

C. W. SHERMAN.  
CASTING PLANT.  
APPLICATION FILED JAN. 14, 1905.

938,904.

Patented Nov. 2, 1909.

4 SHEETS—SHEET 1.

Fig. 1.

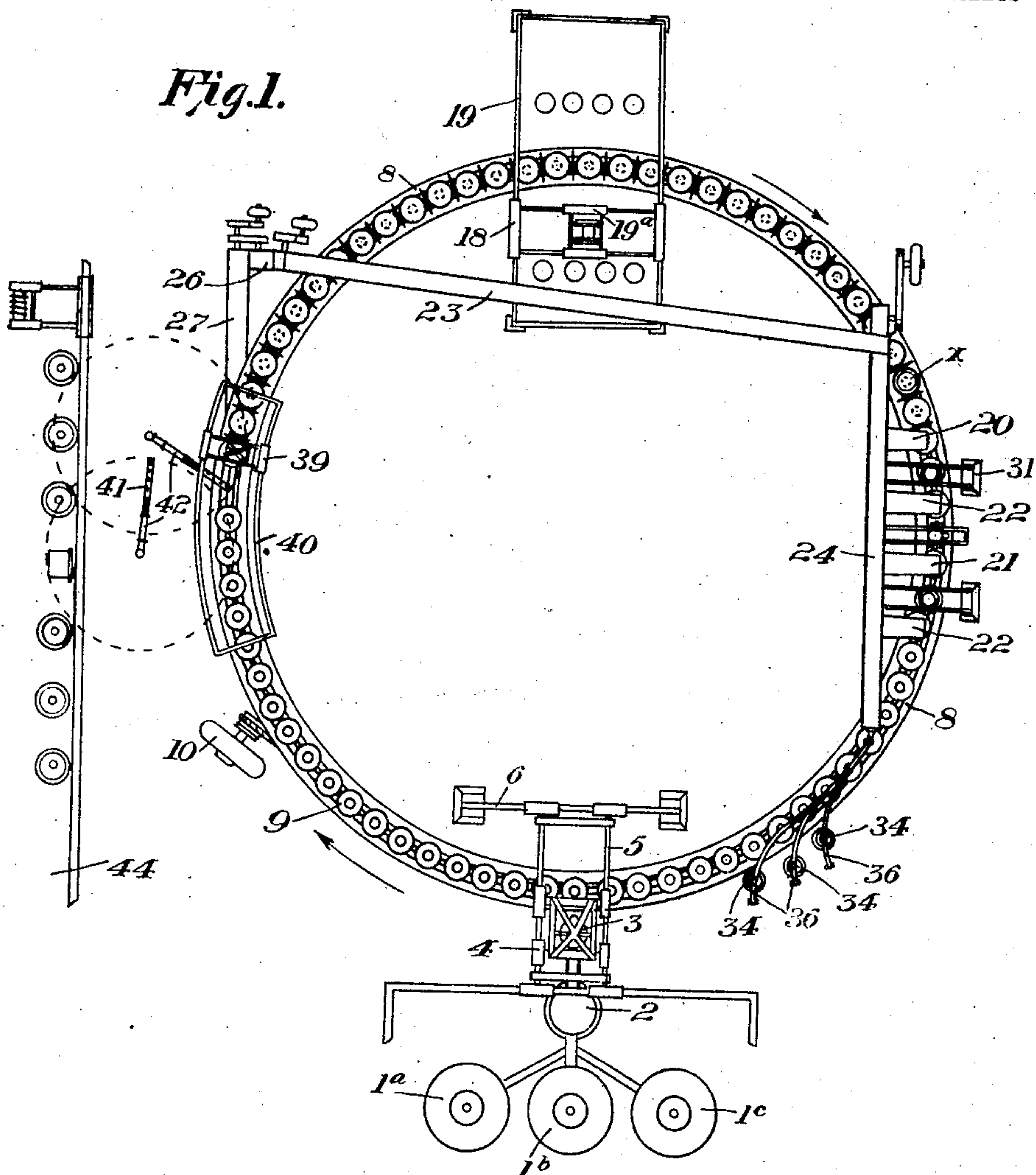
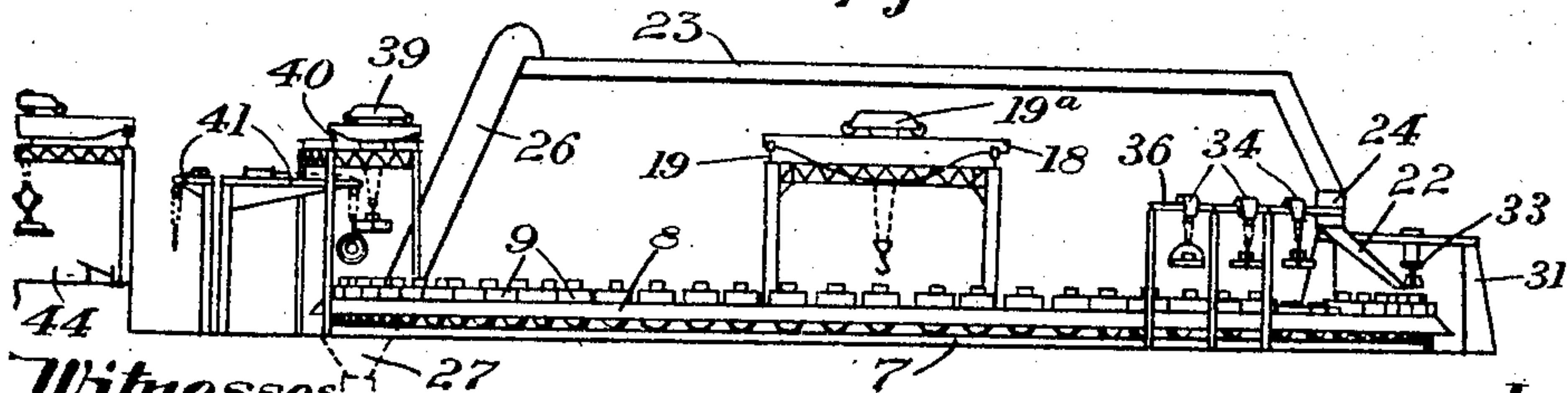


Fig. 2.



Witnesses

Cyril C. Brick

Margaret Hughes

per

Inventor,

Clifton W. Sherman

W. G. Doolittle

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4 SHEETS—SHEET 2.

Fig. 3.

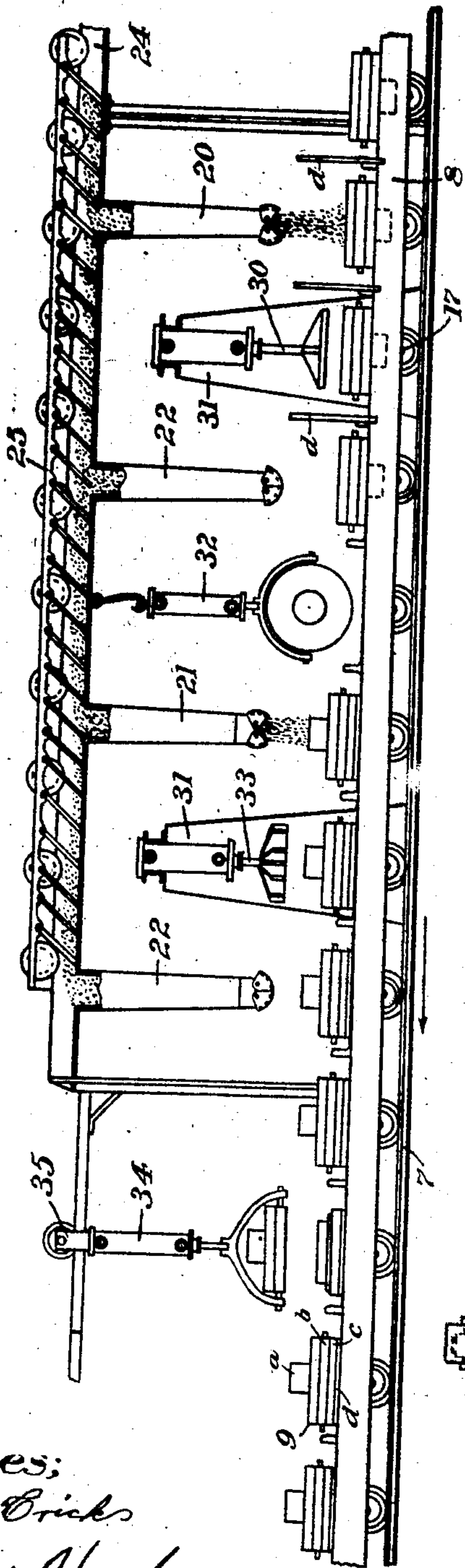
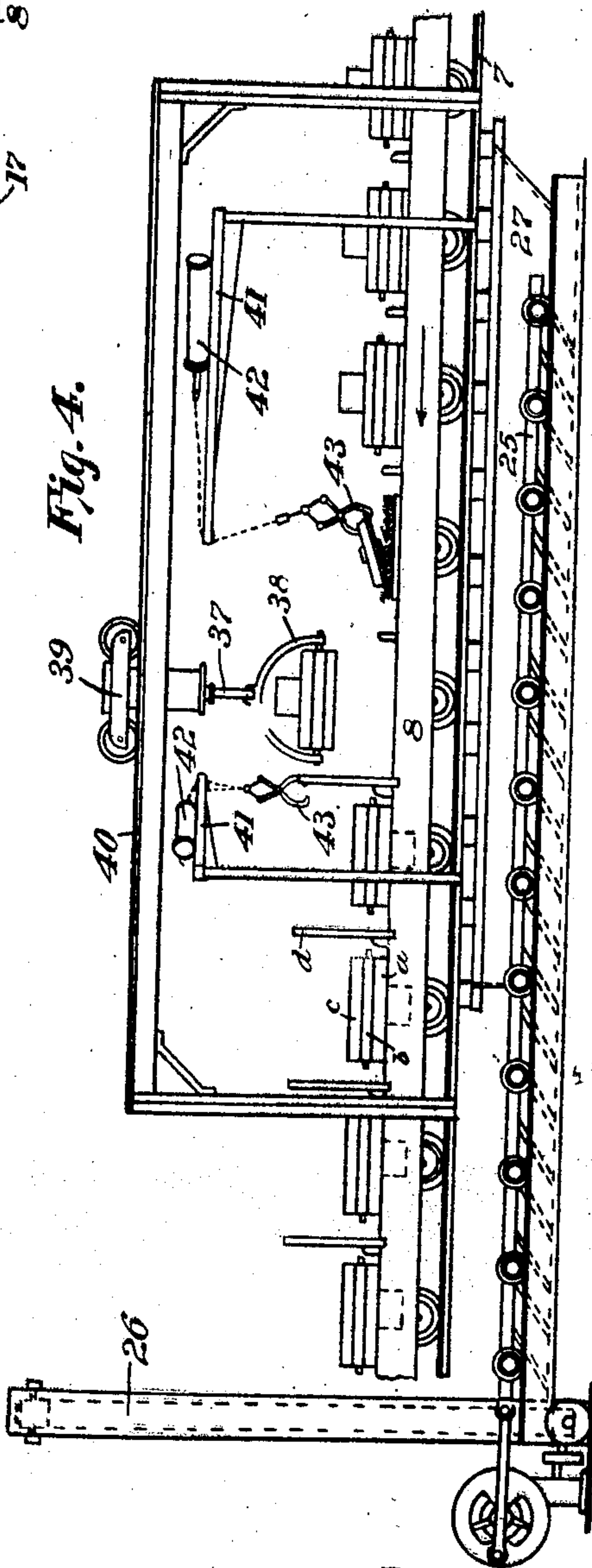


Fig. 4.



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4 SHEETS—SHEET 3.

Fig. 5.

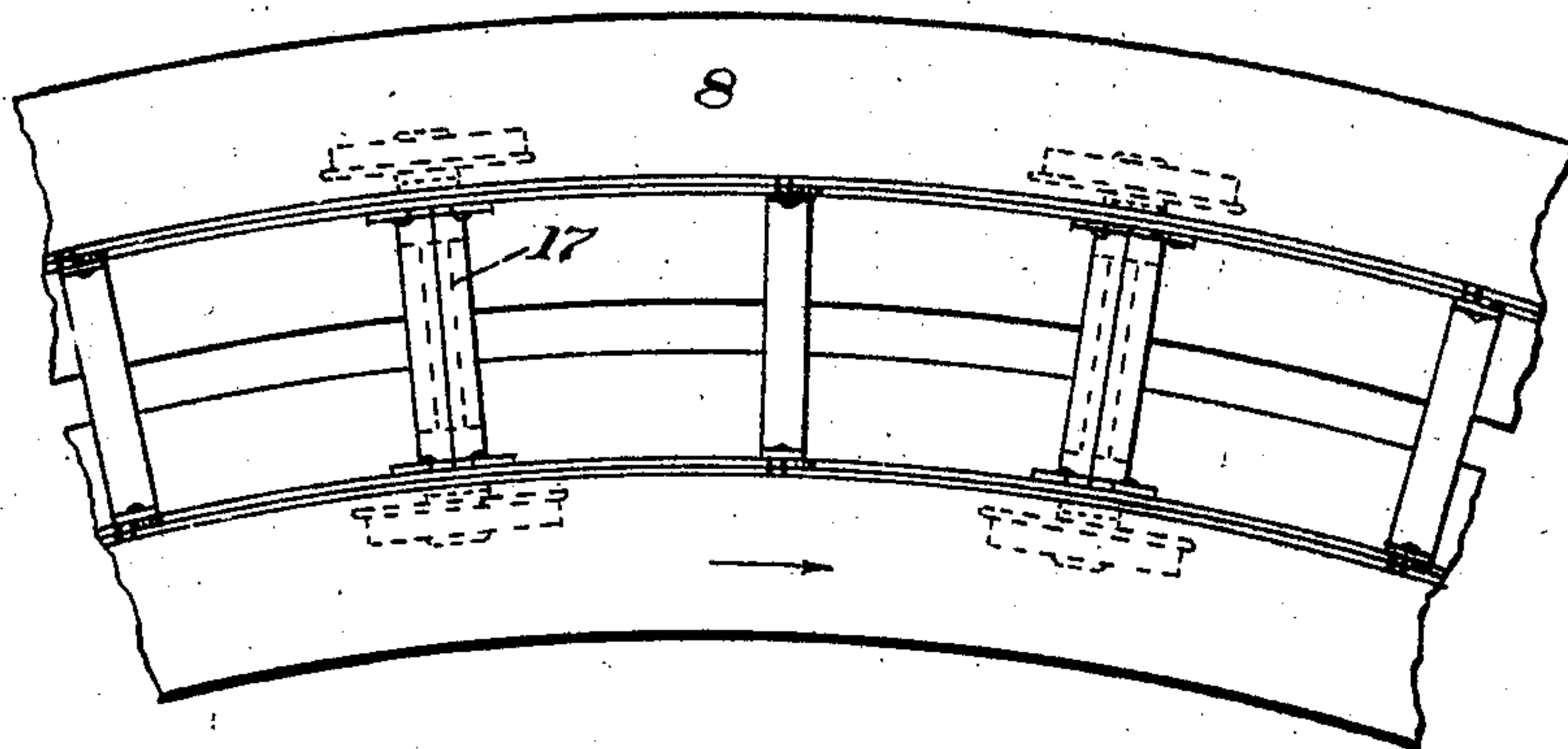


Fig. 6.

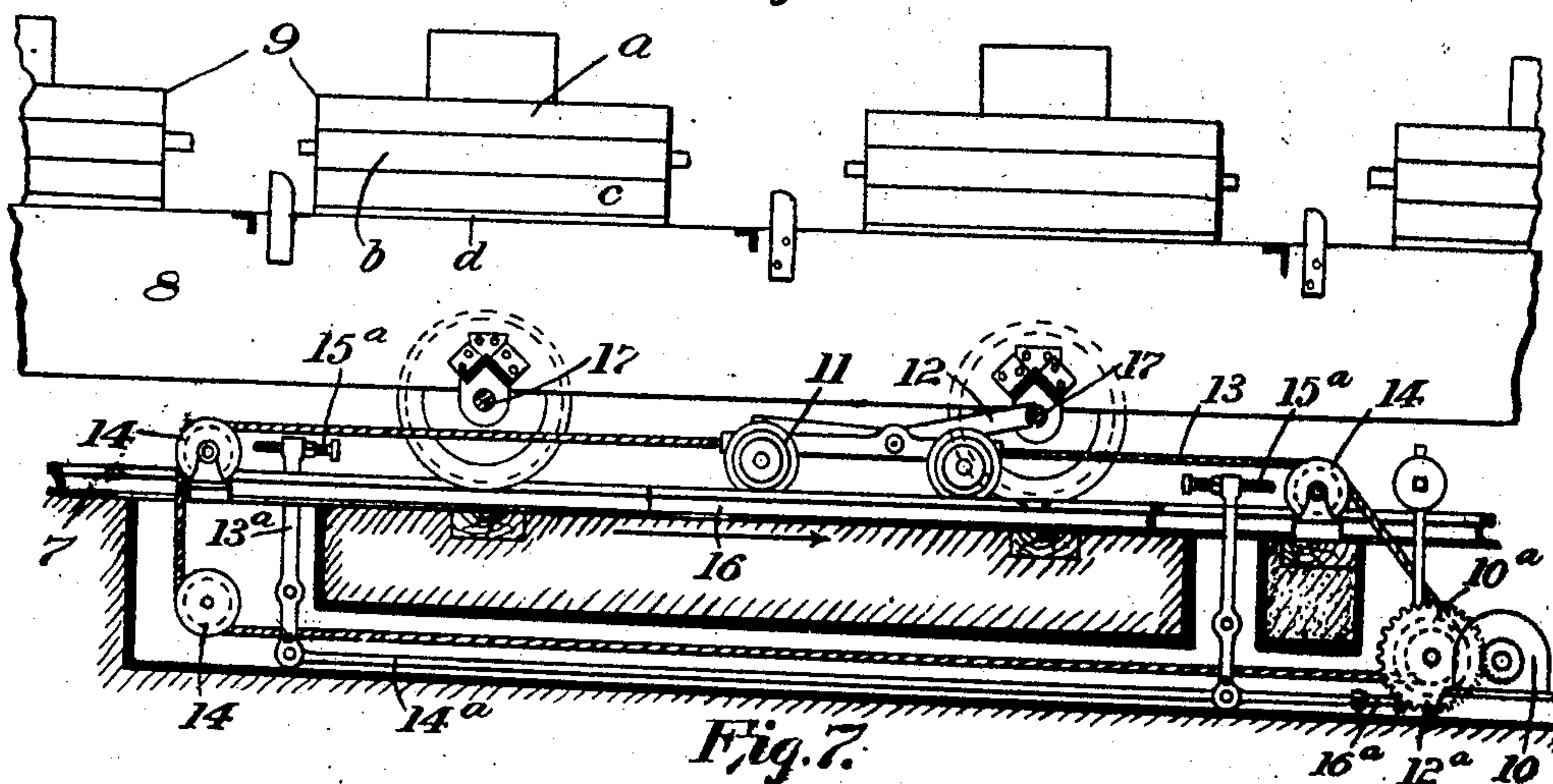
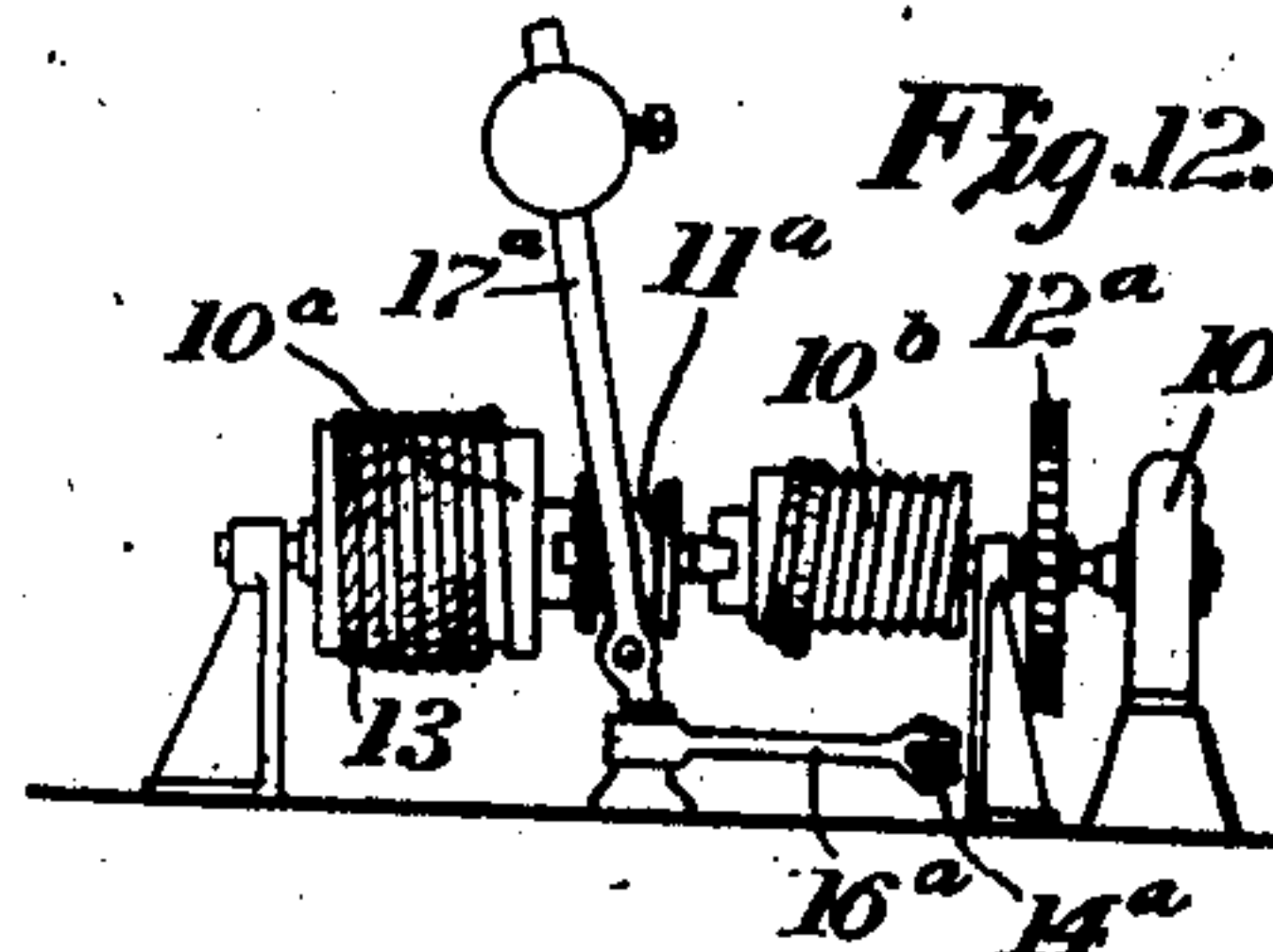
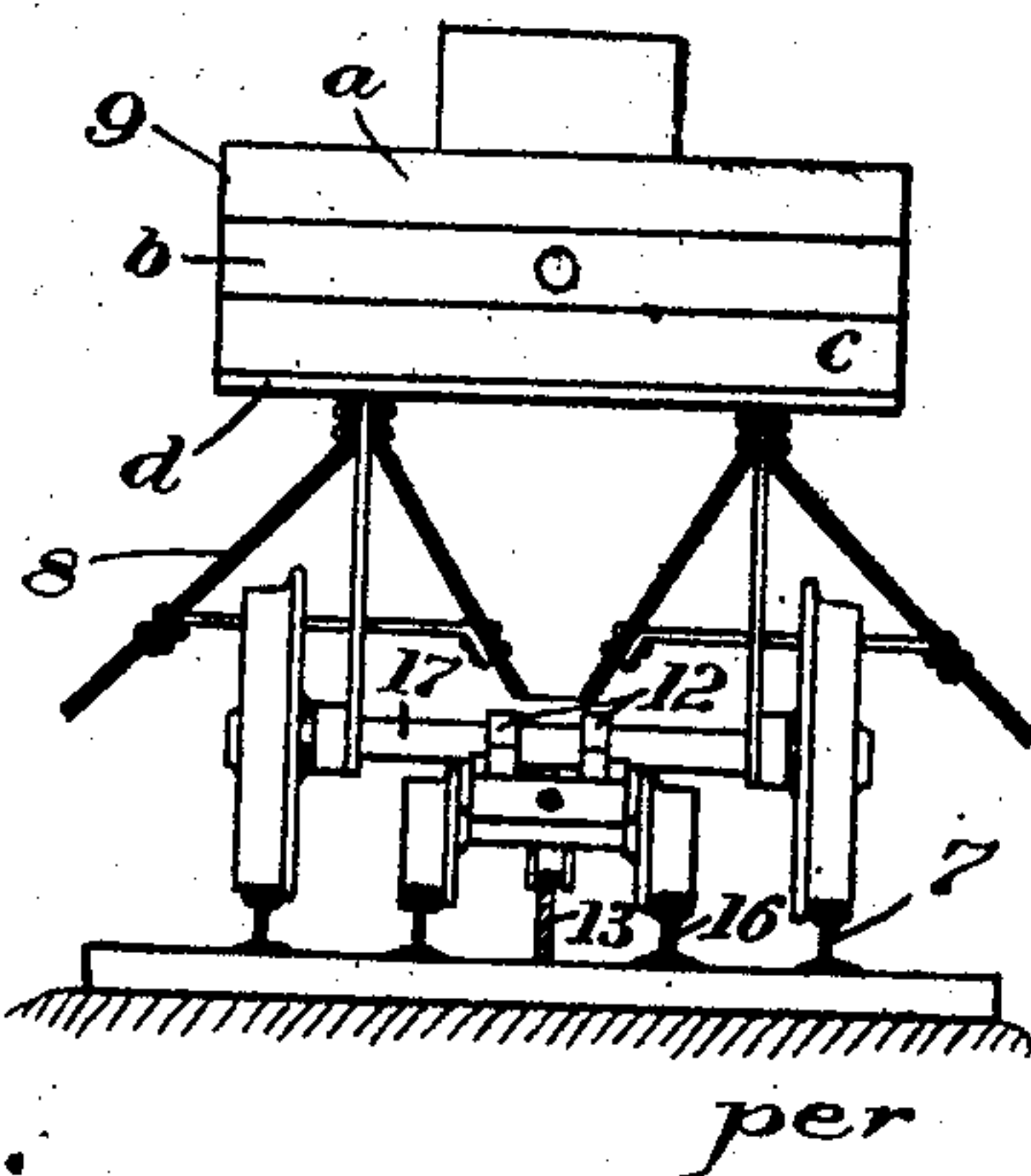


Fig. 7.



Witnesses;  
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4 SHEETS—SHEET 4.

Fig. 10.

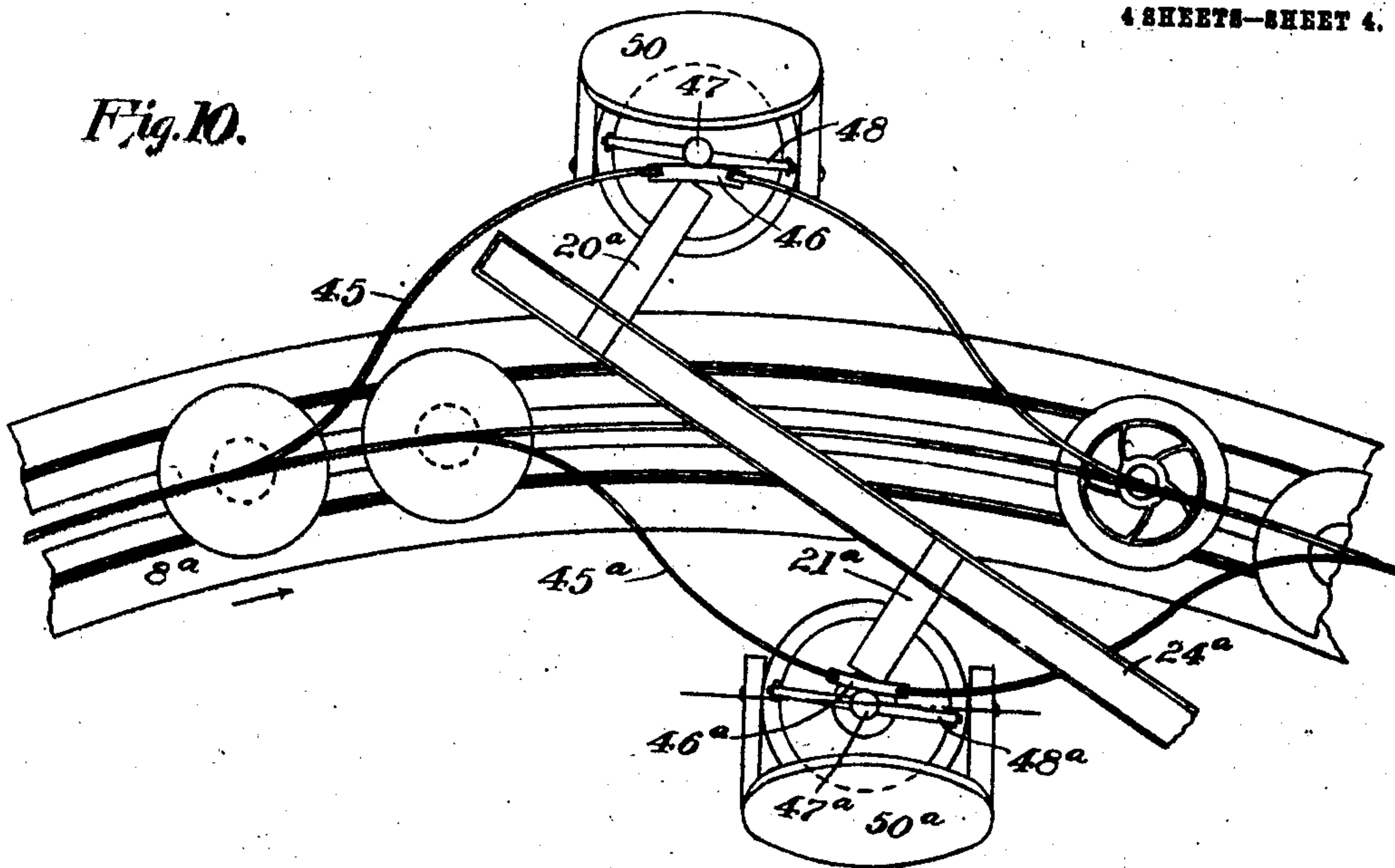


Fig. 8.

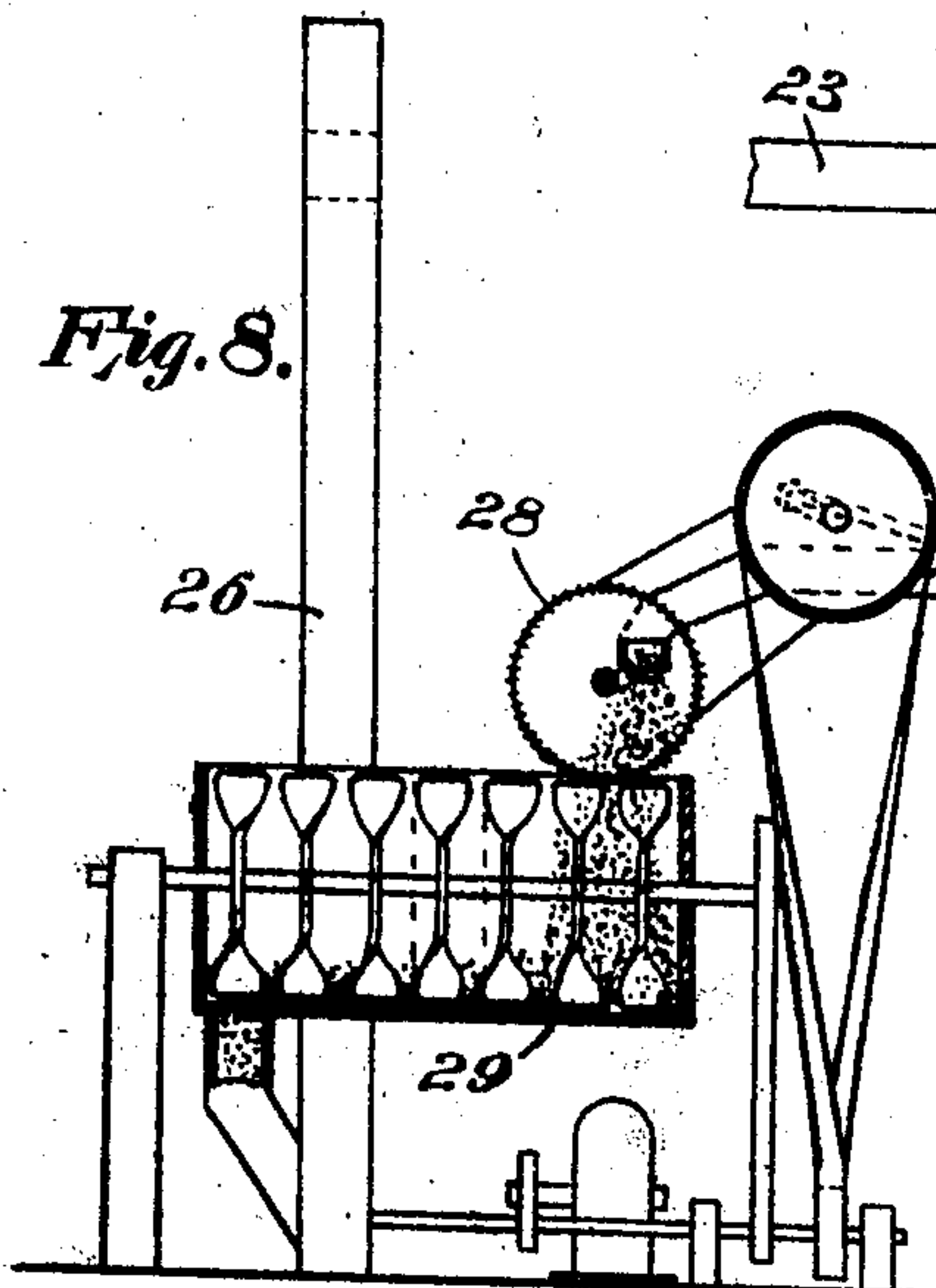


Fig. 9.

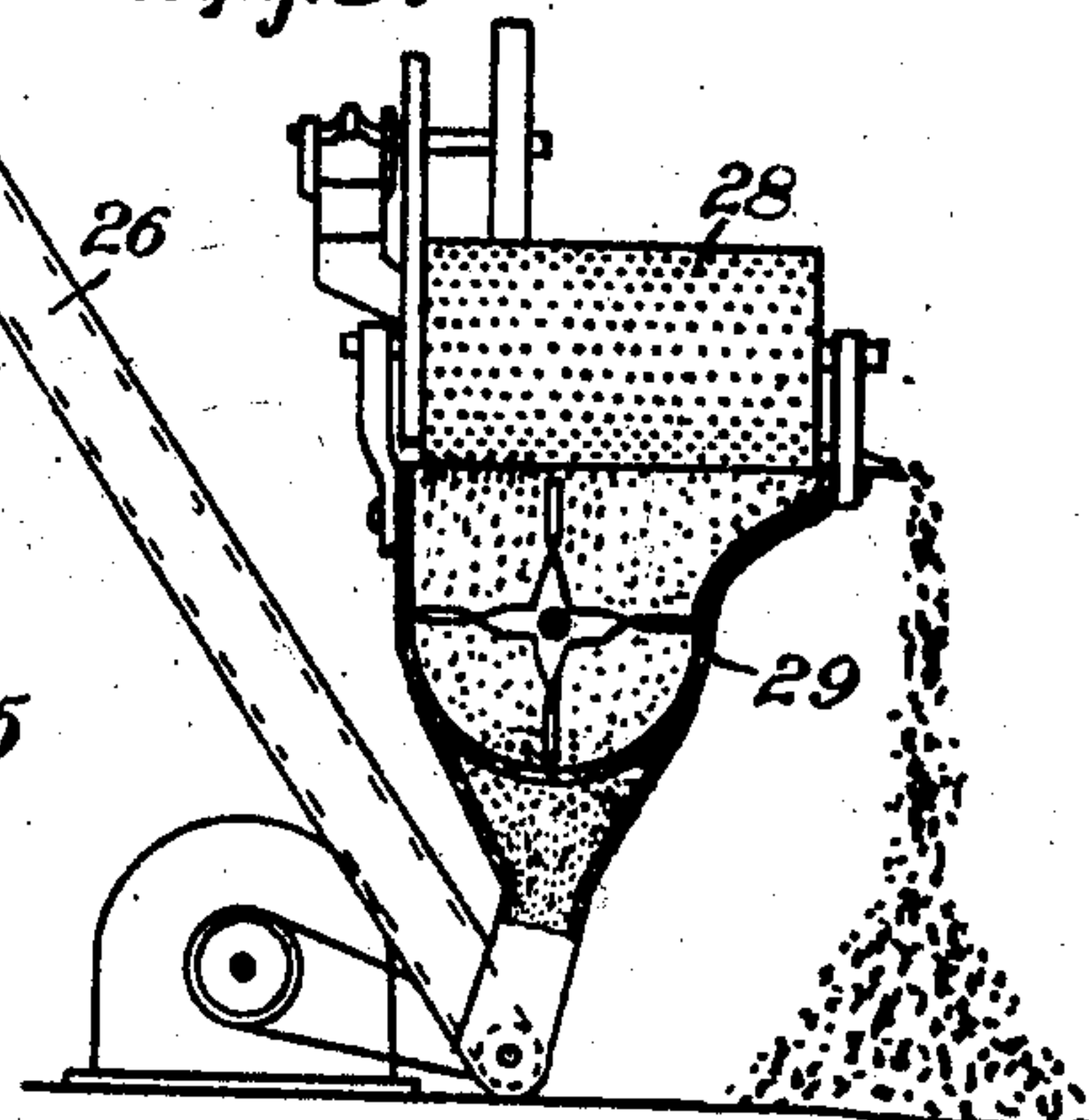
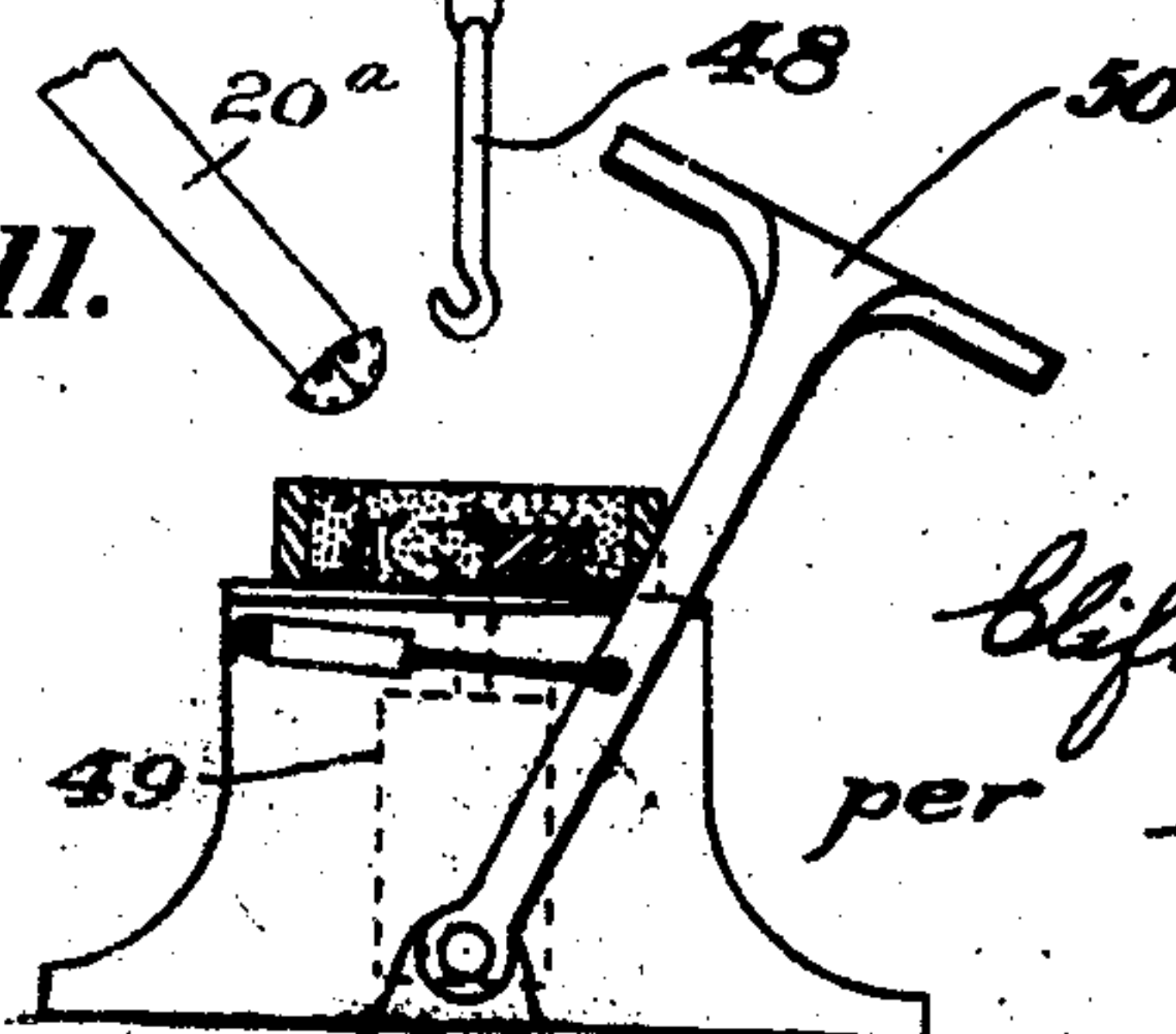


Fig. 11.



Witnesses;

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Att'y.



# UNITED STATES PATENT OFFICE.

CLIFTON W. SHERMAN, OF BELLEVUE, PENNSYLVANIA.

## CASTING PLANT.

938,904.

Specification of Letters Patent.

Patented Nov. 2, 1909.

Application filed January 14, 1905. Serial No. 241,092.

*To all whom it may concern:*

Be it known that I, CLIFTON W. SHERMAN, a citizen of the United States, residing at Bellevue, in the county of Allegheny and State of Pennsylvania, have invented new and useful Improvements in Casting Plants, of which the following is a specification.

The object of my invention is to provide a new and improved casting-plant, and the present invention particularly relates to that class of inventions shown and described in United States Letters Patent No. 776,696 granted to me on December 6th, 1904. In said patent I have described and shown a casting-plant especially designed for the manufacture of chilled cast iron car-wheels. In the present invention I have also illustrated a casting-plant for the manufacture of similar car-wheels, but my invention is not limited to a casting-plant for making car-wheels only, for, with certain changes coming within the scope of my invention, other castings may be made.

In the accompanying drawings which illustrate applications of my invention, Figure 1, is a plan view of a plant embodying my invention; Figs. 2, 3 and 4, elevational views showing different portions of the plant; Fig. 5, a broken plan of platform or carrier; Fig. 6, an elevational view of platform showing flasks thereon and driving-mechanism; Fig. 7, a part elevational and a part sectional view showing a flask and the construction of platform or carrier; Fig. 8, a detail view of a portion of the sand-conveyor, sand-screen, and sand-mixing apparatus; Fig. 9, a detail view taken at right angles to the view of Fig. 8; Fig. 10, a diagrammatic view showing a modified method of ramming the sand in the cope and drag portions of the flask; Fig. 11, a detail view of a portion of the mechanism employed in the modified form of Fig. 10; and Fig. 12, detail view of driving-mechanism.

Referring to the drawings, 1<sup>a</sup>, 1<sup>b</sup>, and 1<sup>c</sup> represent three cupolas connected up with a reservoir-ladle 2, which latter is arranged to discharge the molten metal into a pouring-ladle 3. Pouring-ladle 3, is suspended from an overhead traveling carriage 4, mounted on a traveling-crane 5. Crane 5, is mounted on ways 6.

As illustrated and as preferred I employ a circular-track 7, on which is mounted a traveling annular ring platform or carrier 8. Carried on platform 8 is a series of

equipments or car-wheel flasks 9. The term "equipment" as used herein will include the several parts of a car-wheel-flask, that is to say, the cope, chiller, drag and bottom-board, and in the drawings I have respectively designated these parts as *a*, *b*, *c* and *d*.

The form of platform or carrier preferably employed is clearly shown by Figs. 5, 6 and 7 and the driving-mechanism for moving the platform particularly shown by Figs. 6 and 12. This driving-mechanism which may be located at any suitable point or points along the track comprises a motor 10, a carriage 11 having automatically engaging and disengaging members 12, cable 13, sheaves 14. The carriage is mounted and runs on rails 16. The mechanism is so arranged that the forward or carrier-moving travel of the carriage is limited to about the diameter of an equipment or flask, and the backward travel is the same distance. For the purposes of causing this reciprocating movement of the carriage on the rails and causing the said engaging and disengaging-members to automatically engage and disengage, say an axle 17 on the carrier, just at the proper times, I employ, in addition to the parts heretofore mentioned, two drums 10<sup>a</sup> and 10<sup>b</sup>, upon which the cable winds, a movable clutch 11<sup>a</sup>, gear-mechanism 12<sup>a</sup>, pivoted and connected levers 13<sup>a</sup> and 13<sup>b</sup>, joined by a connecting-rod 14<sup>a</sup>. Each lever 13<sup>a</sup> and 13<sup>b</sup> is provided with an adjustable-stop 15<sup>a</sup>. Connecting-rod 14<sup>a</sup> extends beyond the lever 13<sup>b</sup> and joins a bell-crank 16<sup>a</sup>. Joined to bell-crank 16<sup>a</sup> is a pivoted weighted lever 17<sup>a</sup>.

The position of the parts as shown by Fig. 12 is the position they assume while the carriage 11 is in the position shown by Fig. 6. When the carriage strikes the stop 15<sup>a</sup> of lever 13<sup>b</sup>, the connecting-rod, bell-crank and weighted lever 17<sup>a</sup>, are moved thereby causing the clutch-mechanism to be disengaged from the drum 10<sup>a</sup> and thus stopping the carrier-moving travel of the carriage.

As shown by the drawings pouring-ladle 3, is arranged to be moved directly over and across the track and as the crane 5 is arranged to travel on ways 6, it will be noted that ladle 3, may be readily moved into the desired position for pouring metal into a flask carried on the platform or carrier.

For the purposes of placing the equip-



ments on and removing the same from the carrier I employ a crane 18 mounted and adapted to run on a track 19 which latter extends across the track as shown by Fig.

5 1. On the crane is a carriage 19<sup>a</sup>.

In describing my method of manufacturing car-wheels, the plant illustrated, and the different mechanisms employed I shall follow one equipment or flask, and for this purpose, it is assumed that the equipments are in position upon the carrier and the plant in operation.

At some convenient point along the track as at X, a pattern is placed within the equipment by an operator. A continued movement of the carrier with the equipment thereon will bring the equipment under the sand supply spout 20, from which sand is fed to the drag. Spout 20, as well as several other sand-supply spouts 21, and 22, communicates with a sand-handling and conveying system comprising portions 23, 24, each provided with a reciprocating sand-conveyer 25, a sand-elevator 26, a hopper 27 also provided with a reciprocating mechanism 25, a screening-mechanism 28 and a mixer 29. This system of handling and conveying the sand permits the sand to be continuously worked and conveyed from the hopper 27, into which the sand falls during the operation of stripping, which will be hereinafter fully described, to the sand delivery spouts 20, 21 and 22. Attention is called to the fact that the means shown provide for mechanical means for passing the sand from hopper 27, into a screening apparatus 28, whereby the sand is thoroughly screened, passing the sand from the screen into a mixer 29, thence elevating the sand through elevator 26 and passing it through the reciprocating conveyers located in portions 23 and 24 of the system. The screening and mixing apparatus are particularly shown by Figs. 8 and 9.

45 Sand having been supplied to the drag-part, the equipment is moved under a ramming-mechanism or press 30. As illustrated the ramming-mechanism comprises a cylinder into which fluid is supplied from some suitable source of supply, not shown. The ramming-mechanism is supported directly over the track, carrier and equipment by means of a housing or casting 31, which straddles the track, etc. The sand having been properly rammed in the drag-part, and the bottom-board placed in position, the equipment then passes under a hoisting apparatus 32, by which the equipment is raised from the carrier, turned over to bring the cope-part uppermost and replaced upon the carrier. Sand is supplied to the cope-part of the equipment by spout 21, and the cope-sand then rammed by a ramming mechanism, or press 33. Ramming mechanism 33, is similar to the mechanism 30, above de-

scribed. Spouts 22, are provided for the purpose of supplying additional sand to both parts of the flask, if found necessary. If this additional sand is supplied it is rammed by an operator.

70 The sand being thoroughly packed in the flask by the ramming machines the next step in the operation of making a wheel is the withdrawal of the pattern. For the purpose of withdrawing a pattern or patterns I preferably provide a hoisting apparatus 34 suspended from an overhead trolley 35. If found desirable two or more patterns may be removed from the flasks at about the same time, this may be accomplished by employing two or more hoisting apparatus as 34, mounted to run on different supporting rails 36. The location of rails or supports 36 is clearly shown by Fig. 1. In Fig. 1 I have shown three rails and cope-lifting-apparatus, and it will be seen that three different copes may be simultaneously lifted from the carrier conveyed along for a distance in line with the line of travel of the carrier and then carried out of the path of said travel, and, after the withdrawal of the patterns, the copes are brought back and deposited upon the three drag-portions of the three flasks.

95 The sand in the flask having now been thoroughly packed and the pattern removed, molten metal is introduced to the flask by means of the pouring-ladle, above described. The time required for the flask containing the metal to travel to the point where the casting is removed, is sufficient to permit the metal to solidify and to assume a condition ready for the "shaking-out steps" of the method of manufacture. For the purposes of carrying out the "shaking-out steps", I employ a flask-hoisting or lifting-mechanism 37, having a bail 38, which latter is adapted to be connected with lugs on the flask. This mechanism is suspended from a trolley 39, adapted to run on a track 40, or a single rail. Flask hoisting-apparatus 37 is designed to lift the flask, with the exception of the bottom board from the carrier and the casting and then, after the flask has been turned over, deposit it with its cope down on a vacant space on the carrier. To remove the casting from the carrier after the flask has been raised therefrom I preferably employ a swinging-crane 41, provided with a casting-hoisting apparatus 42. Apparatus 42, comprises a pair of gripping-tongs 43. In the drawings I have shown two similar cranes 41 and casting-hoisting apparatus; only one crane and one hoisting-apparatus however, are necessary, the other is provided for emergency purposes, or for the purpose of extending the time between the pouring of the metal and the operation of stripping the wheel, if necessary.

Crane 41 with the casting is adapted to



swing over and deposit the casting in a pitting-room 44 having a series of annealing pits as shown by Fig. 1.

After the casting has been removed from the carrier the bottom-board *d*, is lifted and placed ahead in a vertical position; the "shaking-out steps", and the mechanisms employed therefor are particularly shown by Fig. 4. While the flask is being raised from the carrier and casting the sand falls down over the sides of the carrier through the track into the hopper located below said track, this is also the case during the operation of lifting the casting from the carrier. Lifting the bottom-board from the carrier causes what sand is left to fall into the hopper. The sand received into the hopper is conveyed therefrom, screened, mixed and conveyed to the sand-delivery-spouts above referred to.

Instead of supplying the sand to the drag and cope, as above described while on the carrier and ramming or pressing the sand by causing the equipments while on the carrier to be brought under the machines; the construction shown by the modified form of Figs. 10 and 11 may be employed. In this construction I have shown means for separately lifting the drag and cope-parts and carrying said parts under sand supply means and ramming-machines or presses located a short distance from the track. As illustrated by Figs. 10 and 11, I employ two supports 45 and 45<sup>a</sup> which extend for a distance in line with the carrier then extend outwardly therefrom and return over the middle of the carrier. On the support 45, is a trolley 46, a hoisting-device 47 having a bail 48; and similar means 46<sup>a</sup>, 47<sup>a</sup> and 48<sup>a</sup> are carried on support 45<sup>a</sup>. These means permit both parts of the flask, *i.e.* the drag and cope-parts to be separately lifted from the carrier and separately conveyed to pressing-machines 49. Sand is supplied to the respective parts of the flask through sand-delivery spouts 20<sup>a</sup> and 21<sup>a</sup> which communicate with a portion 24<sup>a</sup> of the sand-handling system, as heretofore described.

After the parts have been set on the presses 49, part 50 is brought into a vertical position. The drag or cope-part is then raised and the sand thoroughly pressed.

What I claim is—

1. In a casting plant, the combination of an endless way, a carrier traveling thereon, a series of flasks on said carrier, successive mechanisms as follows arranged adjacent to the way and acting in the order named for effecting a complete molding and casting operation and returning the flasks and sand to the starting point in a cycle of mechanical operations, consisting of a mold-forming-station, mechanism for raising a flask from the carrier, inverting the flask and replacing it on the carrier, lifting mechanism for the

flask for permitting the withdrawal of the pattern, pouring mechanism, mechanism for separating the flask and casting, replacing the flask on the carrier, and removing the casting, mechanism for returning the sand to the mold-forming-station, said sand-returning-mechanism including a screen and mixer, mechanism for removing flasks from the carrier and replacing others thereon, and mechanism, separate and independent of the carrier comprising reciprocating means for moving the carrier intermittently, thereby bringing the flasks in succession opposite the several mechanisms named.

2. In a casting plant, the combination of an endless way, a carrier traveling thereon, a series of flasks on said carrier, successive mechanisms as follows arranged adjacent to the way and acting in the order named for effecting a complete molding and casting operation and returning the flasks to the starting point in a cycle of mechanical operations, consisting of a mold-forming-station, mechanism for raising a flask from the carrier, inverting the flask and replacing it on the carrier, lifting mechanism for the flask for permitting the withdrawal of the pattern, pouring mechanism, mechanism for separating the flask and casting, replacing the flask on the carrier and removing the casting, mechanism for removing flasks from the carrier and placing others thereon, and mechanism comprising reciprocating means arranged to engage the carrier for moving the carrier intermittently, thereby bringing the flasks in succession opposite the several mechanisms named.

3. In a casting plant, the combination of an endless way, a carrier traveling thereon, a series of flasks on said carrier, interrupted at one point by a vacant space on the carrier, said flasks each comprising a cope and a drag, successive mechanisms as follows arranged adjacent to the way and acting in the order named for effecting a complete molding and casting operation and returning the flasks and sand to the starting point in a cycle of mechanical operations, consisting of a mold-forming-station, mechanism for raising a flask from the carrier, inverting the flask and replacing it on the carrier, lifting mechanism for the flask for permitting the withdrawal of the pattern, pouring mechanism, mechanism for separating the flask and casting, replacing the flask on the vacant space on the carrier, and removing the casting, mechanism for returning the sand to the mold-forming-station, said sand-returning-mechanism including a screen and mixer, and mechanism comprising reciprocating means arranged to engage the carrier for moving the carrier intermittently, thereby bringing the flasks in succession opposite the several mechanisms named.

4. In a casting-plant, the combination



with an endless-track, of a carrier adapted to travel on the track, a series of flasks mounted on the carrier, sand-supply spouts arranged to feed sand to the flasks, a machine for ramming the sand in the drag-part of the flask, a machine for ramming the sand in the cope part of the flask, a flask-hoisting apparatus located between the ramming machines, and means for intermittently moving the carrier and the flask to cause some of the flasks to be simultaneously and

respectively stopped under the said sand-supply spouts, ramming machines and flask hoisting apparatus, substantially as set forth. 15

In testimony whereof I affix my signature, in presence of two subscribing witnesses.

CLIFTON W. SHERMAN.

Witnesses:

W. G. DOOLITTLE,  
MARGARET HUGHES.