

No. 673,890.

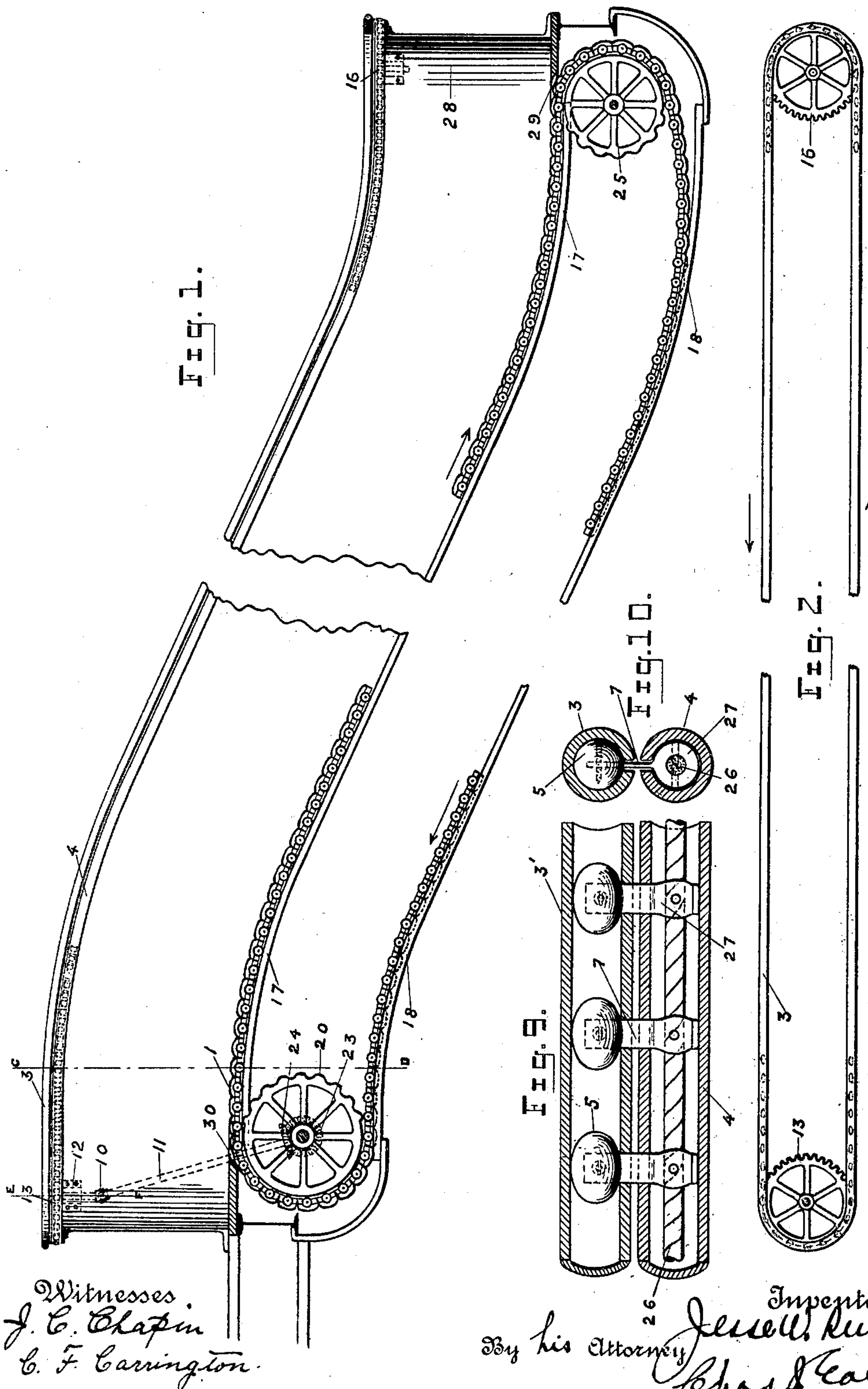
Patented May 14, 1901.

J. W. RENO.
INCLINED ELEVATOR.

(Application filed Nov. 22, 1900.)

(No Model.)

2 Sheets—Sheet 1.



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2 Sheets—Sheet 2.

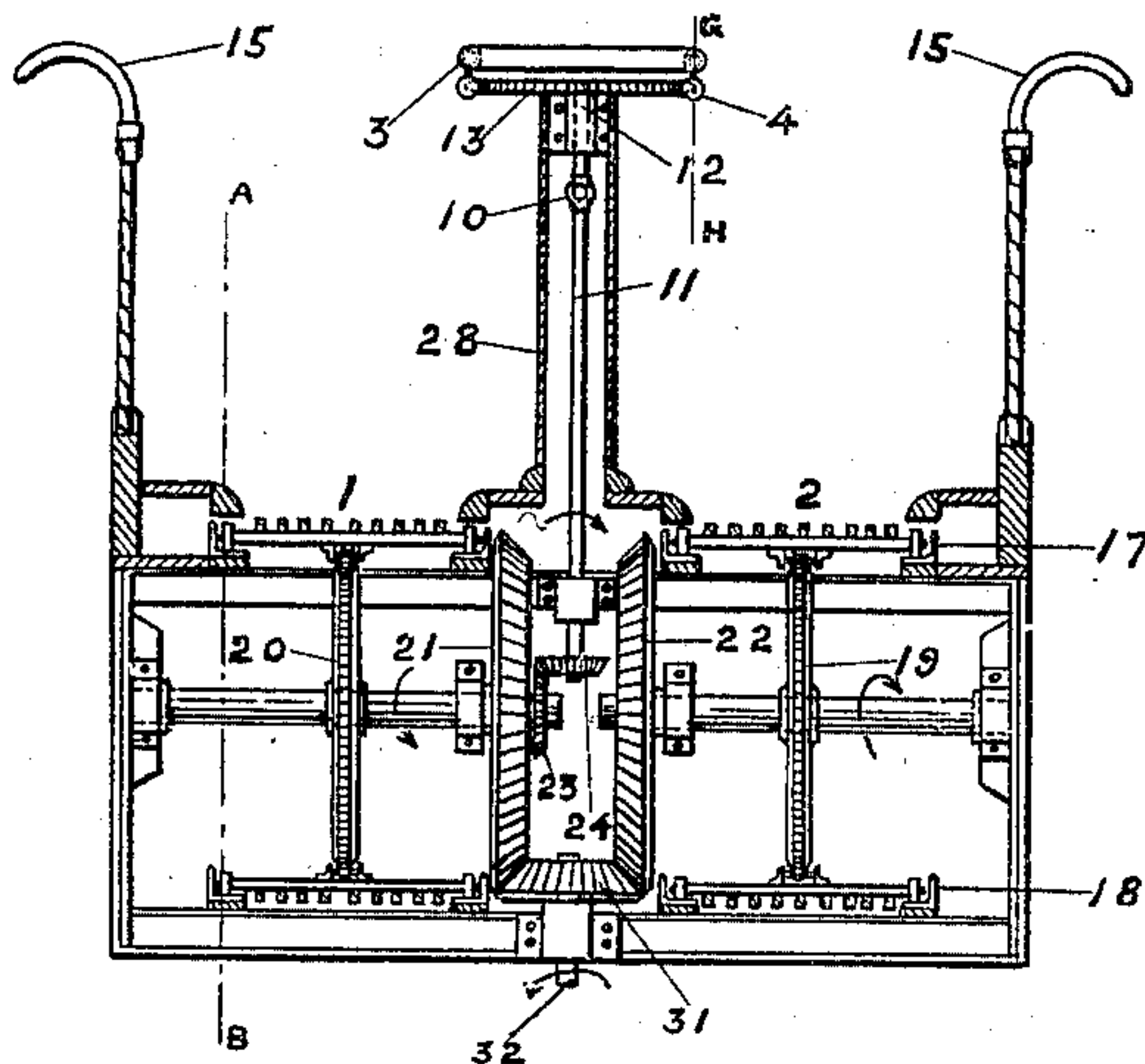


Fig. 6.

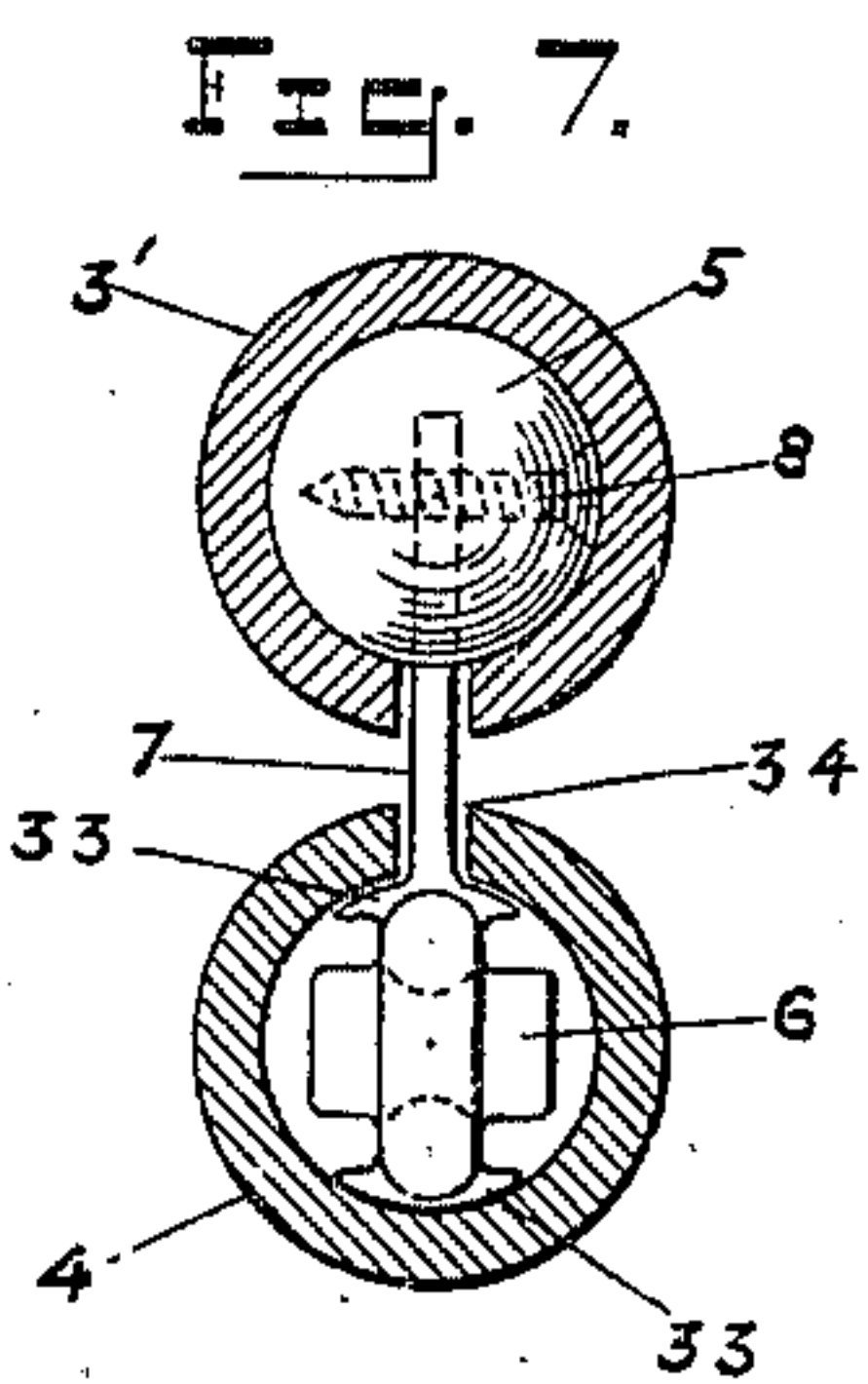


Fig. 7.

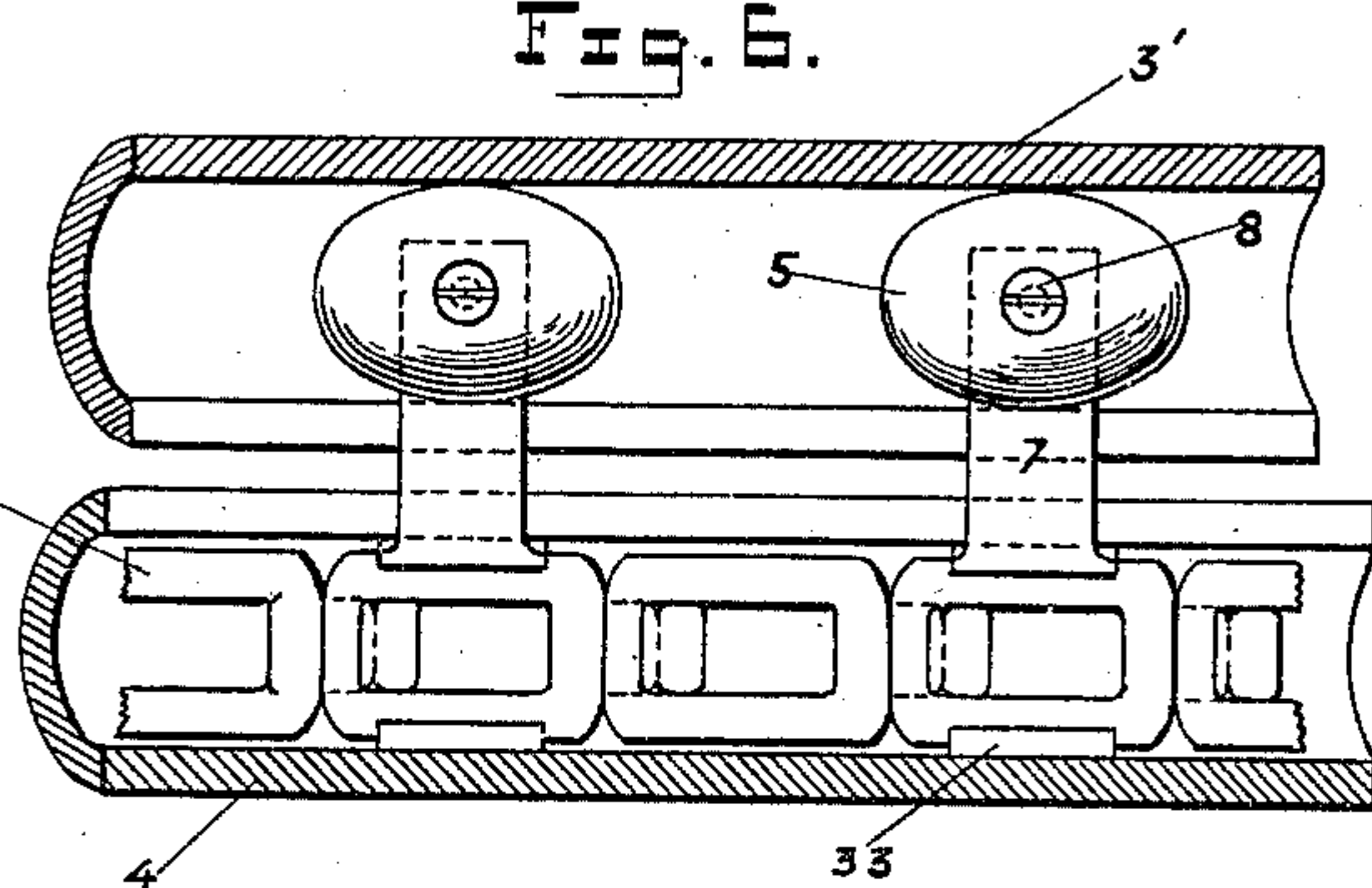


Fig. 8.

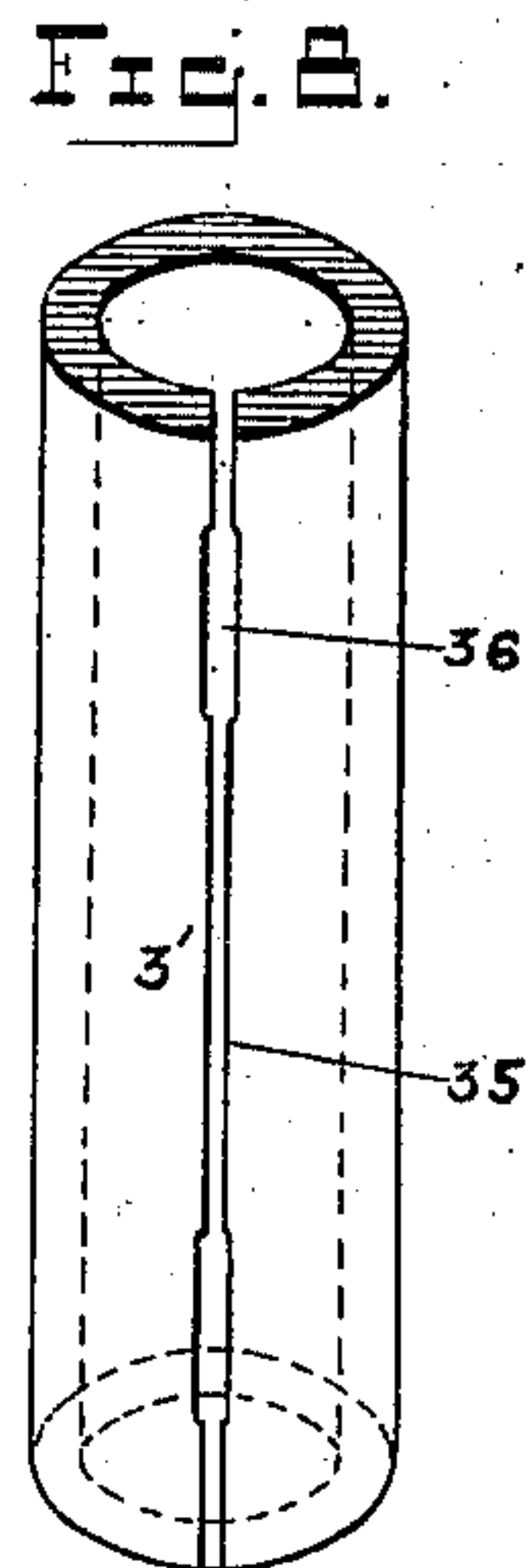


Fig. 9.

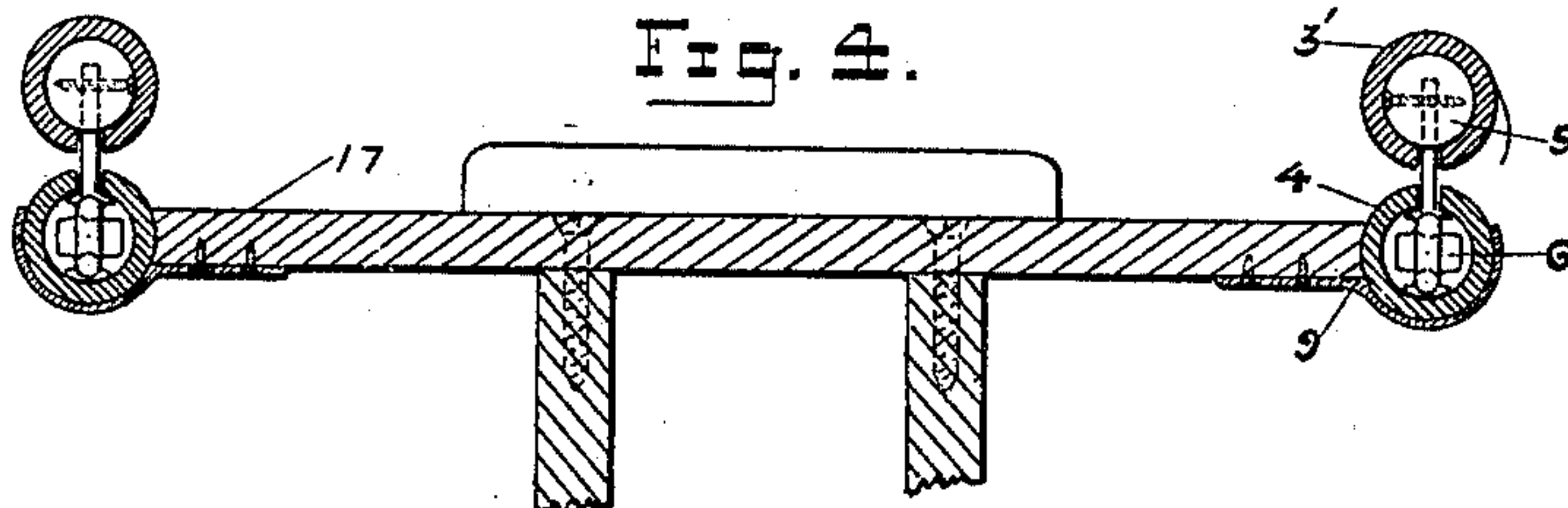


Fig. 10.

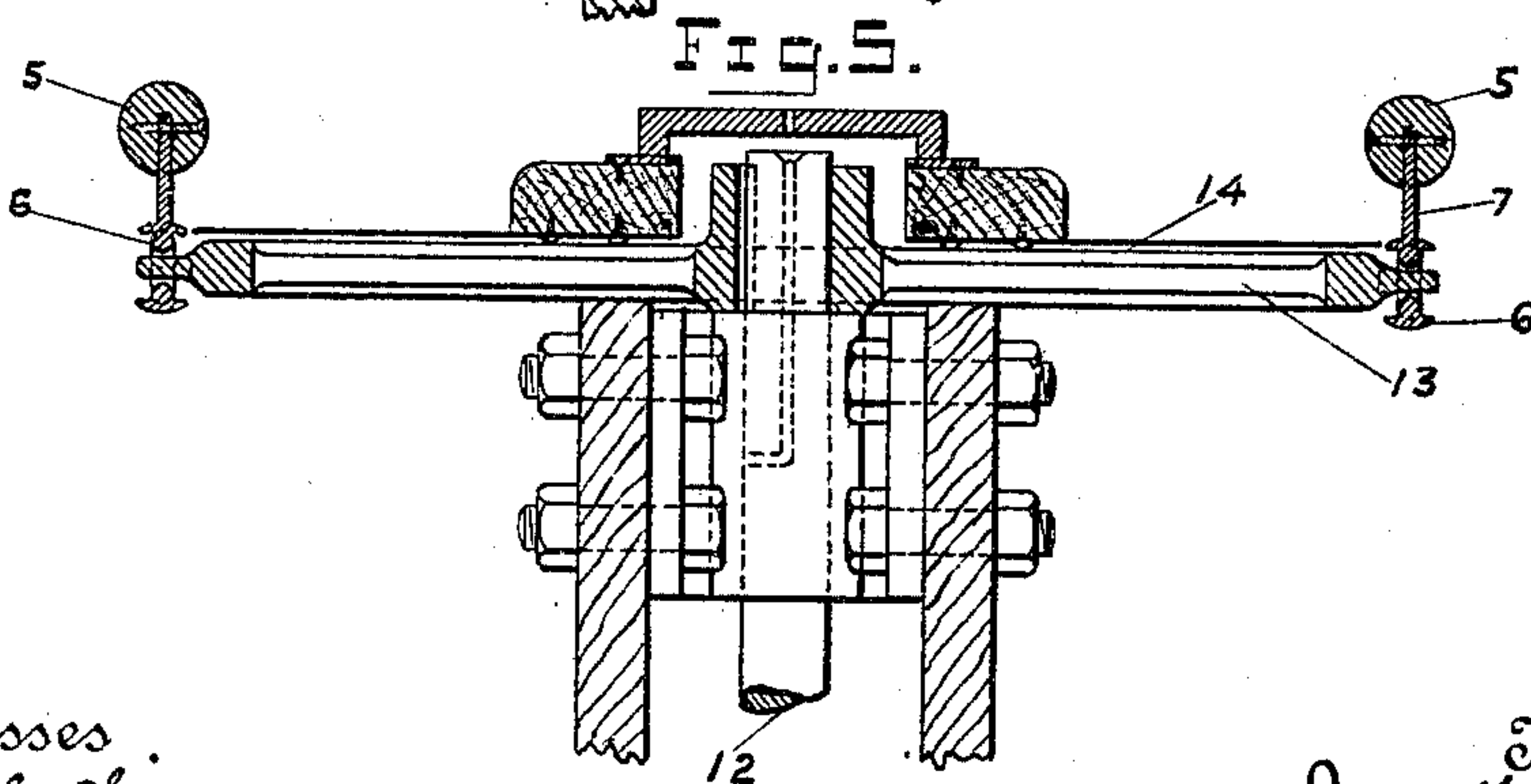


Fig. 11.

Witnesses.
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C. F. Carrington.

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J. W. Reno.
By his Attorney
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UNITED STATES PATENT OFFICE.

JESSE WILFORD RENO, OF NEW YORK, N. Y.

INCLINED ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 673,890, dated May 14, 1901.

Application filed November 22, 1900. Serial No. 37,388. (No model.)

To all whom it may concern:

Be it known that I, JESSE WILFORD RENO, a citizen of the United States of America, and a resident of the city, county, and State of New York, have invented certain new and useful Improvements in Inclined Elevators, of which the following is a specification.

My invention relates to improvements in inclined passenger-elevators, by means of which passengers are carried on a continuously-moving tread surface or belt adapted to travel along an inclined track from one level to another; and it relates more particularly to the case where two such elevators, one ascending and one descending, are situated adjacent to each other. Such an elevator I designate by the term "duplex."

The object of my invention is to produce an elevator of this class which shall be simple and inexpensive in its operation and construction as well as safe and convenient for use.

My invention consists in the novel construction and arrangement of parts whereby two endless tread-belts are arranged to travel in opposite directions along inclines which are placed side by side and driven by a single gear or motor and in so arranging the parts that the load on one incline tends to counter-balance that on the other.

My invention consists, further, in arranging a single endless moving hand-rail so that its ascending and descending portions may be used, respectively, by passengers on the ascending and descending tread-belt.

My invention consists, further, in the novel construction of the moving hand-rail and its guides and of the stationary balustrade.

In the drawings accompanying and forming part of this specification, Figure 1 represents a longitudinal vertical section of a duplex inclined elevator embodying my invention, taken on the line A B of Fig. 3. Fig. 2 represents a plan view of the moving hand-rail and the sprocket-wheels for actuating the same. Fig. 3 is a transverse section on line C D of Fig. 1. Fig. 4 is an enlarged section of the moving hand-rail, showing in detail its support and guide on line C D of Fig. 1. Fig. 5 is a section taken on line E F of Fig. 1, showing the driving sprocket-wheel for the

moving hand-rail. Figs. 6 and 7 are enlarged longitudinal and transverse views, respectively, of the moving hand-rail. Fig. 8 is a view showing the construction of the flexible cover for the hand-rail. Figs. 9 and 10 show, respectively, longitudinal and transverse views of a modified form of the hand-rail.

The reference characters are used in the same sense in all of the drawings and the specification.

Numerals 1 and 2 represent, respectively, the descending and ascending tread-belts, which may be of any suitable design or construction and which I prefer to make of transverse slats with rollers at either end, as described in the United States patents issued to me Nos. 470,918 and 637,526.

3 represents the movable hand-rail; 4, the guide for same, which I prefer to make of a metal tube provided with a slot 34.

3' represents the flexible covering of the movable hand-rail.

5 represents buttons, preferably of wood, which are located within the flexible covering 3' and secured to the shanks 7.

6 represents the links of the hand-rail sprocket-chain; 7, the shanks, as described; 8, screws for securing the buttons 5 to the shanks 7.

9 represents clips secured to the top 17 of the central balustrade separating two elevators, which clips are also secured to the hand-rail guide 4.

10 represents a universal-joint coupling connecting the two shafts 11 and 12, 11 being the shaft to which the bevel-gear 24 is secured and 12 the shaft to which the driving-sprocket 13 is secured.

14 is a sheet-metal guard or cover for the sprocket-wheel 13.

15 is the curved top of the outer balustrades.

16 is the lower hand-rail sprocket-wheel, which ordinarily is used simply as an idler.

17 represents the track rails or supports for the tread-belt.

18 represents corresponding lower rails for the return of said belts. The rails 17 are preferably curved, so as to produce horizontal tangents at the top and bottom of the movable tread-belt.

19 and 20 represent the driving sprocket-wheels for the ascending and descending tread-belts 2 and 1.

21 and 22 represent bevel-gears adapted to engage the bevel-pinion 31.

23 and 24 represent a pair of bevel-gears, by means of which the sprocket-wheel 13 is driven.

25 represents the lower tread-belt sprocket-wheel or idler.

26 represents a rope, preferably a wire rope, which may be used in place of the chain for driving the movable hand-rail, and 27 represents clamps secured to said rope, the shanks 7 of which are secured to the buttons 5.

28 represents the paneling or partition of the balustrade which separates the ascending and descending tread-belts.

29 and 30 represent, respectively, the upper and lower landings.

31 represents a bevel-pinion secured to the shaft 32 and engaging the bevel-gears 21 and 22. The shaft 32 is secured in any suitable way to any convenient form of motor for driving the elevator.

33 represents enlarged portions of the links of the hand-rail chain by means of which adequate wearing-surface is provided.

34 represents a slot in the hand-rail guide.

35 represents the slot in the flexible hand-rail cover.

36 represents enlarged portions of slot 35 for the shanks 7.

The direction of rotation of the various shafts and wheels is indicated by arrows.

By means of this construction I am enabled in a very simple manner to use the load on one tread-belt to counterbalance that on the other, thereby greatly reducing the amount of power which would otherwise be consumed, and by means of my arrangement of driving-gears for the tread-belts I am enabled in a very simple manner to drive both belts from a single source of power, and the counterbalancing effect of the two belts upon each other does not have to be transmitted through a long series of gears.

Heretofore in elevators of this class the moving hand-rail has passed around sheaves which revolve in vertical planes. This in the case of a duplex inclined elevator would necessitate having two sets of moving hand-rails with their respective driving mechanisms. By means of guiding the movable hand-rail around terminal sheaves or sprocket-wheels which revolve in horizontal planes I am enabled to make one movable hand-rail serve for both the ascending and descending tread-belts. The upper or driving sprocket-wheel 13 for the moving hand-rail is located some distance beyond the sprocket-wheels 19 and 20, for the reason that it is more convenient to grasp a hand-rail at a point somewhat in advance of the point on which one stands.

I have described the right-hand tread-belt, as seen in Fig. 3, as being the ascending and the left-hand belt the descending, in which

case the moving hand-rail in both ascending and descending would be grasped by the left hand. This I find to be preferable, because it is customary for persons to turn to the right in passing and also because the right hand is generally used for carrying packages and the like. It is of course obvious that the direction of movement of the tread-belts and of the hand-rail may be reversed in any case where it is desirable.

As seen from the drawings, the links of the hand-rail chain are pivotally connected together, so as to swing horizontally. There is, however, enough clearance or looseness between the links to permit of slight bending of the chain vertically to accommodate itself to the path of the guide-rail, and I prefer to arrange the track-rails 17 for the tread-belt and also the guides 4 for the hand-rail so that each shall have at the top and bottom a horizontal section which is connected by a curve with the straight inclined portion.

In Fig. 9 is illustrated a modified form of the hand-rail, in which a rope, preferably a wire rope, is substituted for a chain.

In both forms of the moving hand-rail it is seen that the neutral axis of the hand member 3—that is, the axis which does not change its length as the hand-rail bends around its sheave—lies in the same plane substantially as the pitch-plane of the chain 6 or rope 26, thus preventing any tendency of the flexible hand member to stretch or elongate in bending.

An important feature of my invention lies in the construction of the outer stationary balustrades. It is of course absolutely necessary to provide balustrades or banisters of some description to prevent accidents and to give assurance to passengers. At the same time I have found in practice that confusion sometimes arises from passengers grasping the stationary banister or hand-rail. To meet these conditions, I provide the outwardly-curved portion 15, which presents a smooth curved surface of wood or other suitable material at about the height of an ordinary hand-rail, but of such large radius of curvature as to make it inconvenient, if not impossible, to be grasped by the hand. Its presence gives assurance to passengers, but because of its large radius of curvature and bulky appearance relative to that of the moving hand-rail 3 passengers instinctively lay hold of the latter in preference to the former.

What I claim is—

1. In a duplex inclined elevator, the combination with a pair of tread-belts and supports therefor, arranged side by side, one for ascending, the other for descending traffic, of a flexible endless movable hand-rail located between and at a suitable height above said tread-belts, having its ascending and descending sections, respectively, in operative position for the ascending and descending tread-belts.

2. In a duplex inclined elevator, the com-

5 combination with a pair of tread-belts and supports therefor, arranged side by side, one for ascending, the other for descending traffic, of a movable hand-rail, guides therefor parallel to said tread-belts, and sheaves or wheels at the upper and lower landings to guide the movable hand-rail from the operative position for one tread-belt to that for the other.

10 3. In a duplex inclined elevator, the combination with a pair of tread-belts and their supports, arranged by side by side, one for ascending and the other for descending, of driving sprocket-wheels mounted on shafts, having their axes in the same line, at the upper
15 landings of said tread-belts, bevel-gears mounted on the inner ends of said shafts, and a third bevel-gear, adapted to be connected with a source of power, engaging the first-named bevel-gears to drive them in opposite
20 directions.

4. In a duplex inclined elevator, the combination with a pair of tread-belts and their supports, arranged side by side, one for ascending, the other for descending, a sprocket-wheel and shaft, located at the upper landing, for each of said tread-belts, said shafts located concentrically, bevel-gears on the inner ends of the shafts engaging a single bevel-pinion, a moving hand-rail located between and at a suitable height above said
30 tread-belts, a sprocket-wheel for driving said movable hand-rail located beyond the vertical plane through said tread-belt sprocket-wheels, and a shaft and universal joint coupling said hand-rail sprocket-wheel with the
35 tread-belt-driving shaft.

40 5. In a moving hand-rail for inclined elevators the combination with a flexible member adapted to be grasped by the hand, of a sprocket-chain exterior thereto, whose pitch

plane coincides substantially with the neutral axis of the flexible hand member.

6. In a moving hand-rail for inclined elevators, the combination with a flexible tube of a sprocket-chain located exterior thereto and shanks connecting said flexible tube and the said sprocket-chain. 45

7. In a moving hand-rail for inclined elevators, the combination with a flexible tube and a flexible driving member exterior thereto, of buttons within said tube, and shanks secured to said buttons and said flexible driving member. 50

8. In a moving hand-rail for inclined elevators, the combination with a flexible tube of a flexible driving member located exterior thereto and connected therewith, and a slotted tubular guide for said driving member. 55

9. In a moving hand-rail for inclined elevators, the combination with a tubular hand member longitudinally slotted with a sprocket-chain located exterior thereto and connected therewith by the shanks 7 and the buttons 8, said shanks engaging the enlarged openings 36 of the flexible hand member. 60 65

10. In an inclined elevator, the combination with a tread-belt and its supports, and the movable hand-rail, of the stationary balustrade, having its top flare outwardly in a curve of relatively great radius of curvature rendering it difficult to be grasped by the hand. 70

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JESSE WILFORD RENO.

Witnesses:

C. F. CARRINGTON,
EDW. B. HAWKINS.