

E. SCHUCHARDT.

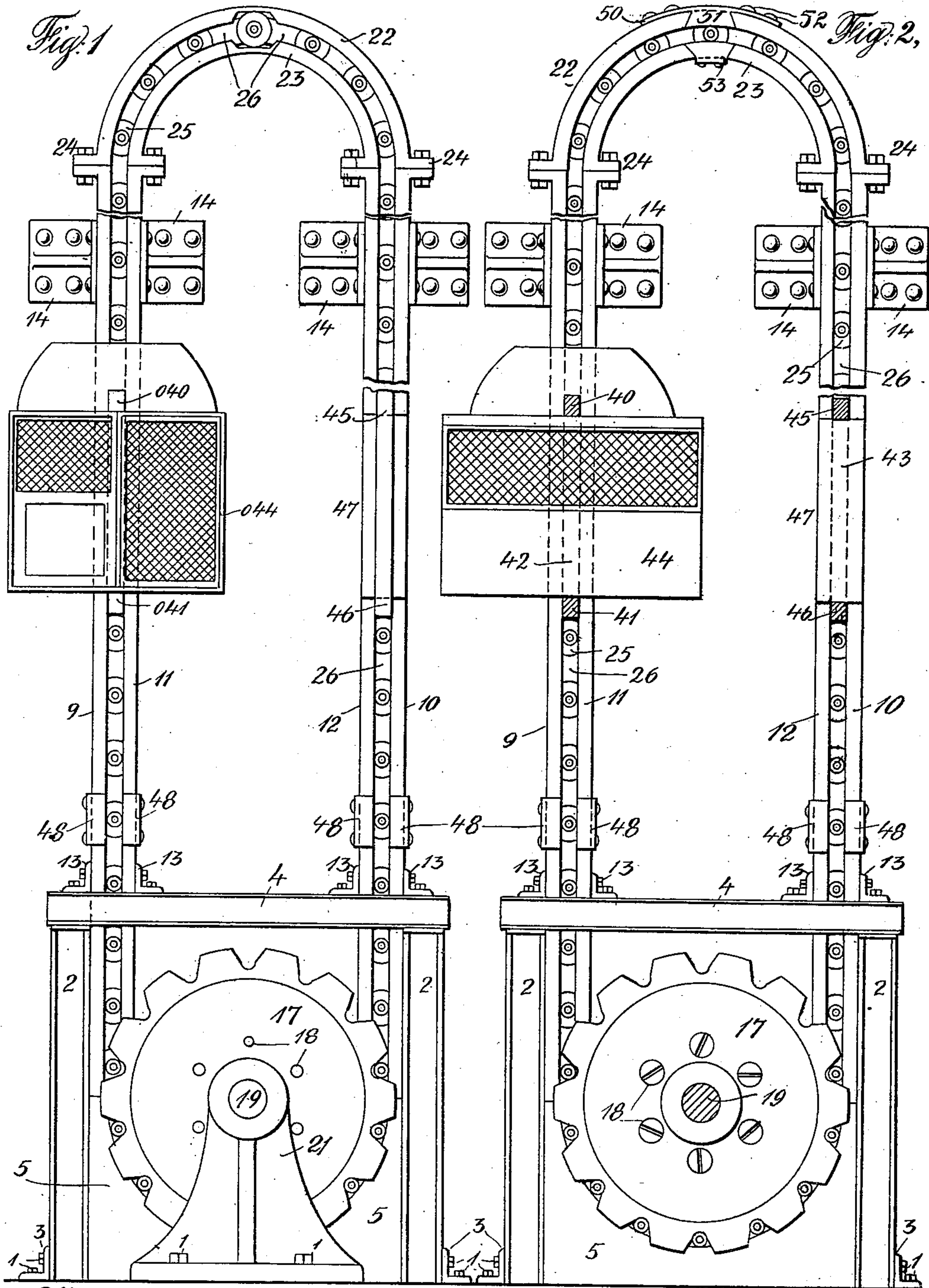
ELEVATOR.

APPLICATION FILED APR. 6, 1908;

Patented May 9, 1911.

3 SHEETS—SHEET 1.

991,549.



Witnesses:  
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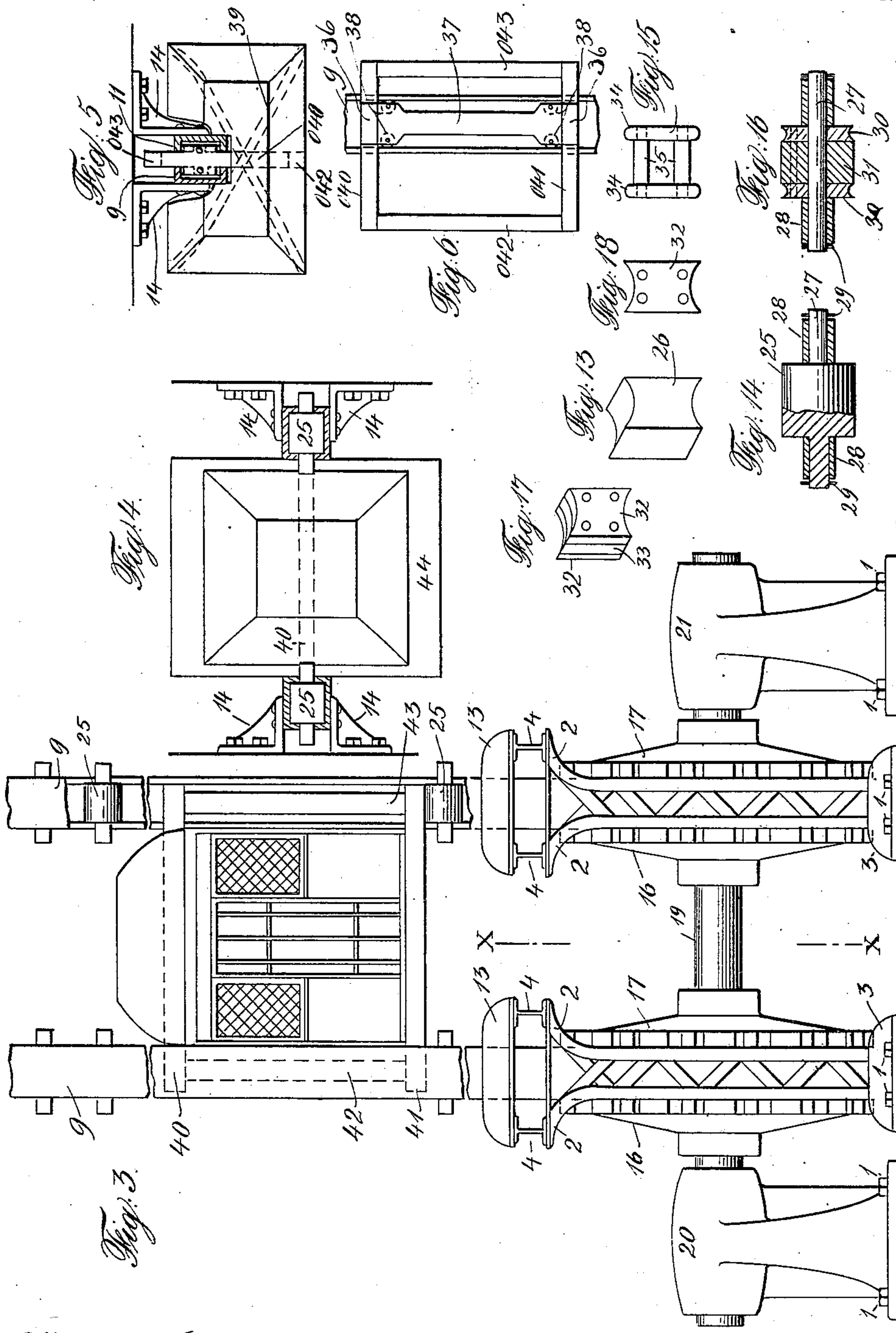
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3 SHEETS—SHEET 2.



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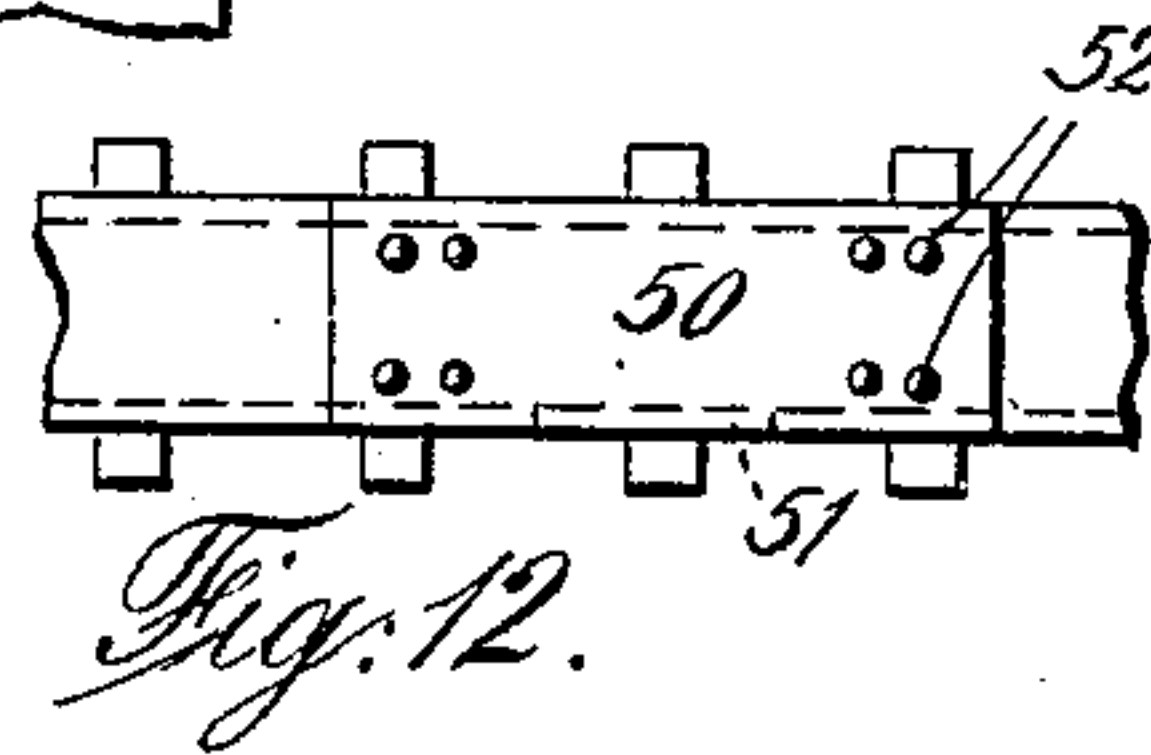
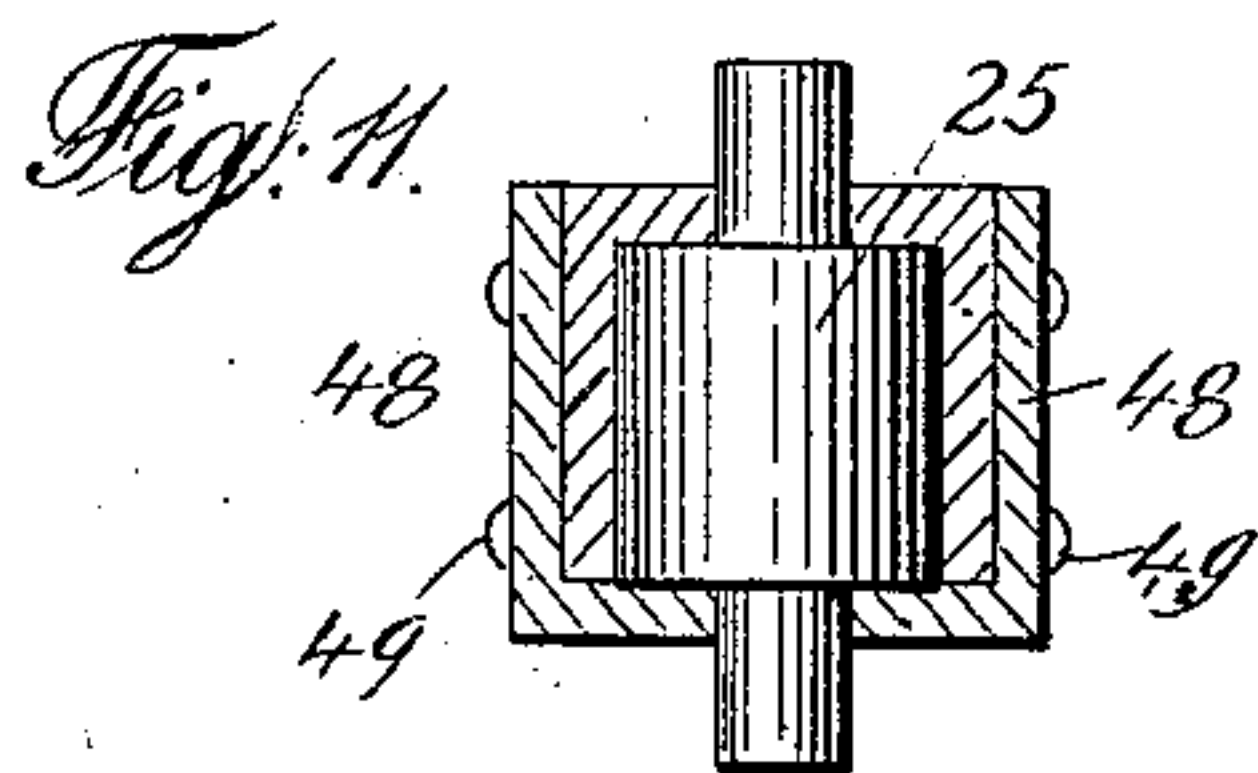
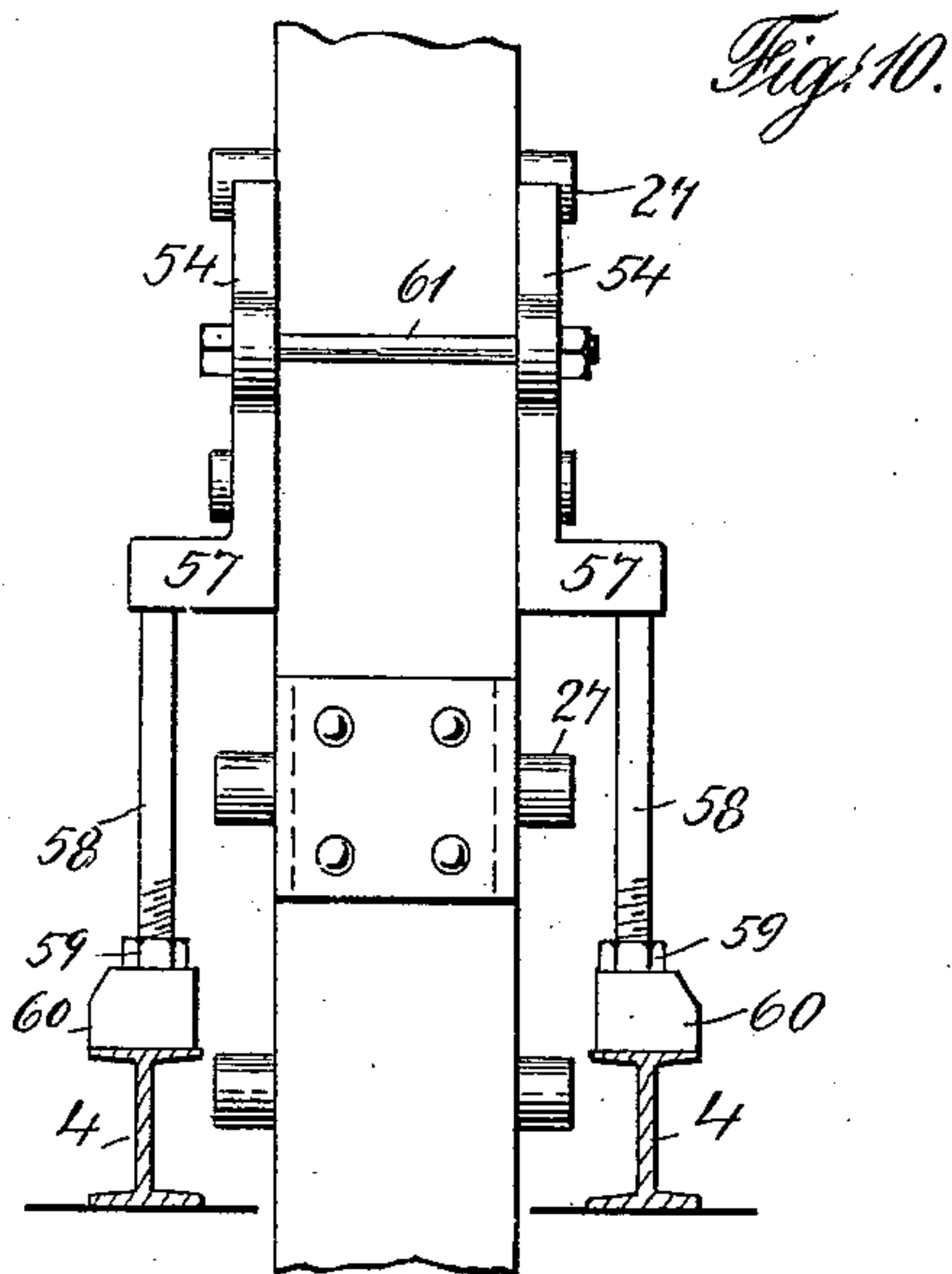
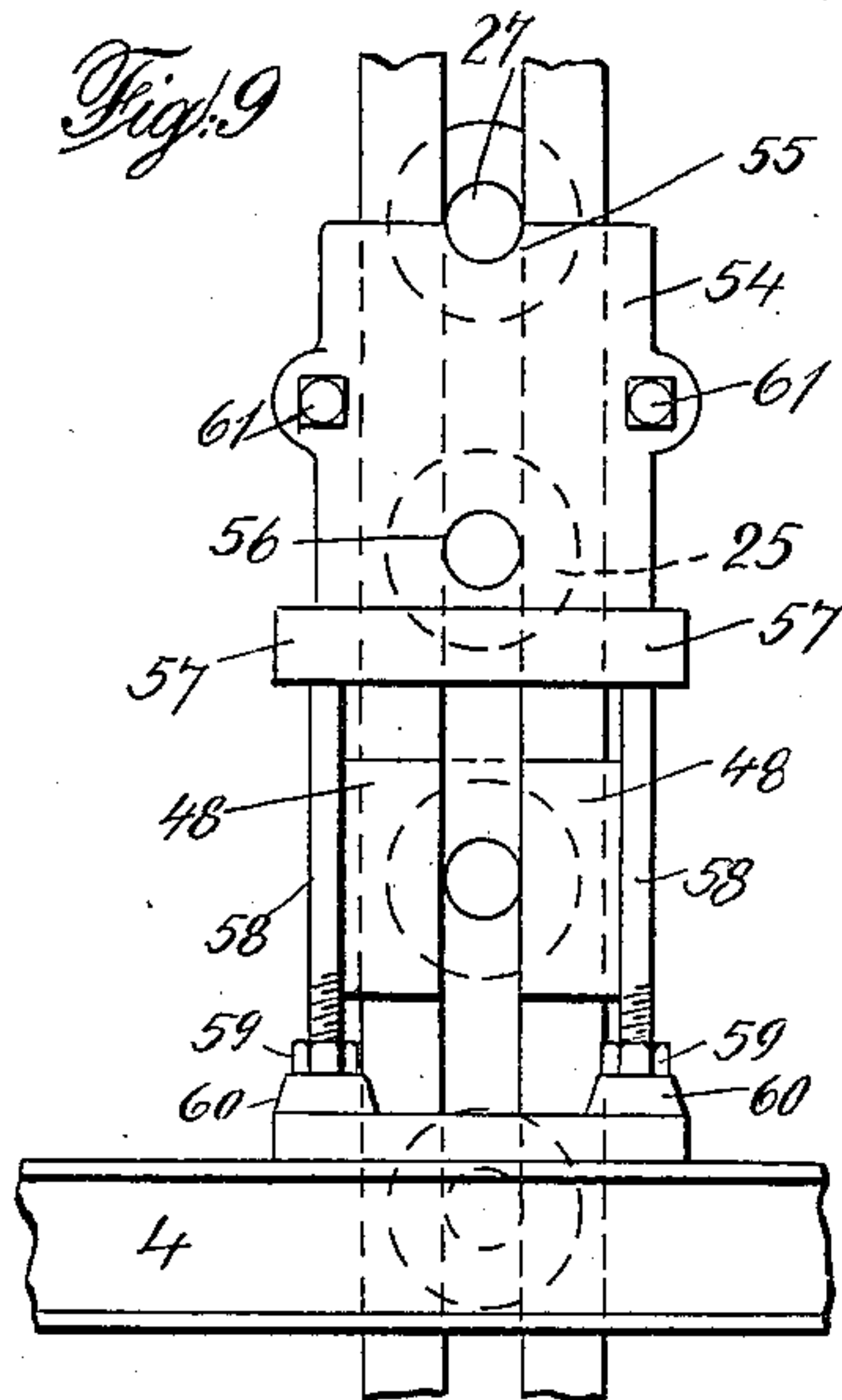
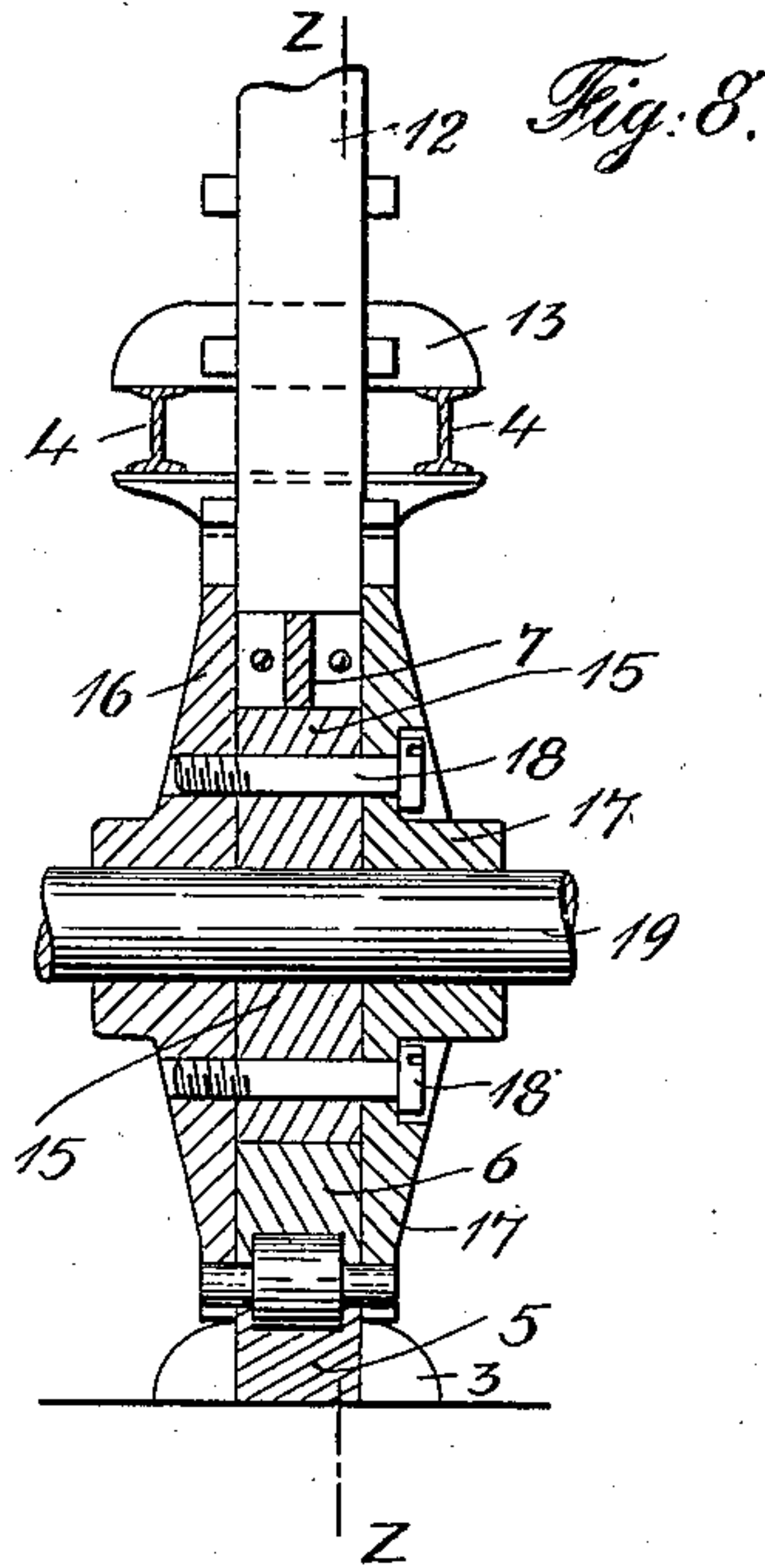
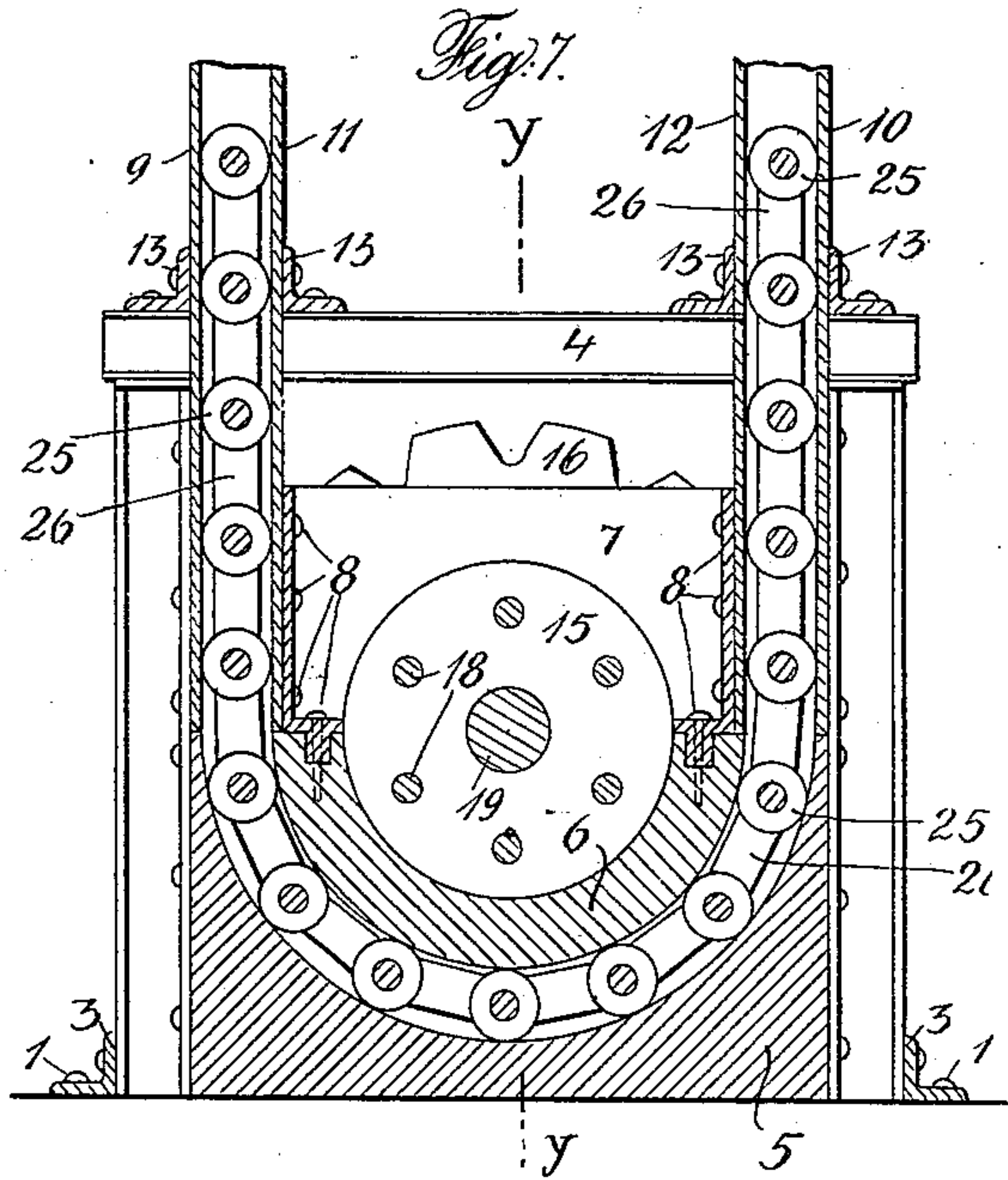
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3 SHEETS—SHEET 3.



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# UNITED STATES PATENT OFFICE.

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## ELEVATOR.

991,549.

Specification of Letters Patent.

Patented May 9, 1911.

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*To all whom it may concern:*

Be it known that I, EMIL SCHUCHARDT, a citizen of the United States, residing at the borough of Manhattan, in the city, county, and State of New York, have invented certain new and useful Improvements in Elevators, of which the following is a specification.

This invention relates to an improvement in elevators, and it is one of the objects thereof to provide a device of this character in which an endless flexible column carries the elevator car and its counterweight, and moves in an endless pathway, and in which cables and telescopic or other supporting pistons may be dispensed with.

With this and other objects in view, the invention consists in certain constructions and combinations which will be hereinafter fully described and then specifically pointed out in the claims hereto appended.

In the accompanying drawings, which form a part of this specification and in which like characters of reference indicate the same parts, examples of my invention are disclosed.

Figure 1 is a side view of an example of the invention in which one flexible column and one pathway therefor is shown, partly in section. Fig. 2, is a side view of an example of the invention in which two flexible columns and two corresponding pathways are employed, partly in section, the lower part a side view of the mechanism shown in Fig. 3. Fig. 3, is a perspective front view of a portion of the mechanism shown in Fig. 2. Fig. 4, is a top view of the elevator car of Figs. 2 and 3. Fig. 5, is a top view of the elevator car of Fig. 1. Fig. 6, is a view of the skeleton frame of the elevator of Fig. 1. Fig. 7, is a view of the operating wheel and its supports and braces, partly in section. Fig. 8, is a section on the line,  $y-y$ , of Fig. 7. Figs. 9 and 10, show a device adapted for blocking the flexible column when it is desired to remove a member for repair or replacement. Fig. 11, is a view, partly in section, of one of the gates adapted to be used for repairs, with the example shown in Fig. 1. Fig. 12, is a view, partly in section, of one of the gates adapted to be used for repairs, with the example shown in Fig. 2. Details of parts of the invention are shown in Figs. 13, 14, 15, 16, 17 and 18.

In carrying the invention into effect, the parts are to be secured firmly in place and to each other in any convenient manner. This may be satisfactorily done by providing a suitable foundation to which the bottom portions are rigidly secured, as by bolts, 1, 1. Strong columns, 2, conveniently constructed of steel, are secured in place, as may be done by suitable angle pieces, 3, at the foot and braced by strong cross pieces, 4, 4, at the top, which are spaced wide enough to allow the journals of the rollers to pass between them. Within the space inclosed by the columns, 2, the lower portion, 5, of the endless pathway is disposed. This portion, 5, may be a casting or other strong structure straight or flat at the bottom and concave at the top, and having a rim on each side of its concave face, as clearly shown at 5 in Fig. 8. A semicircular casting, 6, presenting its convex face toward the support, 5, spaced to permit the rollers to pass between the parts 5 and 6, is secured in place at a suitable distance from the part, 5, and the convex face of the part, 6, is also provided with a rim on each side, as clearly shown at 6 in Fig. 8. A brace piece, 7, on its lower edge of semicircular form, rests upon the part, 6, and is secured thereto through a shoulder and bolts, as indicated in Fig. 7. This brace piece, 7, is also provided with shoulders at each end, as indicated in Figs. 7 and 8, and bolts, 8, 8.

Upon the top outer edges of the part 5, and firmly bolted in place to the columns, 2, 2, rests the outer continuation of the endless pathway pieces, 9, 10; and bolted to the outer edge of the piece, 7, rests the inner continuation of the endless pathway pieces, 11, 12. These continuations consist of strong angular U-shaped parts of suitable material, which are furthermore held in place and braced by the angle pieces, 13, 13, on the cross beams, 4, 4; and these continuations of the pathway are braced at such points of their entire length as may be necessary by suitable holding devices as the angles, 14, 14, shown in Figs. 2, 4, and 5.

Within the circular cavity formed between the pieces 6 and 7, as shown in Figs. 7 and 8, is disposed a circular portion, 15, and to this part sprocket wheels, 16 and 17, are firmly secured, as by bolts, 18, passing through this central portion, 15, and the



sprocket wheels 16 and 17. These sprocket wheels 16, 17, are also to be made of very strong materials, as by means of them the device is to be operated. Through the sprocket wheels, 16 and 17, and the interior piece, 15, a steel shaft, 19, is passed, and is strongly keyed or otherwise attached thereto. The shaft, 19, is suitably supported for the work required, as by pillow blocks, 20, 21, shown in Fig. 3. At a suitable point on such shaft, 19, as in the center, between the pillow blocks, 20 and 21, shown in Fig. 3, a suitable worm or spur gearing is attached to such shaft, 19, or keyed thereto, by which the power to operate the device is to be applied. This may be of any of the well known devices, and such may also be employed for starting and stopping the movement of the elevators.

In the case of the application of the invention to a single endless column and a single endless pathway, as in the example shown in Fig. 1, one of the sets of sprocket wheels, 16, 17, would of course be omitted, as for instance, that shown near the pillow block 20, in Fig. 3, and a shorter shaft than 19 would be employed, the pillow block, 20, being then moved to a position corresponding to that of the set of sprocket wheels in the drawing shown nearest thereto. The endless pathway is carried to any height desired in the building and at suitable positions on the walls of the building or on the floor beams or other suitable points it is firmly secured, as by suitable angles and bolts, as indicated at 14 in the several figures. The upper part of each pathway is finished by a semicircular portion, an exterior part, 22, as shown in Figs. 1 and 2, and an interior portion, 23, in the same figures, the uprights and semicircular parts being connected by suitable angles and bolts, 24, as shown. In the endless pathway thus formed, an endless flexible column is arranged to be moved. This column may be conveniently formed of a set of rollers, 25, and a set of parts, 26, which I call saddles, interposed between the rollers, 25. The saddles, 26, may be formed of solid steel, as shown in Fig. 13, with concave parts, to take in the body of the rollers, 25. These rollers may also be formed of solid steel, as shown in Fig. 14, with a journal, 27, of the same metal, projecting at each end. Around the ends of these journals, 27, friction sleeves, 28, 28, may be placed, secured in place by pins, 29.

If desired, for the purpose of levitation, and in light structures, the rollers may be made of two steel exterior parts or rings, 30, 30, shrunk on to the journal, 27, as shown in Fig. 16, and a central portion, 31, of wood or other lighter material, and the saddles may be formed corresponding with exterior parts, 32, 32, and a central part, 33, as shown

in perspective in Fig. 17, and side view in Fig. 18. Likewise, the saddles may be formed of two steel parts, 34, 34, held in position by strong brace parts, 35, 35, as shown in Fig. 15. So the bearing parts, 30, 30, of the rings on the rollers may be formed with concave rims, and the corresponding bearing parts of the saddles may be terminated with convex face, as indicated in Figs. 15 and 16. These rollers and saddles are placed in the endless pathway, and the adjustment is such that the journals of the rollers will enter the sprocket wheels, 16, 17, as clearly indicated in the drawings and form an endless column of steel which is flexible.

At suitable positions in the endless column proper frames to receive the elevator cars and the counterweight therefor are to be provided. These may consist of two horizontally disposed parts, 40 and 41, and two vertical parts, 42, 43, forming a frame, and in this frame a suitable elevator car is to be disposed and secured in any convenient manner, as indicated in Figs. 1, 2 and 3. In the column, or in the columns, when two are to be employed, opposite the elevator frame, a similar steel frame, consisting of like horizontal and vertical parts is interposed (the two horizontal portions of this frame being shown in Fig. 2, as 45 and 46), in which a suitable counterweight, 47, to the elevator car, is to be secured.

When the elevator car and its counterweight are properly placed, as contemplated and described, the weight of the elevator car on one side, and the counterweight on the other side, the flexible column or columns, as the case may be, the two will exactly balance each other, and then, power being applied to the shaft, 19, between the two sets of double sprocket wheels, as shown in Fig. 3, the elevator car will be in position to be raised and lowered as described, the power necessary being only so much as will be sufficient to raise and suspend the weight introduced into the car.

When it is intended to use two flexible columns, as indicated in Figs. 2 and 3, an ordinary steel or other strong frame of the parts, 40, 41, 42 and 43, will be all that is necessary to receive the elevator car, which may be suspended on the top cross piece, 40, and secured to the lower cross piece, 41, and the side pieces, 42 and 43, in any convenient and well known manner. Of course it will be understood that the uprights holding the cross pieces, 40 and 41, of the elevator frame, and the uprights forming parts of the counterweight frame must be of sufficient strength to support the weight of the column above them at every position in the operation of the device.

In case only one endless pathway and one flexible column is to be employed, a special



arrangement of frame to support the elevator therein will be desirable. I have shown such an arrangement of frame in Figs. 5 and 6. In this arrangement the cross pieces, 040 and 041, are each provided with an expanded part, 36, which fit substantially the opening occupied by the rollers, 25. On each side of the interior of this pathway also, uprights, 37, 37, are disposed in the endless pathway formed by the parts, 9, and 11, as shown in Fig. 5, which are firmly secured to the cross pieces, 040, 041, and in the pockets formed in the uprights, 37, 37 at the top and bottom, friction wheels, 38, are disposed, to bear against the inner faces of the pieces forming the endless pathway. Suitable brace parts, 39, to support and inclose the elevator car are provided.

For the purpose of making repairs to the parts, the endless column is provided with gates at suitable points. Some of these gates consist of parts, 48, 48, shown in side view in Figs. 1 and 2, and in section in Fig. 11. The parts, 48, 48, consist of angles of the same width as the portion of the pathway cut away, and of substantially the same thickness as the side of the pathway, and they are removably attached in their proper places by the bolts, 49, 49. For the purpose of repairs, the column is run to the point where the part to be repaired is opposite the gate, the portion of the column above such part is suitably blocked, the gates are opened, and the part to be removed is drawn out. The width of these gate parts corresponds to the thickness of the roller, 25, or of the saddle, 26, whichever requires the larger opening, so that either may be withdrawn.

At the upper portion of the pathway, on the semicircular part, 22, another form of gate may be provided. This may consist of a semicircular part, 50, with a shoulder, 51, of the size and shape of the rim at that point, so that when the part, 49, is taken out the upper rim on one side of the pathway will be open to the width of the part, 51, as indicated in Figs. 1 and 2. The part, 50, is secured in place by bolts, 52, as shown and suggested in Figs. 2 and 12. On the lower portion, 23, of the upper semicircular pathway, another gate, 53, which has a removable part of the rim opposite the removable part, 51, is disposed, so that when these parts, 51 and 53, are removed, one side of the pathway will be open to the extent of allowing one of the parts forming the flexible column to be withdrawn when desired.

It is to be observed that by the arrangement indicated the endless pathway will remain inclosed, when the gates are opened for repairs, except for so much of the rim on one side as will allow one part at a time to be withdrawn endwise.

A convenient device for blocking the col-

umn for repairs at the sides is shown in Figs. 9 and 10. Two strong metal plates, 54, 54, are provided, each of which may have a notch, 55, and a circular opening, 56, of a size and spaced to take in journals 27 of the endless column. The parts, 54, 54, have shoulders, 57, 57, which take in strong bars, 58, 58, screw threaded at one end to enter nuts, 59, 59, and these nuts rest upon cross pieces, 60, which in turn may be placed upon the cross beams, 4, 4.

When repair work is to be undertaken, the flexible column is run to the point which will place the part to be repaired opposite the repair gate parts, 48, 48, as shown in Figs. 1, 2. The parts, 54, 54, are then placed in position to take in the journals, 27, 27, of the two rollers, 25, above the part to be withdrawn, and are secured to each other by bolts, 61, holding the parts securely in position; the repair gates, 48, 48, are then unscrewed and removed, so that the ends of the rollers will face the repairer, as indicated in Fig. 9. The part to be removed is then drawn out toward the repairer, and the portion of the flexible column above such part is supported in place by the frame pieces, 54, 54.

I have not shown any device for starting or stopping the elevator movements, for taking off the shock of rigidity of the elevator car, which is usually done by strong springs under the floor of the elevator car, or for applying power to the shaft 19, as these do not form any part of my present invention, and they may consist of any of the devices now in use for such purposes, and I do not limit myself to the application of any particular devices for such purposes, and I do not limit myself to any particular form of parts designed to constitute the endless flexible column, or the endless pathway, as these may all be varied; for example, the rollers, 25, may be made melon shape and the saddles, 26, adjusted thereto, so the endless pathway may be made of steel angle parts in cross section formed so as to receive ring portions similar to those shown at 30, Fig. 16, and having a journal passing through the center, such journal rounded at the ends, extending beyond the ring parts and moving in grooves in the sides of the pathway, or such journals may be shortened, and instead of having rounded ends, could be formed with concave ends to take in balls for bearing against the pathway. In such case also the endless pathway may be inclosed on three sides and partially on the fourth side leaving an opening in the middle; in such arrangement only one sprocket wheel will be needed, instead of a pair of such wheels, the same being adjusted to take in the journal in the middle between the ring parts; and in such an arrangement saddles may be employed, or may be omitted, as de-



sired; and other forms of endless pathways and endless flexible columns may be devised, without departing from my invention; but

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is:

1. An elevator mechanism including an endless pathway having a circular portion at its lower extremity and a circular portion at its upper extremity, an endless flexible column adapted to move therein, an elevator car and counterweight for the same interposed in such flexible column, such flexible column comprising rollers having journals projecting laterally beyond such pathway, in combination with a sprocket wheel adapted to take in such projecting journals, substantially as described and shown.

2. In an elevator mechanism, an endless pathway provided with a circular portion at its upper and also at its lower part, an endless flexible column adapted to move in such pathway and to be supported upon the lower circular portion of the same, an elevator car and a counterweight for the elevator car disposed in such flexible column, such elevator car and counterweight adapted to support the part of such flexible column which moves along the upper circular portion of such pathway, substantially as described and shown.

3. In an elevator mechanism, an endless pathway, an endless flexible column adapted to move therein, an elevator car, a counterweight for the elevator car, both adapted to be upheld from beneath by such flexible column, the upper part of such flexible column adapted to be upheld from beneath by such elevator car and counterweight, substantially as described and shown.

4. In an elevator mechanism, an elevator car, a movable support for the same including an endless flexible column composed of rollers provided with projecting journals, a series of parts having concave faces interposed between such rollers, in combination with an endless pathway adapted to take in such rollers, and having open sides through which pass the journals of the same, substantially as described and shown.

5. In an elevator mechanism, an endless flexible column consisting of a series of rollers provided with projecting journals and a series of parts having concave faces interposed between such rollers, in combination with an endless pathway adapted to permit the journals of the rollers to project beyond the same, and including a lower circular portion adapted to support such flexible column, substantially as described and shown.

6. In an elevator mechanism, an endless pathway formed of suitable material, provided with a circular portion at its upper

extremity and a circular portion at its lower extremity, in combination with a flexible column consisting of a series of rollers having journals projecting beyond such endless pathway, and a series of parts with concave faces interposed between such rollers, substantially as described and shown.

7. In an elevator device such as described, an endless pathway with a circular portion at its lower extremity, rollers adapted to move upon the same, such rollers having projecting parts or journals, in combination with suitable sprocket wheels adapted to operate therein, to take in the journals or projecting parts of such rollers and drive the same, substantially as described and shown.

8. In an elevator device such as described a flexible column formed alternately of parts having concave faces, and of rollers provided with journals and friction sleeves thereon taking into such concave parts and projecting laterally beyond the same, substantially as described and shown.

9. In an elevator mechanism, an endless pathway and an endless flexible column disposed within the same, such flexible column including a series of rollers provided with journals projecting laterally beyond such endless pathway and adapted to engage with suitable mechanism to operate the flexible column, substantially as described and shown.

10. In an elevator mechanism, an endless pathway open at the sides, a flexible column comprising a series of rollers having journals adapted to project through the open sides of such pathway, in combination with a series of parts provided with concave faces interposed between such rollers, substantially as described and shown.

11. In an elevator mechanism, an endless flexible column, consisting of parts adapted to move along an endless pathway, an endless pathway consisting of two parts each having two shoulders on opposite sides, and having portions of the shoulders on one side thereof cut away at suitable points adapted to permit the insertion and withdrawal of portions of the flexible column, and angle pieces adapted to close the cut away portions of the pathway, substantially as described and shown.

12. In an elevator mechanism, an endless pathway and an endless flexible column adapted to move along the same, such endless pathway provided with gates through which portions of such endless column may be withdrawn, such endless column provided with parts projecting beyond such pathway, in combination with suitable blocking devices adapted to engage with such projecting parts and support such endless column above the gates, substantially as described and shown.

13. In an elevator mechanism, an endless



flexible column consisting of a series of rollers provided with projecting journals, a series of parts having concave faces interposed between the rollers, an elevator car and a counterweight for the same interposed in such flexible column, and a suitable endless pathway adapted to support such flexible column, substantially as described and shown.

14. An elevator device comprising the combination of endless pathways, endless flexible columns moving along such pathways, an elevator car suitably disposed at a point in such flexible columns, together with a counterweight for such elevator car disposed in such flexible columns at a proper point relative to such elevator car, substantially as described and shown.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."