girder of the car near the outer extremity thereof, the pivotal bearing being indicated by the numeral 15, and a track member 2 pivoted to the part 1 at the point 16. The lower end of each of the pivoted track members 2 is supported by a

bail 17 depending from the center sill of the car, the parts being so arranged that the track members 2 have some freedom of movement upon their supporting bails. The upper part 1 of the shaft supporting arm is formed with a projection 18 extending parallel to the main body of the arm, and the track member 2 above referred to is pivoted to said projecting part. The reciprocating door operating shafts 7 are supported at their ends in carriages 3, and mounted upon said shafts 7 are rollers 14 adapted to contact with the tracks 13 upon the under sides of the dump doors. The carriages 3 are provided with horizontal rollers 6 bearing upon the upper surface of the tracks 2, and with vertical rollers 5 bearing against the side surface of the tracks 2. A separate door operating shaft 7 is provided for each door, each of the shafts 7 being of a length substantially equal to the width of one of the dump doors and extending between the adjacent cross girders.

Reciprocating racks 20 are mounted upon the pivoted track members 2. These racks are formed as shown in Fig. 11 of the drawings, and are provided with recesses 21 wherein are pivotally mounted rollers 23 which bear upon the pivoted track members 2, the latter projecting through slots in the lower faces of the racks. By this construction the racks are free to reciprocate upon the track members 2. The stops 25 upon the racks contact with the bails 17 and limit the downward motion of the racks upon the tracks 2.

For the purpose of reciprocating the racks 20 I have provided pinions 27 mounted upon shafts 28. These shafts preferably extend half the length of the car, one fourth of the dump doors being operated by each shaft. For the purpose of imparting rotary motion to the gears 27, sprocket wheels 29 are mounted upon the shafts 28 at the end of the car. A sprocket chain 30 passes over the wheel 29 and over a second sprocket wheel 31 to which is attached a hand wheel 32. For the purpose of keeping the racks 20 in engagement with the spur gears 27 during the reciprocation of the arms 1, I have provided supporting angle irons 35, which are secured to the cross girder immediately beneath the shafts 28. The construction of the arms is shown in detail in



Fig. 9. The projecting lip 36 is designed to overhang the flange 37 of the shaft carriage 3, as shown in Fig. 3. Secured to the cross girder 38 of the car is an angle iron 39 having a curved upper surface adapted to co-act with the curved under surface 40 of the arm 1, and take part of the strain away from the pivotal bearing 17. As will be apparent from Fig. 9 the upper part of the arm 1 is recessed on the side away from the cross girder, while the lower part is recessed on the side toward the cross girder, the overhanging lip 36 being located in the upper and outer recess and the bearing surface 40 and supporting angle 39 being located in the inner and lower recess.

The concentric circles 50, shown in Fig. 1 of the drawing, represent a series of telescoping shafts of the construction illustrated and described in my pending application, Serial No. 352,195, filed January 14, 1907. These telescoping shafts are more clearly shown in Figs. 13 and 14. The largest of these shafts projects inwardly from the end of the car to the inner edge of the first dumping door; the shaft next smaller in diameter projects beneath the second dumping door and each of the other shafts projects beyond the next larger shaft a distance substantially equal to the width of one of the doors. All of the shafts project beyond the end sill and are graded in length, each shaft having a crank 51 attached thereto. Each of the cranks 51 is connected to a separate lever 52 by means of a link 53 in addition to cranks 51 beyond the end of the car above referred to. Similar cranks are located upon each of the shafts adjacent the operating arms of one of the dump doors. These last mentioned cranks are provided with studs 55 which co-act with slots 56 upon the inner ends of the door operating arms.

It will be apparent that by lowering the crank arms 51 the studs 55 co-acting with the slots 56 will permit the door operating arms to drop from the position shown at the left of Fig. 1 to that shown at the right. By operating any one of the levers 52 the door operating arms connected to one of the dump doors may be lowered, thus permitting the opening of any selected door.

It will be seen that when the door operating arm 1 is lowered by the means above described, to the position shown at the right of Fig. 1 of the drawing the door operating shaft 7 will be caused by gravity to ride downwardly upon the pivoted track member 2 until the carriage 3 in which the door operating shaft is mounted contacts with the end of the rack 20. The downward movement of the door operating shaft permits the drop door 10 to fall to its open position. In closing any of the doors the first operation is to rotate the hand wheel 32 in such direc-

tion as to impel the rack 20 and with it the carriage 3 upwardly. The upward movement of the carriage 3 carries with it the shaft 7 and rolls 14 located beneath one of the doors, thus moving that door upwardly by the contact of said rolls 14 with the tracks 13. When the carriage 3 has reached the upper limit of its motion and rests upon the part 18 of the arm 1, the lever 52 corresponding to the door which is being closed is raised, thus through the connection of the lever with the operating shaft raising said arms 1 corresponding to the door in question to a horizontal position, as shown at the left of Fig. 1 of the drawings. In this position the carriages 3 have no tendency to move downward under the weight of the door and load as the part of the track upon which they rest is horizontal. Suitable means are provided for locking the levers 52 and with them the arms 1 in their uppermost position and thereby securing the doors in their closed position. The force necessary to retain the arms 1 in their upper position is comparatively small owing to the fact that the shaft 7 when the doors are closed is in close proximity to the fulcrum 15 of the levers 1.

For the purpose of protecting the operating parts I have provided cover plates 60 hinged to the car side at 61, by means of pintles secured to the side stakes or other convenient parts of the structure. The cover plates 60, as shown in Figs. 5 and 6 of the drawing, are provided at their lower ends with hooks 62, which engage notches 63 in the lower edge of the arms 1. The cover plates have a slight outward movement upon the pintles 61 when the arms 1 are lowered.

In order to expel any matter which may accumulate between the teeth of the racks 20, I form the space between the teeth with outwardly and downwardly sloping surfaces, as indicated by the numeral 65 in Fig. 11 of the drawings. The pivoted rail 2 is preferably connected to the arm 1 by a joint similar to that shown in Fig. 7 of the drawings.

I claim:

1. In a dump car a reciprocating door operating shaft, and a pivotally supported track supporting said shaft.

2. In a dump car a reciprocating door operating shaft, and a supporting track therefor, part of said track being movable from a horizontal to an inclined position.

3. In a dump car a reciprocating door operating shaft, an operating arm comprising a track for supporting said shaft, part of said track being rigid with said arm and part being pivoted thereto, and means for supporting the free end of said pivoted part.

4. In a dump car a reciprocating door operating shaft, an operating arm comprising a track for supporting said shaft, part



of said track being rigid with said arm and part being pivoted thereto, means for supporting the free end of said pivoted part, and means for moving said shaft along said track.

5. In a dump car a reciprocating door operating shaft, a track therefor, part of said track being inclined and the other part being movable from an inclined to a horizontal position.

6. In a dump car a reciprocating door operating shaft, a track therefor, part of said track being inclined and the other part being movable from an inclined to a horizontal position, and means for moving said shaft along said track.

7. In a dump car a reciprocating door operating shaft, a track therefor, part of said track being inclined and the other part being movable from an inclined to a horizontal position, a rack movable along said track and operatively engaging said shaft, and means for imparting movement to said rack.

8. In a dump car a reciprocating door operating shaft, a track adapted to support said shaft, part of said track always occupying an inclined position, and means whereby the part of said track upon which the shaft is supported when the door is closed may be moved to a horizontal position.

9. In a dump car a reciprocating door operating shaft, a pivoted operating arm comprising a track for supporting said shaft, part of said track being rigid with said arm and part being pivoted thereto, a rack movable endwise on said pivoted track member, means for moving said operating arm on its pivot, and means for imparting movement to said rack.

10. In a car a plurality of dump doors, a reciprocating operating shaft for each door, operating arms for each of said shafts, each operating arm comprising a shaft supporting track, means whereby the operating arms of any one of said doors may be raised and lowered independently of the remaining operating arms, and means whereby movement may be imparted to the operating shafts to close the doors.

11. In a car a plurality of dump doors, a reciprocating operating shaft for each door, operating arms for each of said shafts, each operating arm comprising a shaft supporting track, part of said track being rigid with said arm and part being pivoted thereto, means whereby the operating arms of any one of said doors may be raised and lowered independently of the remaining operating arms, and means whereby movement may be imparted to the operating shafts to close the doors.

12. In a dump car door operating arms pivoted beneath and adjacent the sides of

the car, a cover plate pivoted to the side of the car and extending over the ends of said arms.

13. In a dump car door operating arms pivoted beneath and adjacent the sides of the car, a cover plate secured to the side of the car and extending over the ends of said arms.

14. In a dump car a reciprocating door operating shaft, a pivoted operating arm comprising a track for supporting said shaft, part of said track being rigid with said arm and part being pivoted thereto, a rack movable endwise on said pivoted track member, a pinion engaging said rack, means for moving said operating arm on its pivot, and means for imparting movement to said pinion and rack and for holding the rack in operative relation to the pinion in the different positions of said operating arm.

15. In a dump car a door operating shaft, a supporting track therefor, carriages upon the ends of said shaft, and rollers in said carriages adapted to engage the upper surface of said tracks.

16. In a dump car a door operating shaft, a supporting track therefor, carriages upon the ends of said shaft, rollers in said carriages adapted to engage the upper surface of said tracks, and other rollers adapted to engage the side surface of said tracks.

17. In a dump car a reciprocating door operating shaft, a track upon which said shaft is supported, a rack mounted upon said track in operative relation to said shaft, and means for moving said rack and thereby also moving said shaft.

18. In a dump car a reciprocating door operating shaft, carriages mounted non-rotatably upon the ends of said shafts, and tracks adapted to support said carriages.

19. In a dump car, a plurality of drop doors, inclined tracks pivoted to the frame of the car beneath said doors, reciprocating shafts coöperating with said tracks and doors, and means whereby the tracks beneath each door may be independently moved upon their pivots.

20. In a dump car, a plurality of drop doors, inclined tracks pivoted to the frame of the car beneath said doors, a reciprocating shaft coöperating with said tracks and doors, and a series of telescoping shafts extending to the end of the car, each shaft being connected to the pivoted tracks beneath one of said doors.

21. In a dump car, a plurality of drop doors, tracks pivoted to the frame of the car beneath said doors, an endwise movable rack upon each of said tracks, reciprocating shafts coöperating with said racks and door, gears meshing with said racks, a shaft upon which said gears are mounted, a sprocket wheel secured to said shaft, a second sprocket wheel secured to the end of the car, and a



sprocket chain meshing with said sprocket gears.

22. In a dump car, a plurality of drop doors, inclined tracks pivoted to the frame of the car beneath said doors, a reciprocating shaft cooperating with said tracks and doors, a series of telescoping shafts extending to the end of the car, each shaft projecting beyond the one next larger in size a distance approximately equal to the width of one of said doors, crank arms upon the projecting ends of said shafts, the crank arms of each shaft being connected to the tracks beneath one of said doors, and levers at the end of the car connected to said telescoping shafts.

23. In a dump car, a plurality of drop doors, tracks pivoted to the frame of the car beneath said doors, and means whereby the tracks cooperating with any one of said doors may be moved between an inclined and horizontal position independently of the tracks beneath the other doors.

24. In a dump car, a drop door, a track pivoted to the frame of the car beneath said door adjacent the free edge thereof, a reciprocating shaft cooperating with said track

and door, a shaft pivoted in the frame of the car, a crank arm secured to said shaft, a stud upon said crank arm cooperating with a slot in the free end of said track, a lever pivoted at the end of the car, a second crank upon said shaft at the end of the car, and a link connecting said second shaft with said lever.

25. In a dump car, a plurality of drop doors, tracks pivoted to the frame of the car beneath said doors, reciprocating shafts cooperating with said tracks and doors, and independent means extending from the tracks beneath each of said doors to the end of the car for moving said tracks between an inclined and a horizontal position.

26. In a dump car, a plurality of drop doors, inclined tracks pivoted to the frame of the car beneath said doors, reciprocating shafts cooperating with said tracks and doors, and means whereby the tracks may be moved upon their pivots.

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