No. 617,778. Patented Jan. 17, 1899.

C. D. SEEBERGER.

ELEVATOR.

(Application filed May 19, 1896.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.

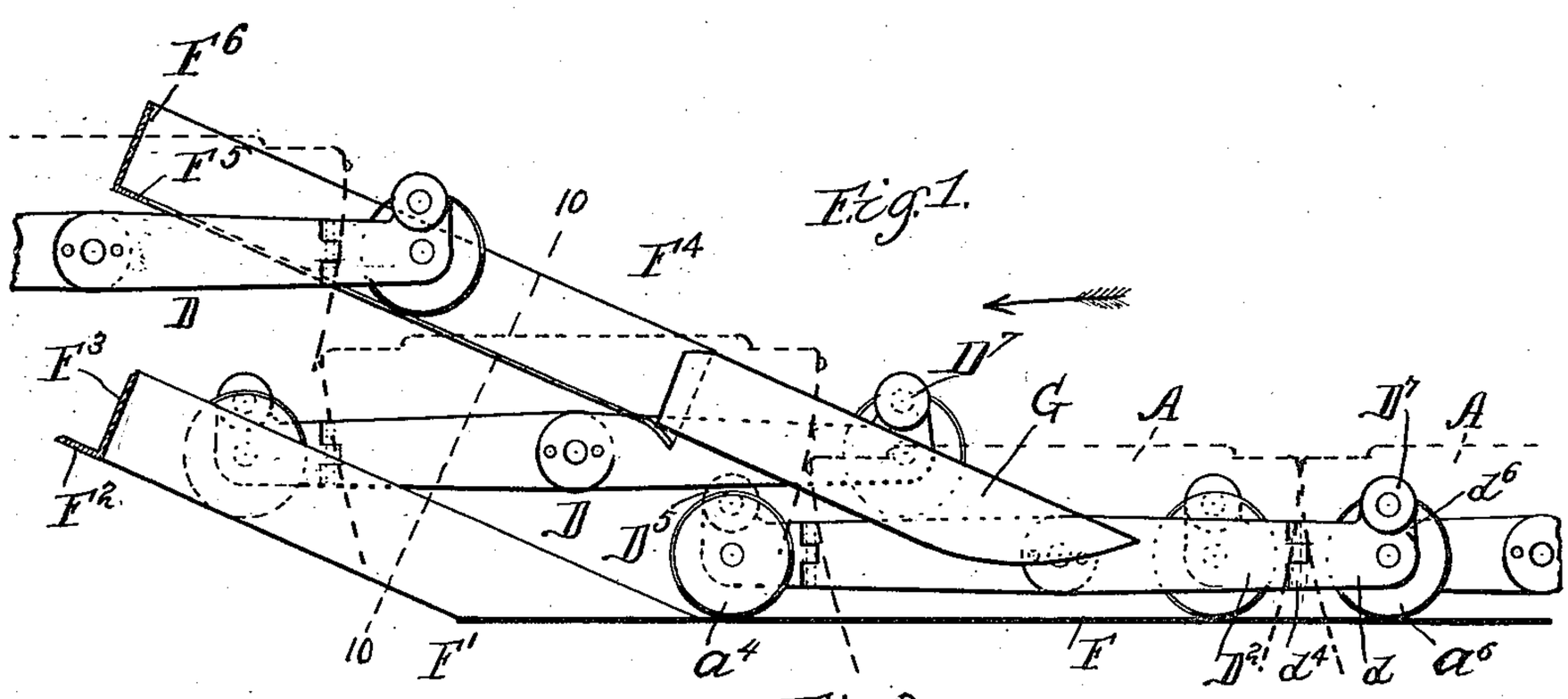


Fig. 2.

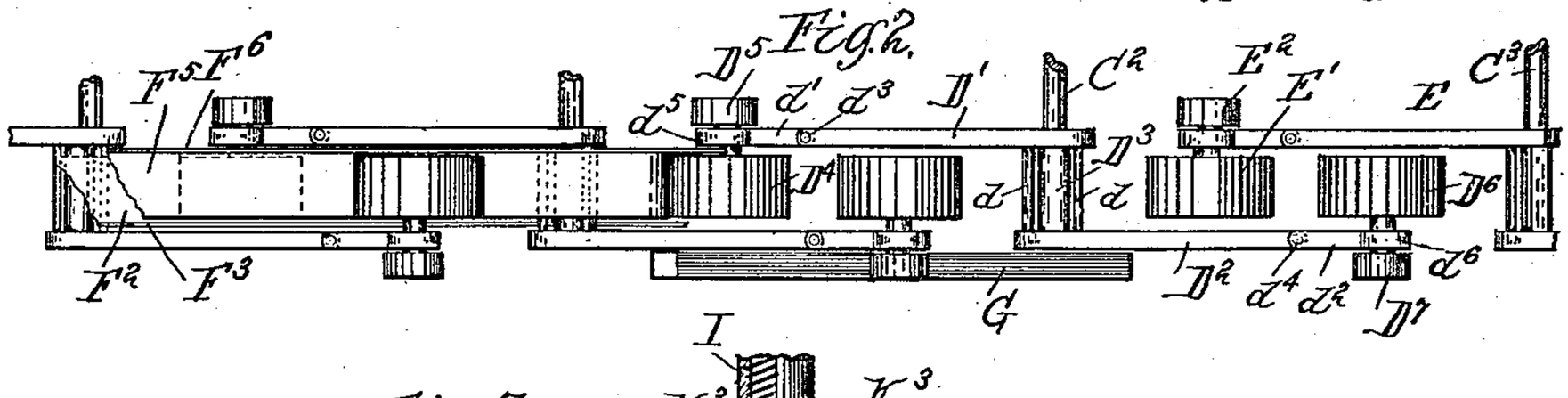


Fig. 3.

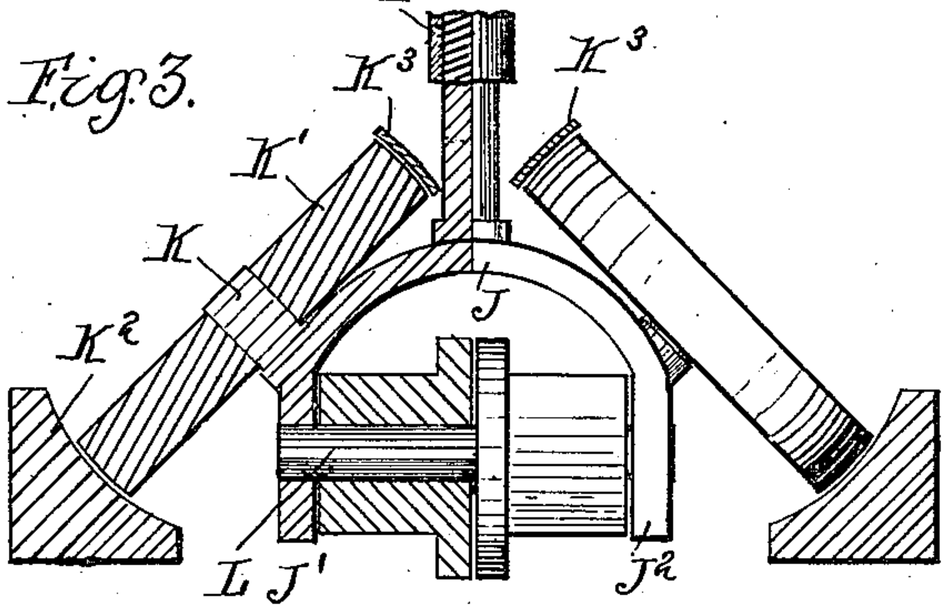
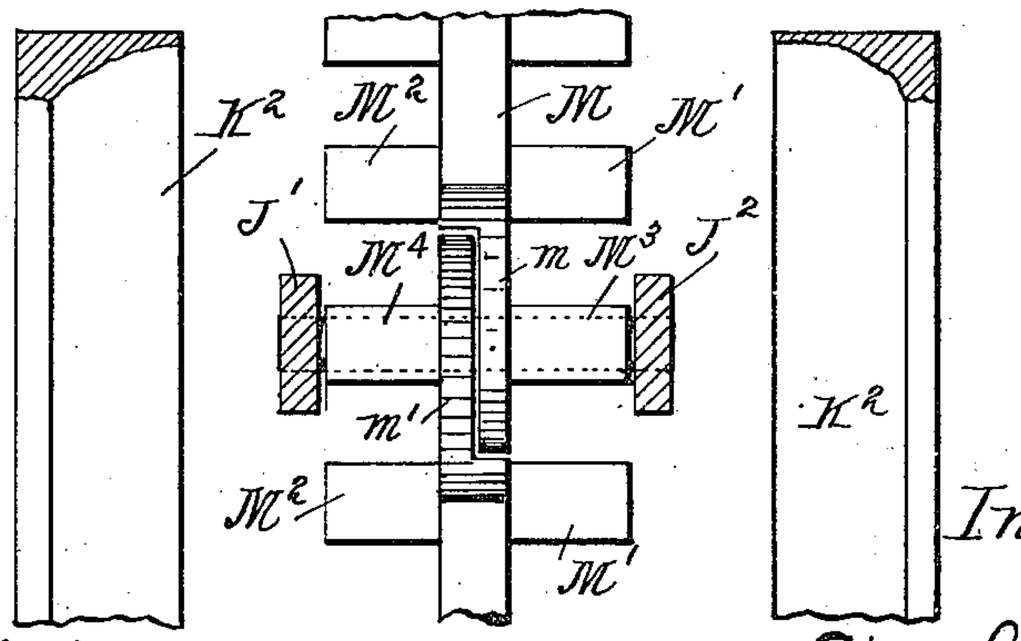


Fig. 4.



Witnesses.

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(No Model.) 4 Sheets—Sheet 2.

Fig. 5.

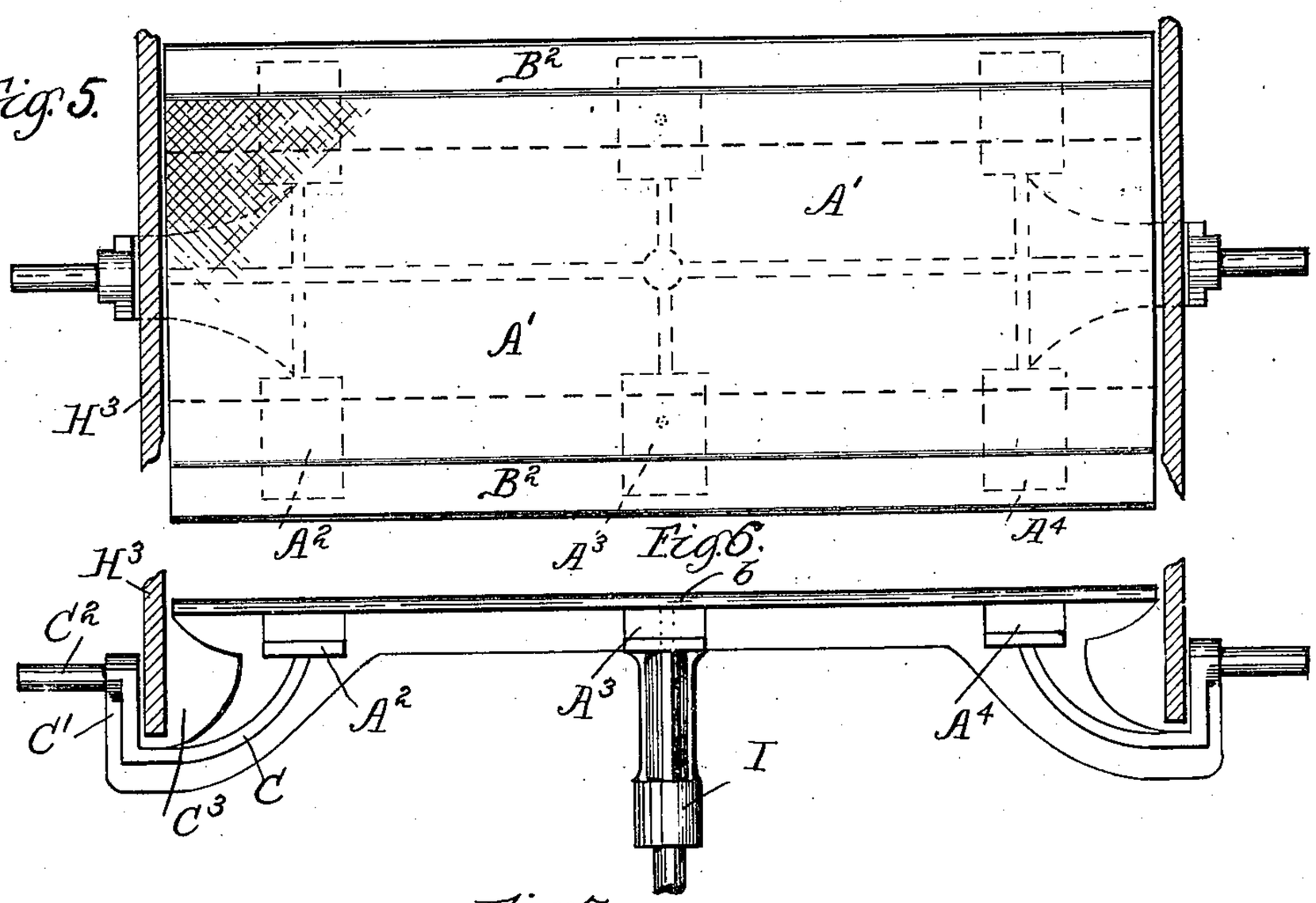


Fig. 6.

Fig. 7

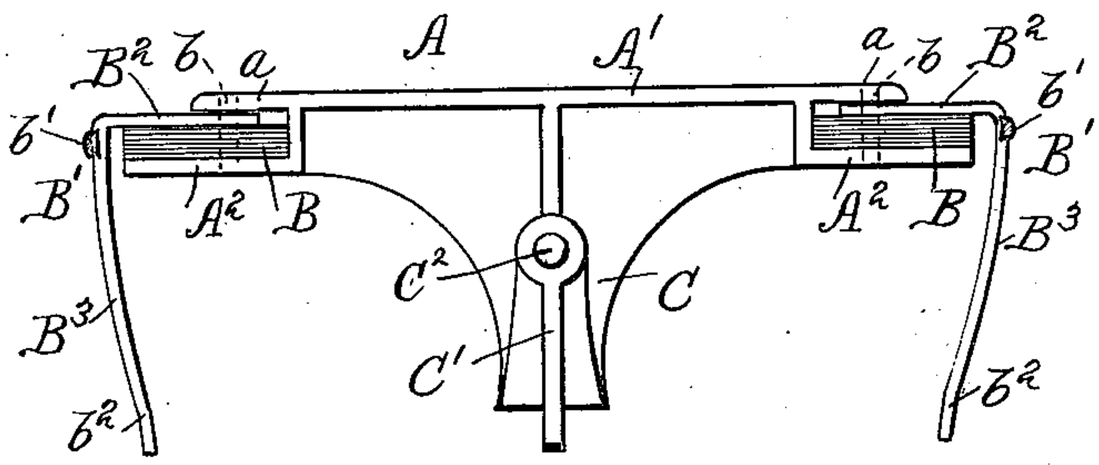
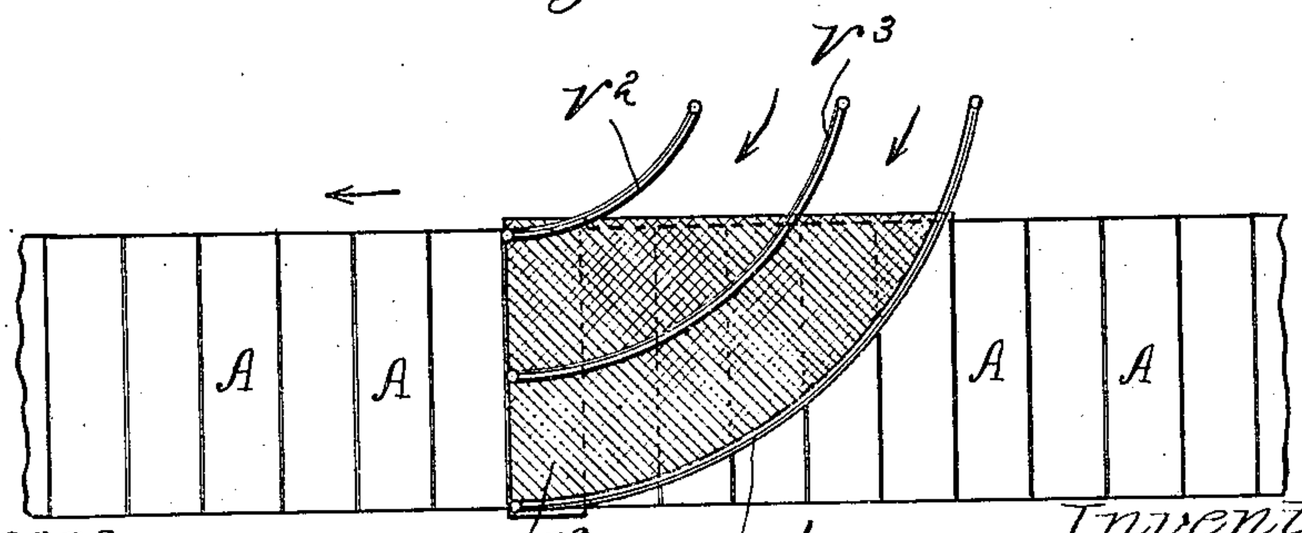


Fig. 8.



Witnesses.
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(No Model.) 4 Sheets—Sheet 3.

Fig. 10.

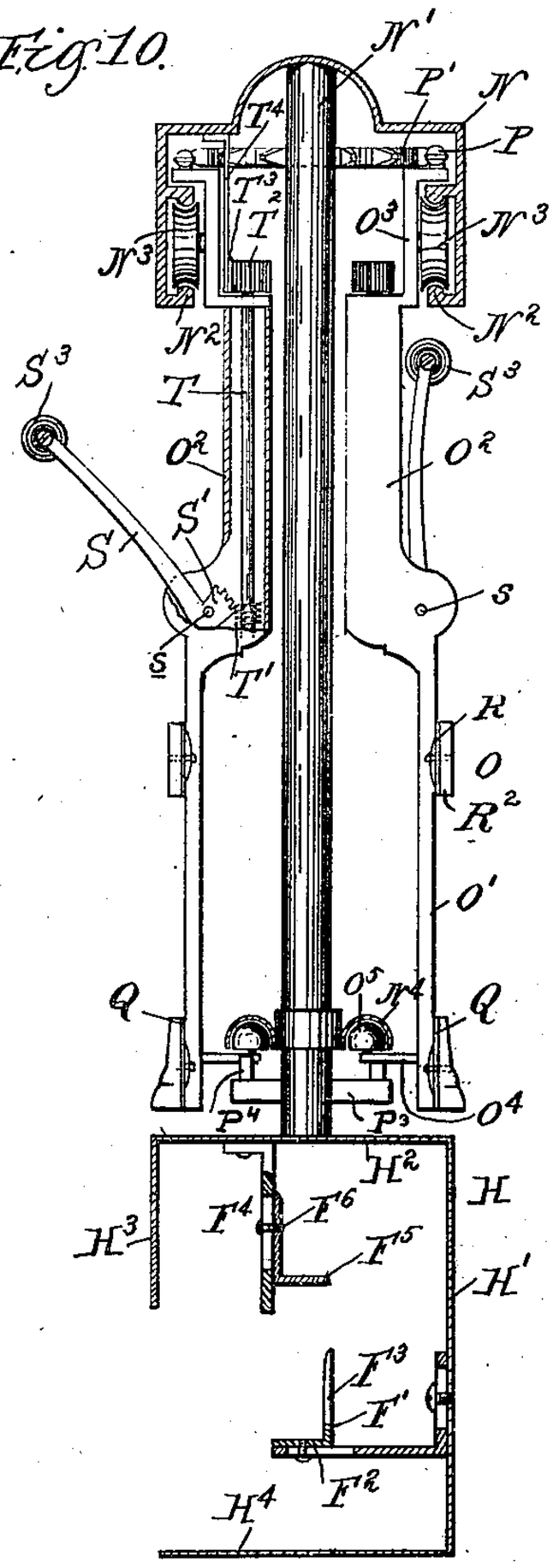


Fig. 9.

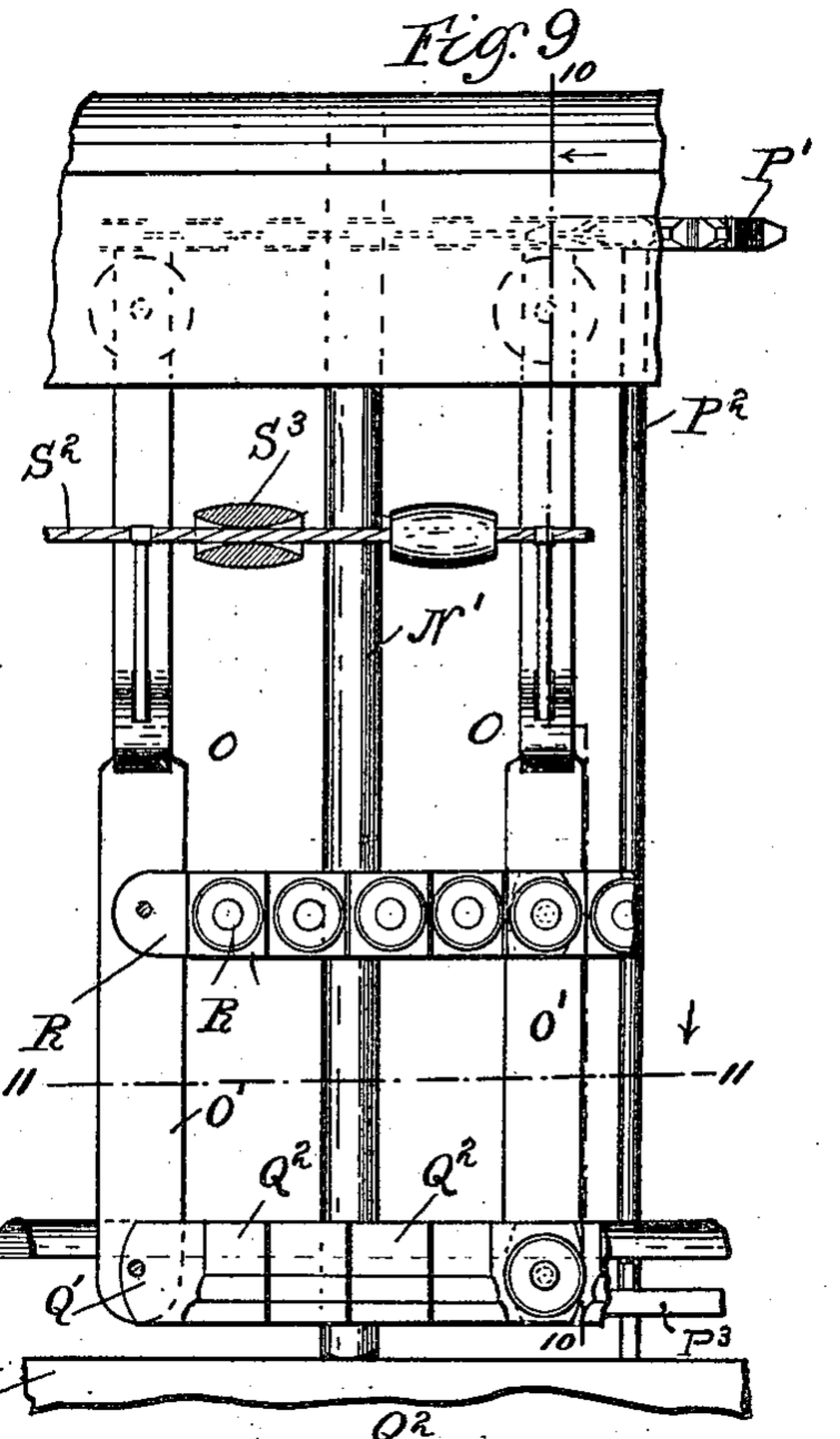


Fig. 11.

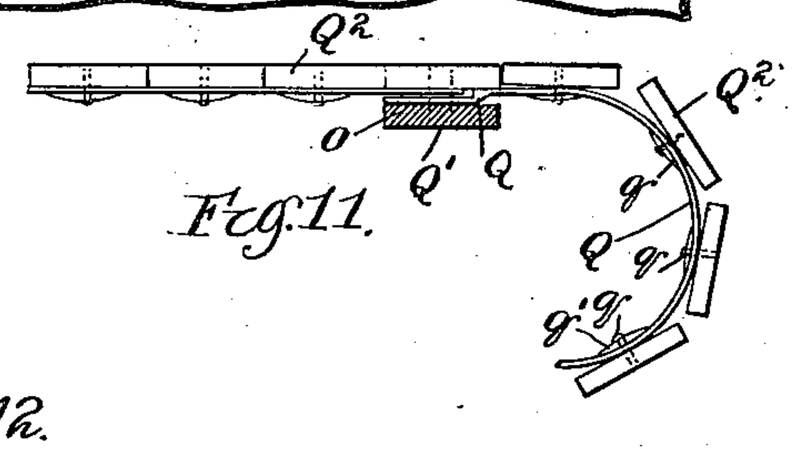
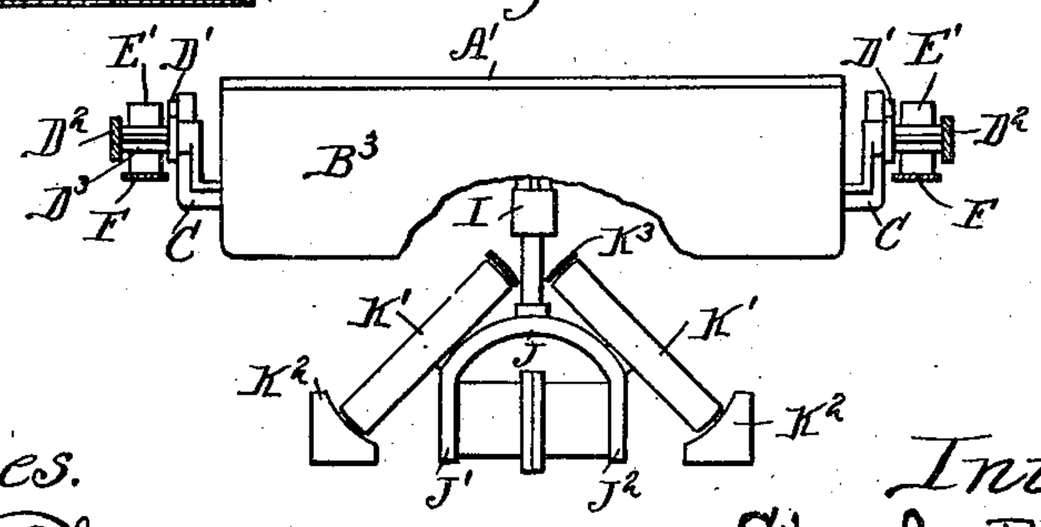


Fig. 12.



Witnesses.
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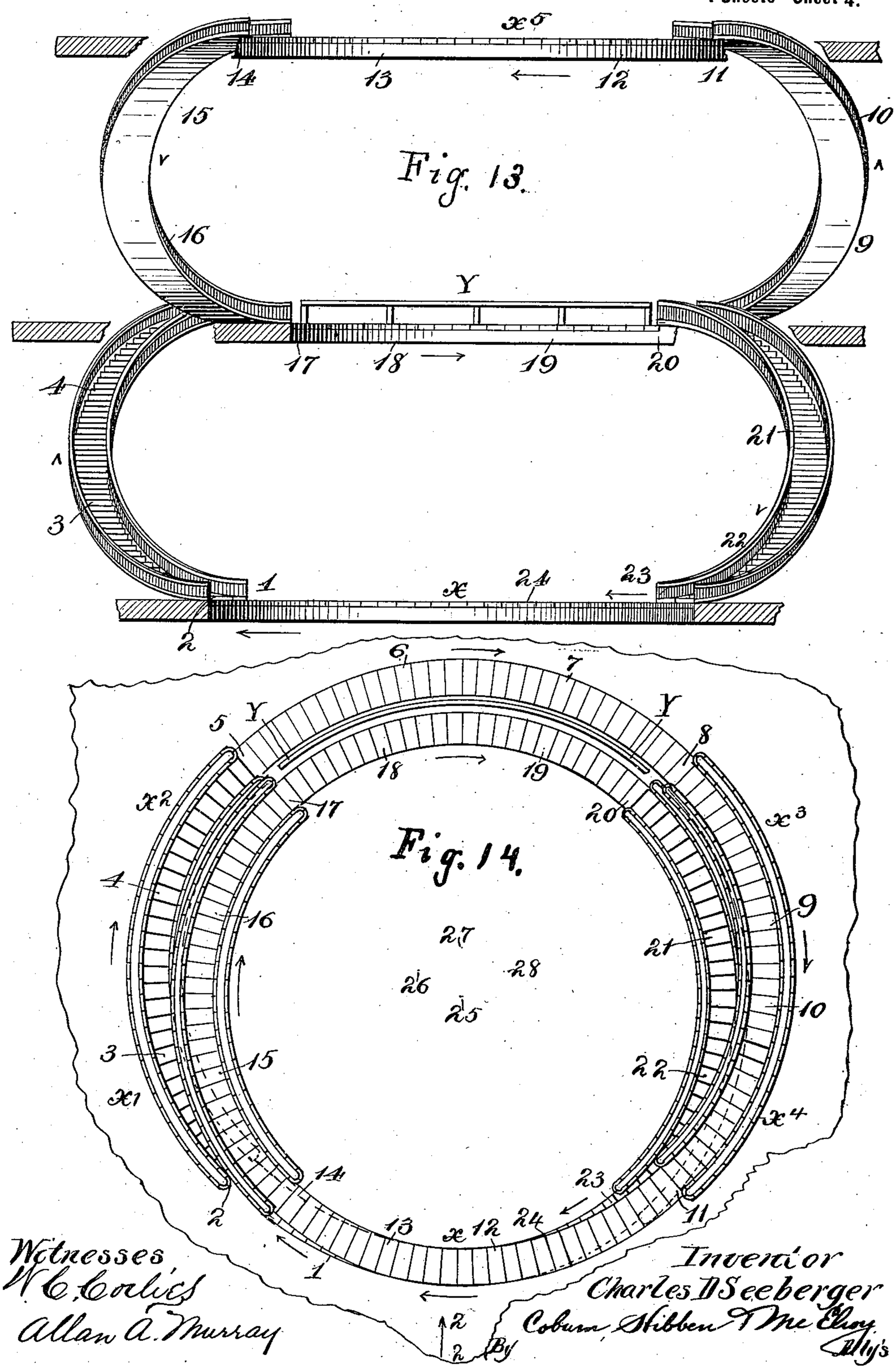

Fig. 13.

Fig. 14.

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UNITED STATES PATENT OFFICE.

CHARLES D. SEEBERGER, OF CHICAGO, ILLINOIS.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 617,778, dated January 17, 1899.

Application filed May 19, 1896. Serial No. 592,135. (No model.)

To all whom it may concern:

Be it known that I, CHARLES D. SEEBERGER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Elevators, which is fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of a portion of the tracks and of the trucks of my elevator. Fig. 2 is a plan view of the structure shown in Fig. 1. Fig. 3 is a detail elevation, partly in section, of the guide and guide-rollers of the sprocket-chain bars. Fig. 4 is a plan view of the structure shown in Fig. 3 with the guide-rollers omitted. Fig. 5 is a plan view of a step or truck. Fig. 6 is a front elevation thereof with the risers omitted. Fig. 7 is an end or side elevation thereof, showing the convex risers. Fig. 8 is a plan of a passage-way and platform for entering upon the elevator. Fig. 9 is a side elevation of a portion of a movable balustrading and hand-rail. Fig. 10 is a vertical section on the line 10 10 of Fig. 9, showing also the track-casing below in section on line 10 10 of Fig. 1 and with the wheels and guide-rollers omitted. Fig. 11 is a horizontal section of the balustrading, taken on such a line as 11 11 in Fig. 9. Fig. 12 is a front elevation of a step, showing its connections with the supporting-wheels, &c., and with the guide-rollers, &c. Fig. 13 is an elevation, somewhat diagrammatic in its nature, of my improved elevator arranged in a double spiral for ascending and descending between three floors; and Fig. 14 is a similar plan view.

My invention applies to that class of elevators in which a series of interconnected trucks or steps are moved over tracks through part of their extent horizontal and through part inclined, the said trucks or steps remaining individually horizontal throughout such movement.

My invention consists of certain improvements upon several features of such an elevating mechanism.

The drawings illustrate only those parts thereof to which the constructions which constitute my invention are applied.

Referring to the drawings by letters and figures, A represents one of the trucks or steps, A′ the tread thereof, and A^2, A^3, and A^4 three brackets secured below the said tread A′, both in front and in rear thereof, in such a way that the outer edges of the said brackets project beyond the partially-overlapping edges *a* of the tread A′. Between the said brackets and the said overlapping edge *a* and resting upon the said brackets and rigidly secured thereto I place a bar B, which serves as a bed or support for the riser B′. The riser B′ consists of the horizontal portion B^2 and the depending portion or riser proper, B^3. The horizontal portion B^2 rests upon the bar B, projecting under the overlapping edge *a* of the tread, and is there pivotally secured by a pivot *b*, passing down through the parts *a* B^2 B and the central bracket A^3. The depending portion B^3 of the riser is constructed to curve outward from the center of the step—*i. e.*, is made convex—substantially as shown in Fig. 7. Near the upper edge of the riser is preferably located a horizontal strip of rubber or other elastic material *b*′, partly countersunk in the said riser.

The operation and advantages of the parts hereinabove described may best be stated at once. When the trucks or steps A are traveling horizontally and in a straight line, the corresponding strips or nosings *b*′ of the adjacent steps are in contact with each other and by their elasticity remain in contact in spite of slight changes in distance between the adjacent steps arising from their movement, obviating the possibility of the dress or person of the passenger by any chance becoming caught in any space which might otherwise be formed between the steps. When the steps commence their ascent along one of the inclined portions of the tracks, the rear riser of each step successively rises in relation to the front edge of the following step, the trucks assuming the position shown in dotted lines on the left-hand side of Fig. 1, where they may be considered as moving in the direction of the arrow. The front nosing of each step bears against the lower edge b^2 of the rear riser of the step next preceding. In such position, also, the elasticity of the nosing-strip *b*′ forms a close-fitting connection between each two adjacent steps.

The depending portion of the riser B^3 is formed curving outward or convex, as shown

in Fig. 7, in order that during the transition of the steps from their position with relation to each other upon the horizontal tracks to their position upon the inclined tracks there shall at no time be formed any space between the rear riser of one step and the nosing of the next succeeding. With this construction the said nosing will continue in contact with the said riser throughout the transition. The particular curve of convexity depends upon the mounting of said steps, their interconnection, &c., and will have to be worked out in each case. The essential principle is that the said riser should be curved and that such curve should be convex.

When the steps run upon tracks which are curved, the said steps will usually be made narrower upon the inside than upon the outside of such curve. When, however, they are to run upon two or more curves of differing radii, such adaptation would not be sufficient. It is necessary to provide a means by which the adjacent steps will remain in contact along their entire edges upon all of such curves. In such a case the pivotal mounting of the riser B′, as hereinabove described, will permit of the risers and the nosings carried thereby automatically adjusting themselves to such changes in curve and preserving continuous close contact between the adjacent steps. The effect of the interposition of the wooden beam B between the brackets A^2 and the horizontal portion B^2 of the riser is to prevent grating of the metal parts upon one another and so deaden sound and reduce friction in these parts.

In Figs. 13 and 14 I show an elevation and a plan view, respectively, of my elevator as arranged in a double spiral for ascending and descending between three floors. The construction and arrangement of the tracks therein shown are fully described and claimed in my application, Serial No. 573,068, filed December 23, 1895, and will be described here simply for the purpose of illustrating one form of tracks with varying curves for which the mechanism of the present application is especially adapted.

To explain the direction of the movement of the elevator at the different points of its course, as exhibited in these figures, we may suppose that it is boarded by a passenger at the point 1, where it is traveling horizontally along the lowest floor shown, which may be called the "first" floor. The passenger is carried a short distance horizontally to the point 2. Here the ascent begins, (represented by the curve 2 3 4 5, at the last of which points he reaches the second floor.) He is now carried horizontally over the second floor along the curve 5 6 7 8, which does not appear in Fig. 13, since it is on the same level with and behind the curved portion 17 18 19 20, hereinafter referred to. At the point 8 the ascent from the second to the third floor commences, represented by the curve 8 9 10 11. At the point 11 the passenger reaches the third floor and is carried horizontally over the same along the curve 11 12 13 14. At 14 begins the descent to the second floor, (represented by the curve 14 15 16 17.) From the point 17 the passenger is transported horizontally over the second floor along the curve 17 18 19 20, this curve being inside of and parallel with the curve 5 6 7 8, hereinabove described. From the point 20 the descent to the first floor commences, and is represented by the curve 20 21 22 23. At the point 23 the passenger reaches the first floor again and is carried along the horizontal curve 23 24, &c., back to the original starting-point 1. This curve 23 24 1 2 being in great part vertically underneath the third-story curve 11 12 13 14 is represented in dotted lines, chiefly in Fig. 14. The arrows in the two figures are placed in corresponding positions and indicate the directions of the movement above described.

As particularly shown in Fig. 7, the tread of each step, broadly considered, consists of the central part or tread proper, A′, and the two horizontal portions B^2 B^2 of the two risers attached thereto. This construction has this further advantage: The slight elevation of the central part A′ of the tread represents that portion of the tread upon which it is wholly safe for the passenger to stand, and by the difference in level between A′ and B^2 the passenger will instinctively feel whether he is on or off the principal part of the step.

At each end or side, as it may be considered, of each step I form a depending bracket C, terminating in the upright arm C′, which carries the horizontal wrist C^2. This offset connection between the wrist C^2, from which the step is supported, and the step itself is for the purpose of permitting the side H^3 of the casing H, later described, to extend down below the level of the tread A′ of the step. Otherwise, along the ascending travel of the steps, the rear portions of the yoke, hereinafter described, the rear wheels and rollers, and that part of the track upon which said wheels travel would be exposed and apt to catch the dress or person of a passenger, as well as to permit the entrance of dirt into these parts.

The wrist C^2 terminates outwardly in a yoke D. This yoke is preferably formed of a forward and of a rearward extending arm D′ and D^2, respectively, the adjacent ends of the said arms being secured upon a sleeve D^3, with which they may be cast integral. Their connection with such sleeve and with each other may be further secured by the bolts or pins *d*. The wrist C^2 is rigidly keyed in the sleeve D^3.

When the trucks move in a single vertical plane—that is, when the tracks are not curved—the arms D′ and D^2 may be rigid and unbroken out to the wheels and rollers which they carry. When, however, the trucks are to travel upon curved tracks, and particularly when the curve of such tracks varies, I pivot the outer portions d' and d^2 of the said arms D′ and D^2, as at d^3 and d^4, respectively.

The pivoted part d' is provided with bearings for a stub-axle on which is mounted a wheel D^4. In an upward extension d^5 is mounted a second stub-axle carrying a roller D^5 on the opposite side from D^4. The pivoted part d^2 of the arm D^2 is similarly provided with an upward extension d^6 with a wheel D^6 and with a roller D^7. Thus the wheels D^4 and D^6 are located and travel in the same vertical plane. The roller D^5 and the roller D^7 each travels in a vertical plane of its own.

Each succeeding step is severally provided on each side with a wrist C^3, supported in a yoke E, similar to the yoke D, hereinabove described, and carrying the wheels and rollers E' E^2, &c., corresponding to the wheels and rollers D^4 and D^5, &c. The arrangement of the wheels is such that each front wheel E' travels, when the steps are moving horizontally, in the space between the rear wheel of the preceding truck and the central part of the yoke thereof. Each rear wheel D^6 travels between the front wheel of the following truck and the central part of the yoke thereof. By this overlapping construction each step or truck is given a very long bearing upon the tracks, the supporting-wheels being some distance in front of and behind the edges of the step proper. This long bearing obviates any tendency to rock on the part of the steps, either when moving horizontally or upon an incline, as later described, and conduces materially to the smooth running and the individual stability of the steps, particularly when the passengers walk up or down the moving steps. The pivoted construction of the arms D' and D^2 enables the yokes, and so the mechanism as a whole, to adapt itself regularly and automatically to the changes in curve where the trucks are constructed to run on curved tracks.

Along such portions of their course as the steps run horizontally it is obviously necessary to provide but a single track F. At that point where the steps commence their ascent the horizontal track F is continued as the lower F' of two inclined tracks. The track F may preferably be formed of an angle-iron, as shown, comprising the horizontal flange F^2, which forms the track proper, and the vertical flange F^3, which serves as a guard-rail. Above the inclined track F' is provided a second inclined track F^4, similarly consisting of an angle-iron comprising a lower horizontal flange F^5 and a vertical flange F^6. During the ascent of the successive steps the front wheels of each travel on the tracks F' and the rear wheels on the tracks F^4, the tracks being so disposed relatively to each other and the wheels so spaced apart that the steps remain severally horizontal during such ascent.

In order to guide each of the rear wheels onto the upper track, I provide the shunt or switch track G, which is placed in the vertical plane of travel of the rear roller D^7 and in such position that the said rear roller D^7 will enter upon the said switch-track at the same moment that the front wheel carried by the same yoke enters upon the lower inclined track F'. At that point where the rear wheel by the onward movement of the track enters upon the upper inclined track F^4 the switch-track G is discontinued. These tracks are all preferably mounted within a casing H, as shown in Fig. 10, the said casing consisting of the outer wall H', the top H^2, the inner depending side H^3, and the bottom H^4. The tracks are mounted within the said casing upon suitable brackets or in any other convenient way. It will be observed that Fig. 10 is taken upon the opposite side of the series of trucks from Figs. 1 and 2. The brackets may be made adjustable in the casing and the tracks thus adjustable on the brackets, as shown in Fig. 10. Similar tracks are provided for the descent of the steps or trucks, and at the beginning and end of each ascent and descent there will be provided a shunt or switch track similar to G. By this location of the rollers D^5 and D^7, I avoid the necessity of upthrust bearings and other devices adapted to prevent the steps from tipping, which are requisite when the said rollers are mounted opposite the centers of their respective steps or thereabout, as previously has been done. Inasmuch as such upthrust bearings, &c., are only partially efficacious in preventing the tendency to tip on the part of the steps in changing the direction of their motion, this location of the rollers is the only construction which insures smooth running of the steps at such points.

From the center of the bottom of each step a post I extends downwardly, terminating in a yoke J, comprising the two curved branches or arms J' and J^2. Upon each of the said arms is formed a short stub-axle K, upon which is mounted obliquely a wheel or roller K', adapted to travel in the guide-track K^2, disposed below and outside of the said roller. Above the said roller K', preferably only at and near that point where the steps commence their ascent, I place an upthrust track or bearing K^3 to check any tendency on the part of the steps to lift at such point, owing to the resultant between the upward pull on the ascending steps and the resistance of the horizontally-moving steps. This construction checks such an upthrust tendency more directly more nearly at the point of application of that force than where such upthrust tracks are arranged over the supporting wheels or rollers outside of the steps and avoids stress in the steps arising from such other construction.

Upon pivots L, mounted in the depending arms J' and J^2 of the yoke J, are loosely mounted the adjoining ends of the sprocket-chain bars M. Each of the sprocket-chain bars carries a double set of teeth M' M^2, which are adapted to mesh with suitable sprocket-wheels that are located at appropriate points and supply motive power to the series of trucks or steps. The adjoining ends of the

chain-bars are rabbeted, as at m', the rabbeted end m carrying a tooth M^3, corresponding to the teeth M', the end m' carrying a tooth M^4, corresponding to the teeth M^2, the pivot L passing through both of said teeth M^3 and M^4. A certain amount of play is left between the adjacent surfaces of the ends m and m' to permit the chain-bars to adapt themselves to the changes in curve where the steps move upon curved tracks. The advantage of this construction over that where two sets of sprocket-chain bars are employed, one attached to each side of the steps, is most marked in case the steps are to run upon curved tracks, since such tracks must frequently be made with changes in the radii of curvature, which in case of an outer and an inner set of chain-bars will require an adjustment in the relative length of such chain-bars. The present construction involving but one set of chain-bars, centrally attached to the steps, accommodates itself to slight changes in curve automatically and readily. The guide-tracks K^2, through the rollers K', receive any side thrust which may arise when the steps are moving along curved tracks. Both of these features—the centrally-disposed single-chain-bar system and the guides and rollers—are applicable and advantageous in cases where the steps move in the same vertical plane.

In a previous application, filed December 23, 1895, Serial No. 573,068, I have shown and described an endless wainscoting adapted to move at each side of the series of steps along certain parts of their course, preferably the inclined portions thereof, the said wainscoting being timed to move at the same rate and in the same direction with the said steps, but otherwise independent thereof. The construction hereinafter described constitutes certain improvements upon the previous construction referred to. Along a certain portion of the travel of the steps, upon one or both sides thereof, I place a hood N, substantially of the form shown, supported from below by the posts N', which may preferably rest upon the track-casing H. Upon each side of the inside of the hood N is formed a track N^2, adapted to receive a roller N^3. Each of the said rollers supports a stanchion O, comprising a base portion O', an upper hollow portion O^2, and an offset or bracket O^3, which is provided with a stub-axle for the roller N^3. Near the lower end of each stanchion is secured a bracket O^4, carrying a roller O^5, adapted to travel in the guide N^4, carried on each side of the posts N'. The offsets or brackets O^3 carry a sprocket-chain P, which meshes with a sprocket-wheel P', keyed upon a vertical shaft P^2, mounted within the hood and balustrading and preferably extending down within the track-casing H, where it is supplied with power requisite to revolve the said shaft. Toward the lower end of the shaft P^2, I may mount a sprocket-wheel P^3 carrying one or more teeth P^4, adapted to engage with the brackets O^4 at the lower end of the stanchions, and thus counteract any tendency of the lower ends of the said stanchions to lag.

The stanchions are disposed at any convenient distance apart and may be secured in such relative position in any one of several ways. The following is one method which I find preferable: The lower ends of the adjacent stanchions are connected together by thin elastic bands of metal Q, secured thereto by pivots Q'. To the bands Q are secured blocks Q^2 of wood or other convenient material by centrally-disposed pins or bolts q, passing through the said band and through a spring-washer q'. These blocks are so disposed relatively to each other that where the endless balustrading is moving in a straight line the ends of the blocks are approximately in contact with each other. When the balustrading at the end of its course passes around the curve requisite to start it on its return course, the blocks will take the position shown in the right-hand side of Fig. 11 as tangents to the curve formed by the supporting-band. Higher up on the stanchions I may provide a second set of similar bands R, supporting similar blocks R^2.

Within the hollow upper portion of each stanchion I mount an upwardly and outwardly projecting arm S, pivoted to move in a vertical plane, as at s, and carrying at its lower end near its pivotal point a segmental gear extension S'. The said arms carry a hand-rail, which I have shown to be formed of a cord or rope S^2, secured in the ends of the said arms S and itself carrying a series of blocks S^3, firmly attached thereto, adapted to be grasped by the hand of the passenger. Inasmuch as both the balustrading and hand-rail, however, have to pass about a curve at the end of their course, it is desirable not to depend upon the arms S being tilted up by the tension in the rail as the curve is approached, but to provide some positive means by which the said arms are automatically tilted in such manner that the outer ends of the arms move through the same curve as do the inner ends and all stretch in the rail is avoided. This I provide for by mounting in the tubular upper portion of each stanchion a shaft T, the lower end of which carries a worm-gear T', adapted to engage with the gear-segment S'. On the upper end of the shaft T is mounted a pinion T^2, which meshes with the rack T^3. The rack T^3 is preferably mounted upon a depending bracket T^4, supported from the casing, and is placed at a point just before that where the balustrading commences to curve in order to take its return course. By this mechanism the arm S is tilted up from the operative position shown on the left-hand side of Fig. 10 to the position shown on the right-hand side thereof. I find it preferable to allow the arm S to remain tilted up in the latter position during the time of its return travel to that point where the balustrading again curves around to its starting-point, whence it moves along with and in

proximity to the steps, as above stated. The second rack will at this point therefore be placed upon the other side of the pinion T^2 in order to tip the arm S down into operative position.

Fig. 8 represents a form of passage-way for entering upon the steps when the same are moving horizontally. At a suitable point I construct a platform extension V, supported from the platform proper on both sides of the moving steps, preferably of the form shown in the said figure, and provide the said extension with the fixed railings V′ and V^2, which are so curved that while the passenger enters upon the platform extension in a direction approximately transverse to that of the movement of the steps he leaves the said extension and steps on the moving steps in the direction of their motion. I may find it desirable in case the steps are wide enough to accommodate two or more passengers each side by side to provide one or more railings, such as V^3, dividing the said single passage-way into two or more passage-ways of the same form. The arrows in the said figure represent the direction in which the passengers enter the said passage-way and the direction in which the steps move. The platform V will preferably be so placed that the steps will just clear it in passing underneath. By this construction it will be obvious that if the steps be run at a rate of speed approximating the ordinary rate of walking of the passenger such passenger stepping from the platform V onto the steps A will experience no jerk whatsoever from the movement of the step. The step will merely continue his own motion at the same rate and in the same direction.

Although I have shown and described but one specific form of construction for the several devices which form the subject-matter of my invention, I do not limit my invention to the said specific forms, since many obvious modifications therein may be made; but

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

1. In an elevating apparatus a series of traveling steps, the upper surfaces of which are adapted to remain severally horizontal whether the steps be moving horizontally or on an incline, the said steps being provided with risers having a convex surface and so mounted thereon as to keep the adjoining steps in contact throughout their length in passing from a horizontal to an inclined surface, and vice versa, and in passing from one vertical plane of movement to another, substantially as described.

2. In an elevating apparatus a series of traveling steps, the upper surfaces of which are adapted to remain severally horizontal whether the steps be moving horizontally or on an incline, the said steps being provided with risers having a convex surface and centrally pivoted thereon so as to keep the adjoining steps in contact throughout their length in passing from a horizontal to an inclined surface and vice versa, and in passing from one vertical plane of movement to another, substantially as described.

3. In an elevating apparatus of the general type described, the combination of a series of interconnected steps having risers convex as at B^3, and provided with elastic nosings *b′*; and of tracks for said steps, said tracks being partly horizontal and partly inclined.

4. In an elevating apparatus of the general type described, the steps A, comprising a tread A′, and one or more risers B′ pivoted to rotate in a horizontal plane.

5. In an elevating apparatus of the general type described, the steps A each comprising a tread A′, and one or more risers, B′, each of the said risers consisting of a horizontal part B^2, pivoted beneath the tread A′, and a depending part B^3.

6. In an elevating apparatus of the general type described, the steps A, each comprising the tread A′, the brackets A^2, and one or more risers B′, consisting of a horizontal portion B^2, and a convex depending portion B^3, the horizontal portion B^2 being pivoted between the said tread A′ and the said brackets A^2.

7. In an elevating apparatus of the general type described, the steps A, provided on either side with the depending bracket C, the upright arm C′, the wrist C^2 connecting with the wheel-supports of the steps and the track-casing H, the inner side of which, H^3, projects down within the space between the arm C′ and the body of the step.

8. In an elevating apparatus of the general type described, the steps A, provided with wheels, the front wheels of one step being in advance of the rear wheels of the adjacent preceding step, substantially as shown and described.

9. In an elevating apparatus of the general type described, the platform-trucks comprising the yokes D, each yoke consisting of the horizontal body portion provided with the wheels D^4 and D^6 journaled in its respective ends and one wheel in advance of the other, and with the rollers D^5 and D^7 also journaled in said ends of the yoke, and in different planes from the wheels D^4 and D^6, substantially as and for the purposes described.

10. In an elevating apparatus of the general type described, the platform-trucks comprising the yokes D, each consisting of the horizontal arms D′ and D^2 projecting forwardly and rearwardly from the center of the yoke and in different parallel planes; the wheels D^4 and D^6 carried by the arms D′ and D^2, and journaled on the inner side of said arms so as to be in the same plane; and the rollers D^5 and D^7 also carried by the arms D′ and D^2, and journaled on the outer sides thereof so as to be in different planes from the rollers D^4 and D^6, and in different planes from each other, substantially as and for the purpose described.

11. In an elevating apparatus of the general type described, the platform-trucks compris-

ing the yokes D, each consisting of the horizontal arms D′ and D² projecting forwardly and rearwardly from the center of the yoke and in different parallel planes, and having the pivoted ends *d′* and *d²*; the wheels D⁴ and D⁶ carried by the pivoted ends *d′* and *d²*, and journaled on the inner side of said ends so as to be in the same plane; and the rollers D⁵ and D⁷ also carried by the ends *d′* and *d²*, and journaled on the outer sides thereof so as to be in different planes from the rollers D⁴ and D⁶, and in different planes from each other, substantially as and for the purpose described.

12. In an elevating apparatus of the general type described, the platform-trucks comprising the yokes D, each yoke consisting of the horizontal body portion provided with the wheels D⁴ and D⁶ journaled in its respective ends and one wheel in advance of the other, and with the rollers D⁵ and D⁷ also journaled in said ends of the yoke, and in different planes from the wheels D⁴ and D⁶; the horizontal tracks F, and the inclined tracks F′ and F⁴, with which the wheels D⁴ and D⁶ cooperate; and the switch-track G in a different plane from the tracks F, F′, and F⁴, to coöperate with the roller D⁷, substantially as and for the purpose described.

13. In an elevating apparatus of the general type described; the steps A; the yokes D; the wheels D⁴ and D⁶ &c. arranged so that the front wheels are in advance of the rear wheels of the adjacent preceding step; the rollers D⁵ and D⁷; the horizontal tracks F; the inclined tracks F′ and F⁴; and the switch-track G, arranged and operating substantially as shown and described.

14. In an elevating apparatus of the general type described, a series of interconnected steps, in combination with adjustable inclined tracks, substantially as shown and described.

15. In an elevating apparatus of the general type described, a series of interconnected steps, in combination with inclined tracks horizontally and vertically adjustable in their mountings, substantially as shown and described.

16. In an elevating apparatus of the general type described, the steps A; the centrally-located depending posts I; supporting-wheels; tracks; and mechanism connected with the posts I adapted to transmit movement to the steps.

17. In an elevating apparatus of the general type described, the steps A; the centrally-disposed depending posts I; the yoke J; the pivot L; and the chain-bars M, the adjoining ends of which are mounted on the pivot L.

18. In an elevating apparatus of the general type described, the steps A; the depending post I; the yoke J; the pivot L; and the chain-bars M, provided with teeth M′ and M², and rabbeted at their ends as at *m* and *m′*, the said ends carrying the teeth M³ and M⁴, respectively, and being mounted on the pivot L.

19. In an elevating apparatus of the general type described, the steps A; the depending post I; the yoke J; mechanism attached thereto adapted to transmit movement to the steps; one or more guide-rollers K′ mounted on the said yoke; and the tracks K², on which said rollers run.

20. In an elevating apparatus of the general type described, the steps A; the depending post I; the yoke J; mechanism attached to the said yoke adapted to move the steps; one or more guide-rollers K mounted on the said yoke; the guide-tracks K² on which said rollers run; and the upthrust tracks K³, against which said rollers bear.

21. In an elevating apparatus of the general type described, a balustrading comprising a series of stanchions O; the elastic strips Q connecting said stanchions; and means for supporting and moving the said balustrading, substantially as shown and described.

22. In an elevating apparatus of the general type described, a balustrading comprising the stanchions O; the elastic metal strips Q connecting said stanchions; the blocks Q² carried by the said strips; and means for supporting and moving the stanchions, substantially as described.

23. In an elevating apparatus of the general type described, a balustrading comprising the stanchions O; the elastic strips Q connecting said stanchions; the blocks Q²; the pivots *q*; the spring-washers *q′*; and means for supporting and moving the said balustrading, substantially as described.

24. In an elevating apparatus of the general type described, a balustrading comprising the stanchions O; the arms S pivoted to the said stanchions and carrying a hand-rail; positive-acting mechanism adapted to tip the arms S into a vertical position where the balustrading makes its turns; and means for supporting and moving the said stanchions.

25. In an elevating apparatus of the general type described, the stanchions O; the pivoted arm S; the gear S′; the shaft T; the worm T′; and means adapted to rotate the said shaft, and tip the arm S into a vertical position, located at the point where the balustrading makes its turn, substantially as described.

26. In an elevating apparatus of the general type described, the stanchions O; the supporting-rollers N³; the sprocket-chain P carried by the stanchions; the shaft P² carrying a sprocket-wheel P′, adapted to engage with the sprocket-chain P to supply movement thereto, and carrying a sprocket-wheel P³ adapted to engage with the brackets O⁴ carried by the stanchions; the guide-rolls O⁵ carried by the said brackets O⁴; guides in which the said rolls are adapted to travel; and means for revolving said shaft P², substantially as described.

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