

No. 682,513.

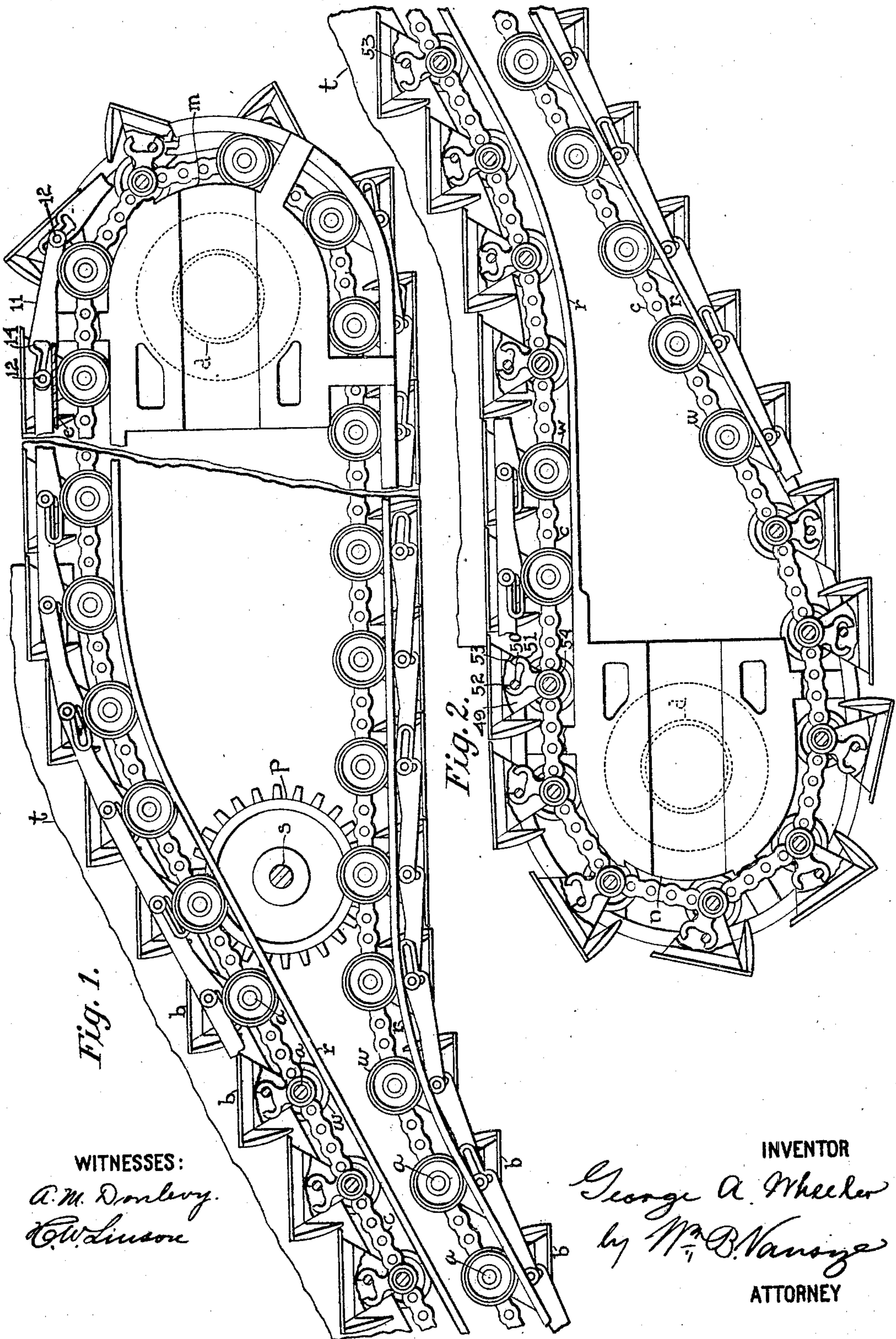
Patented Sept. 10, 1901.

G. A. WHEELER.
ELEVATOR.

(Application filed Mar. 13, 1901.)

(No Model.)

2 Sheets—Sheet 1.



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2 Sheets—Sheet 2.

Fig. 4.

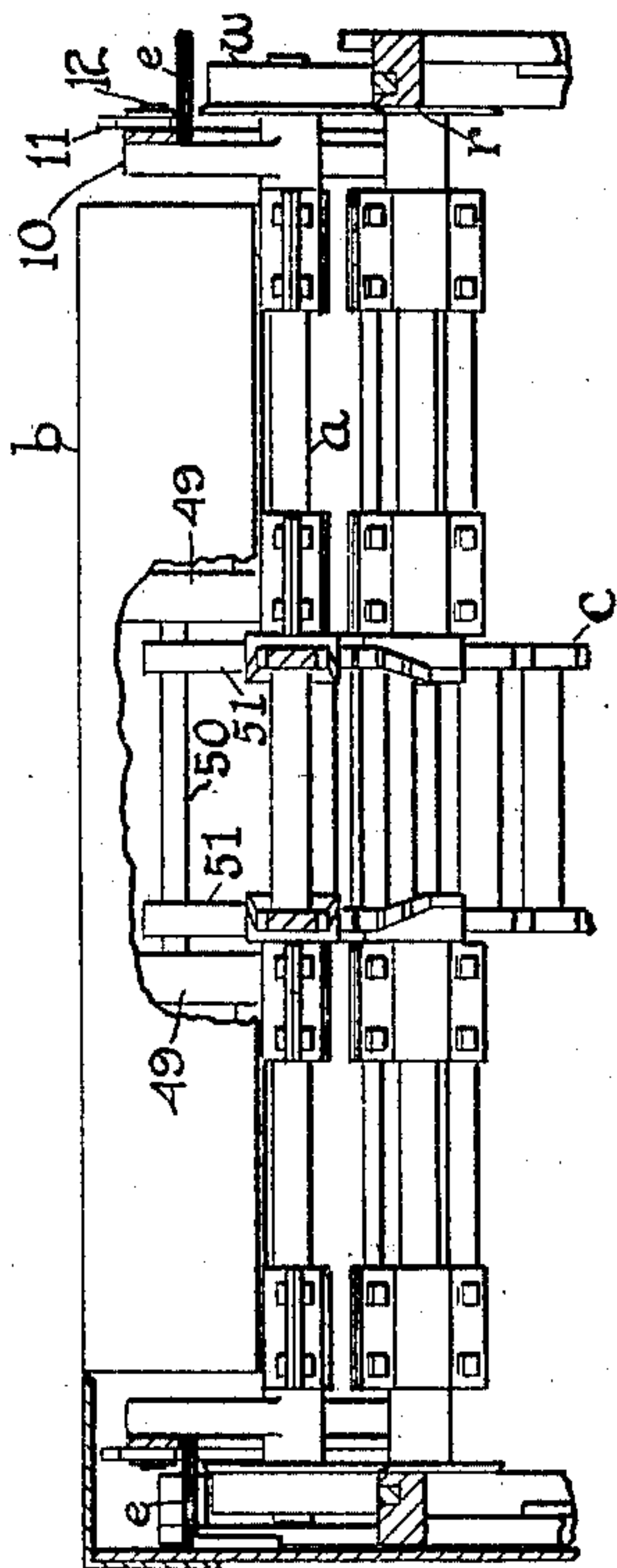


Fig. 6.

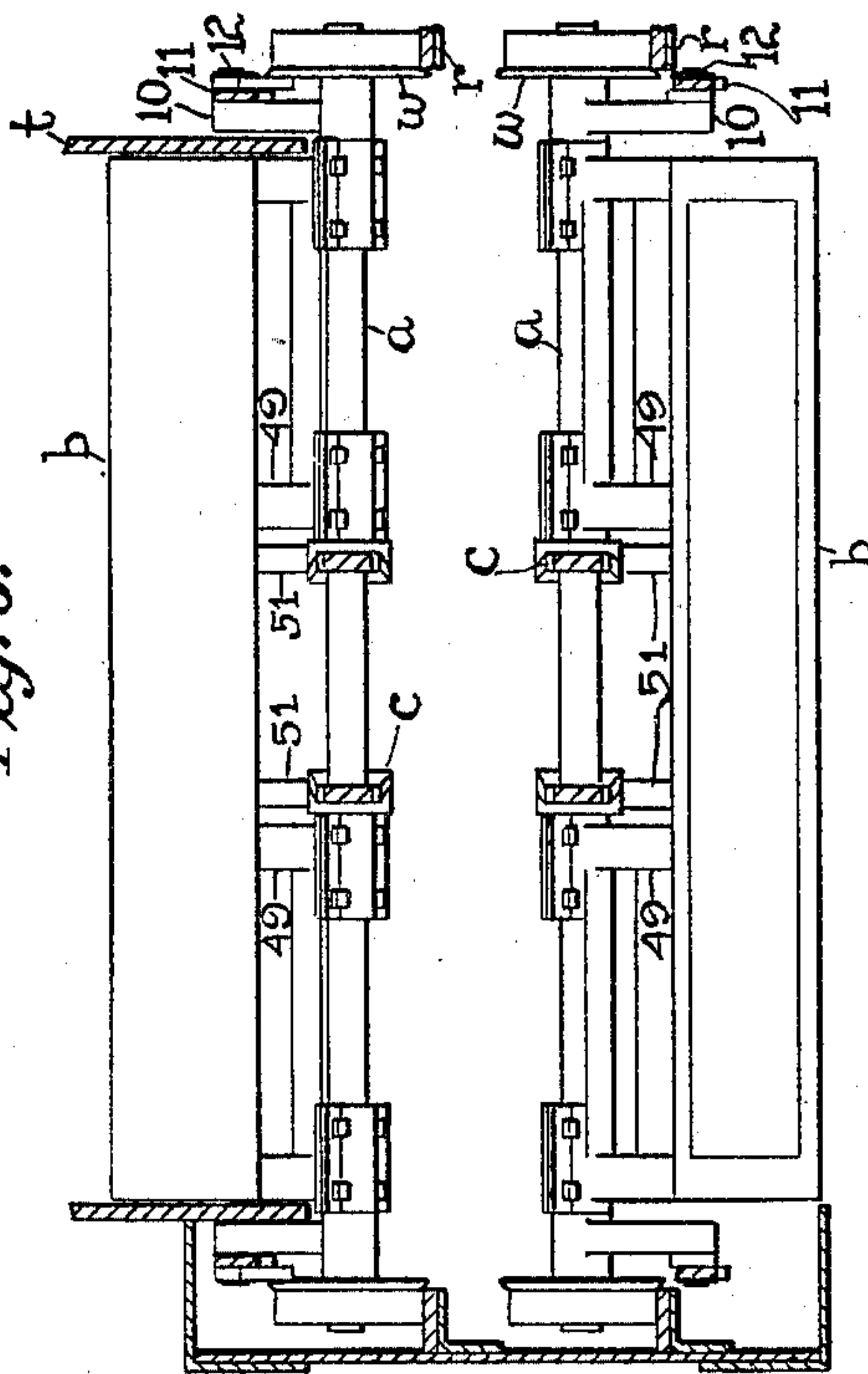


Fig. 3.

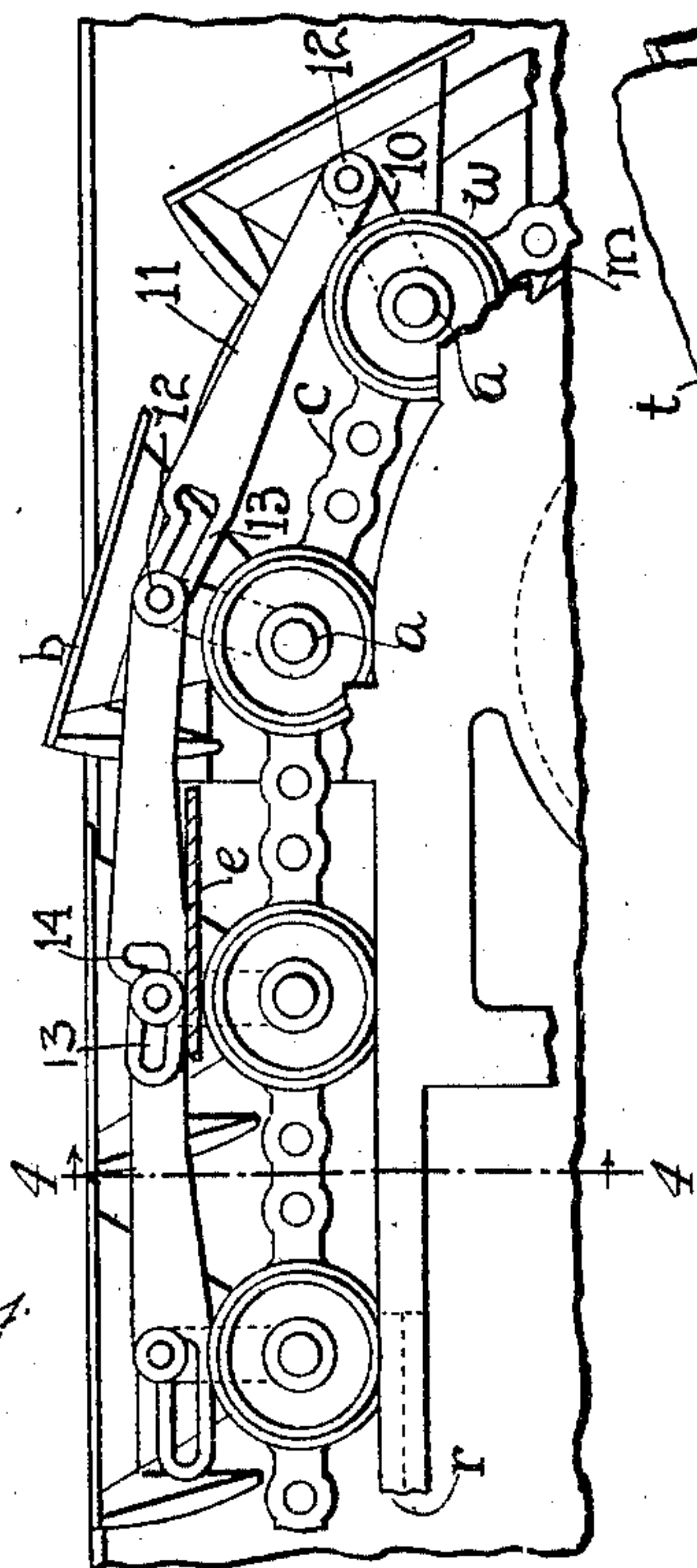
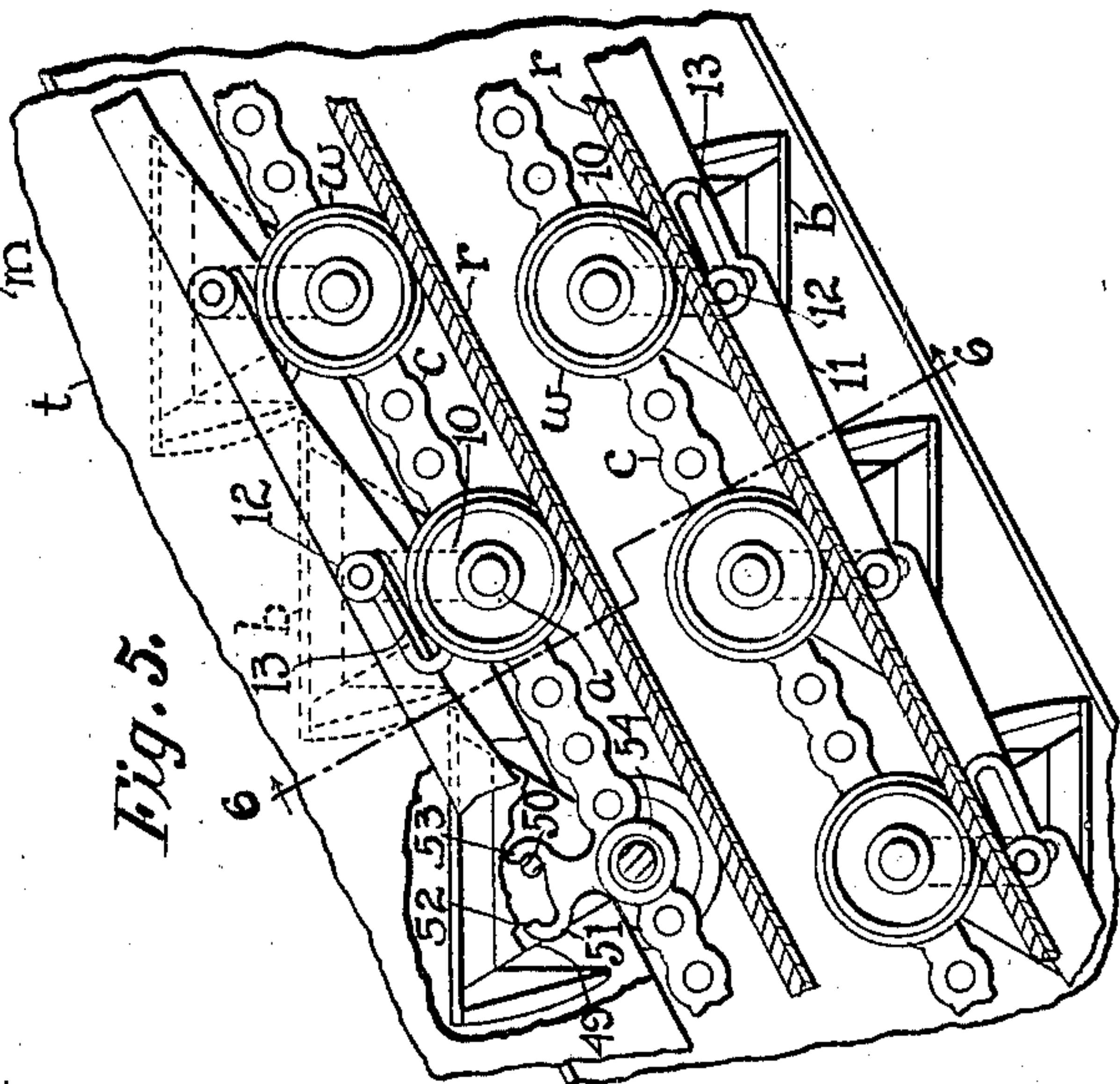


Fig. 5.



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UNITED STATES PATENT OFFICE.

GEORGE A. WHEELER, OF NEW YORK, N. Y.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 682,513, dated September 10, 1901.

Application filed March 13, 1901. Serial No. 50,952. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. WHEELER, a citizen of the United States, residing at New York, in the county and State of New York, have made certain new and useful Improvements in Elevators, of which the following is a specification.

My invention is an improvement in that class of elevators which are used by a continuous procession of foot-passengers, as in the case of an approach to an elevated railroad-station or the floors of a department-store, such as that shown and described in my United States Letters Patent, No. 479,864, August 2, 1892.

The object of my improvement is to increase the safety and efficiency of such structures and to provide for maintaining the treads or steps in a predetermined relative position with respect to each other and to the line of movement, to render the structure more compact, and to simplify and decrease the cost of construction and operation. For this purpose I employ a series of carriages or steps, each provided with antifriction supporting devices, such as wheels, and a suitable road-bed with a track or guideway therefor having curves and terminal loops arranged to maintain the carriages in a predetermined relative position with respect to the line of movement. There is a linked propelling connection between the several carriages through which the motive power is applied, and at opposite ends of each axle at a point outside the end of the step or tread I fix an arm extending upward from the axle toward the tread or step and preferably terminating at a point somewhat below the surface thereof. There is one such arm fixed at each end of each axle and successive arms are connected together by links provided with means for elongation in harmony with variations in curvature of the surface of the road-bed at the loop-terminals. I prefer to employ a link hinged at one end with a slot having a notch at the other end. A pin or rod passes through each end of this link, the slot providing for the necessary expansion or elongation due to the radial position of each step as it passes over the curved road-bed at the loop-terminals. I provide means for automatically changing the bearing-point of the pin in one slot at the

proper point in its movement to pass a loop, and I combine with it suitable means for limiting the extent of its variation from a normal or horizontal position.

The accompanying drawings illustrate my invention.

Figure 1 is a side elevation of the upper part of the elevator with the string and sheathing removed, showing the ends of the steps and parts of some of the steps broken away to show devices between the bracket. The links connecting the arms on the opposite ends of the steps are omitted. Fig. 2 is a view similar to Fig. 1 and shows the lower part or landing at the opposite loop or turn. Fig. 3 is an enlarged detail at the upper landing in Fig. 1. Fig. 4 is a section on line 4 4, Fig. 3. Fig. 5 is a detail elevation at a part on the incline between landings. Fig. 6 is a section on line 6 6, Fig. 5.

b is the tread or step of a series of carriages, each provided with two supporting-wheels *w*, traveling upon a partly-horizontal, partly-inclined, and curved road-bed or track *r*. There is a linked propelling connection *c*, located at or near the center of the axles and uniting all the separate carriages into a single flexible structure. At the loop-terminals *m* and *n* the carriages pass around an adjustable drum *d*, there being thus formed a direct and return line of the separate carriages, and it is a matter of extreme importance that the maximum distance between the moving surfaces of the direct and return line of carriages be as limited as possible in order that valuable space may be economized and a cumbersome appearance avoided.

s indicates the driving-shaft, upon which a sprocket-wheel *p* is located to engage with the chain *c* and propel the carriages. There is a sheathing *t*, (shown in Figs. 1, 2, 5, and 6,) which extends downward over the ends of the treads or steps, as described by me in prior patents.

For the purpose of maintaining the treads of the carriages *b* in a level position while permitting the necessary freedom of movement in passing the loop-terminals I provide at each end of the axles *a*, upon which are located the wheels *w*, a series of arms 10. These arms are each rigidly fastened to the step, preferably through the axle, extending

from said axle toward the step or tread *b*, terminating just below *b*. Successive arms 10 are connected by links 11. Each link has a round hole at one end to receive a pin 12, 5 integral with or fixed in the end of arm 10. The opposite end of each link 11 is slotted at 13. The slot is enlarged, as at 14, and has an angle to receive the pin 12 of the adjacent link. The distance between the enlarged end 10 of the slot 14 and the hole at the opposite end of the link is substantially equal to the distance between successive axles. The link connections between pairs of arms at opposite ends of any pair of steps maintain the 15 treads in their passage from one loop-terminal to another horizontal. It is necessary in passing around the loop-terminals, like *m* and *n*, to provide for an elongation of this distance measured on the line of this link 20 connection, as will be seen by reference to the loop-terminal *m*. The distance on a loop between the pins 12 in the link 11 is somewhat greater than the distance between the corresponding axles *a a*. This is due to the 25 variation in distance of the parts named when measured on radii of the arc forming the curved surface of the road-bed at a loop-terminal. The slot 13 in each link provides this means of elongation. Of course other 30 means may be availed of to provide for this elongation; but I prefer the arrangement shown.

As the described distance changes the normal and horizontal position of the carriages or 35 steps is departed from, and to limit the extent of this variation from the normal I fix a stop, as a rod or bar 50, in the position shown between the intermediate brackets 49 on each step or carriage, and I rigidly fix to the hub 54 of 40 the link of the driving-chain, which is journaled upon the axle, a lug 51, having one or more limits like the stops or hooks 52 and 53. Between these stops the rod or bar 50 is free to move, and the movement of the steps is 45 thus limited. When moving on a level rail, the rod or bar 50 engages the stop 52. When moving on an inclined rail, rod or bar 50 engages the stop 53, and these stops hold the step or carriage within controllable limits 50 while passing a loop and start it on its return movement in the desired horizontal position. As each step approaches a loop the pin 12 rests in the enlargement 14 of the slot 13, and in order that it may pass around the 55 loop it is necessary to provide means for automatically shifting the bearing-point of pin 12. This consists of a fixed plate *e*, over which the linked connections 11 trail in a progressive movement. The slotted ends of 60 the links are lifted slightly in trailing over this plate *e*, and the links 11 are suitably slanted on their under side or contact-surface, as shown, so that the slot-terminal 14 is lifted off the pin 12 at the moment of passing, while the pin 12 gradually passes to the 65 opposite end of the slot 13. On the return movement at the opposite loop the link is

controlled by gravity, and the pin 12 being brought into position by the rod 50 and lug 51 already described drops into the enlargement 14 of slot 13 to continue its movement, 70 retaining the step in a horizontal position until again released at the other loop-terminal, as before described.

It will be seen that in the arrangement 75 above described each step or carriage as it approaches the upper loop is dependent upon its succeeding neighbor only for maintaining its upright position, and when its preceding neighbor is released to start downward 80 around the loop-terminal its own upright position is not thereby affected, it being held by the pin 12 of the next succeeding step, which is still seated in the enlargement 14 of its slot 13. 85

By the use of the fixed arms extending toward the treads and the slotted and hinged links I simplify and cheapen the structure while rendering it more compact. I also am enabled to locate the arms and connecting- 90 links at a point outside the ends of the treads or steps and to thus economize space while securing greater convenience. I am also enabled to maintain the steps in use in horizontal positions while employing but a single 95 pair of wheels and a single track therefor, thus reducing the frictional surfaces to a minimum, and I thereby simplify the structure, lessen the cost of construction, and reduce the power consumed. 100

Although I have shown but one form of elevator the improvements are applicable to to an endless series of carriages traveling in other than a single vertical plane—such, for instance, as that shown and described in 105 United States Letters Patent No. 617,779, dated January 17, 1899.

The arms 10 are shown as rigidly fixed to the axle *a*, as are the steps, so that the arms 10 and steps *a* are rigidly connected together; 110 but I may journal the step on the axle and connect the arm rigidly and directly to the step, or the step and arm may be on the same journal carrying the step.

The axle *a* is the axis of the step, and I have 115 so regarded it in this specification, because it is the part on which the step turns; but I am aware that mechanical equivalents may be provided. Such equivalents I regard as within my invention, provided the step main- 120 tains its equilibrium by means of and with respect to such axis or axle.

What I claim, and desire to secure by Letters Patent, is—

1. In an elevator the combination of a series of carriages or steps each provided with 125 supporting-wheels, a suitable track or guideway therefor, a chain connection between successive carriages or steps, a series of arms suitably connected to the steps, respectively, 130 each arm extending to its pivotal point between the axis of the step and its tread, and links pivoted to said arm at said points whereby adjacent arms are united.

2. In an elevator the combination of a series of carriages or steps each provided with antifriction supporting devices, a suitable track or guideway therefor, whereby the moving carriages or steps are maintained in a predetermined relative position with respect to the line of movement, a link-propelling connection between the several carriages or steps, a series of arms each arm extending to its pivotal point between the axis of the step and its tread and links pivoted to said arms at said points to unite adjacent arms.

3. In an elevator the combination of a series of carriages or steps each provided with supporting-wheels, a suitable track or guideway therefor, a chain connection between successive carriages or steps, a series of arms one for each step suitably connected thereto, each arm extending to its pivotal point between the axis of the step and its tread, and links connecting adjacent arms, each link being hinged at one end and provided with a slotted bearing at the other end.

4. In an elevator the combination of a series of carriages or steps each provided with supporting-wheels, a suitable track or guideway therefor, a chain connection between successive carriages or steps, a series of arms suitably connected to the steps, respectively, each arm extending to its pivotal point between the axis of the step and its tread, a series of links each link pivoted at each end to an arm and having means for elongation in harmony with variations of curvature of the surface of the road-bed at the loop-terminals.

5. In an elevator the combination of a series of carriages or steps each provided with supporting-wheels, a suitable track or guideway therefor, a chain connection between successive carriages or steps and a series of arms suitably connected to the steps, respectively, said arms being located outside the ends of the treads of said steps, each arm extending to its pivotal point between the axis of the step and the tread thereof, and links pivoted to said arms at said points whereby adjacent arms are connected.

6. In an elevator the combination of a series of carriages each provided with supporting-wheels, a direct and return road-bed with looped terminals, a chain connection between the carriages, a series of arms suitably connected to the axles, respectively, a series of links, each link being pivoted at each end to an arm and having means for variation in distance to conform to variations in curvature of the road-bed at the loop-terminals consisting of an expansible bearing including a slot having an enlargement in one link and a pin in said slot connecting it with the adjacent link.

7. In an elevator the combination of a series of carriages each provided with supporting-wheels, a direct and return road-bed with loop-terminals, a chain connection between the carriages, a series of arms suitably con-

nected to the axles, respectively, a series of links, each link pivoted at each end to an arm and having means for variation in distance to conform to variations in curvature of the road-bed at the loop-terminals consisting of an expansible bearing including a slot having an angle in one link, a pin in said slot connecting it with the adjacent link and means for automatically freeing the pin from engagement with one terminal of said slot.

8. In an elevator the combination of a series of carriages each provided with supporting-wheels, a direct and return road-bed with looped terminals, a chain connection between the carriages, a series of arms suitably connected to the axles, respectively, a series of links, each link pivoted at each end to an arm said links having means for variation in distance to conform to variations in curvature of the road-bed at looped terminals and means for limiting the extent of variation in position of each step or carriage consisting of lugs fixed to the propelling-chain at the axles said lugs having one or more separated stops and a stop fixed to the step in position to engage with the stop of the lug.

9. In an elevator, a series of carriages, a suitable track or guideway therefor, a series of journals upon the carriages, a chain-propelling connection between said journals uniting carriages into a single flexible structure, a series of auxiliary journals upon the carriages, links connecting auxiliary journals said links having at one end convertible fixed and extensible bearings for said auxiliary journals in combination with means for automatically shifting the journal from the fixed to the extensible bearing and vice versa.

10. In an elevator, the combination of a series of carriages, a suitable track or guideway therefor, a journal upon each carriage, a chain-propelling connection between said journals for uniting carriages into a single flexible structure, an auxiliary journal upon each carriage, links connecting auxiliary journals, said links having an elongated slotted bearing with a notch recessed from the slot and adapted to receive the journal and retain it until forced out of engagement and means for automatically forcing said journal out of said notch and for replacing it.

11. In an elevator the combination of a series of carriages or steps each provided with supporting-wheels, a suitable track or guideway therefor, a chain-propelling connection between successive carriages or steps uniting them into a single flexible structure, means for maintaining the treads of the steps in a horizontal position, including lugs suitably attached to the chain, having one or more stops, adapted to engage with a stop upon the steps to control the latter.

12. In an elevator the combination of a series of suitable steps each provided with supporting-wheels arranged on an axial line, a track or guideway therefor, a linked propel-

ling connection uniting said steps together into a flexible sectional structure, means for maintaining the treads of the steps in a horizontal position including a series of auxiliary
5 journals or bearings upon said steps, devices for connecting and retaining said journals or bearings at a definite distance and for modifying control of one step after another only at a predetermined point in the progressive movement.

GEORGE A. WHEELER.

Witnesses:

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A. M. DONLEVY.