C. D. SEEBERGER.

CONVEYER.

APPLICATION FILED JUNE 6, 1906. RENEWED JUNE 28, 1909.

956,606.

Patented May 3, 1910.

3 SHEETS—SHEET 1.

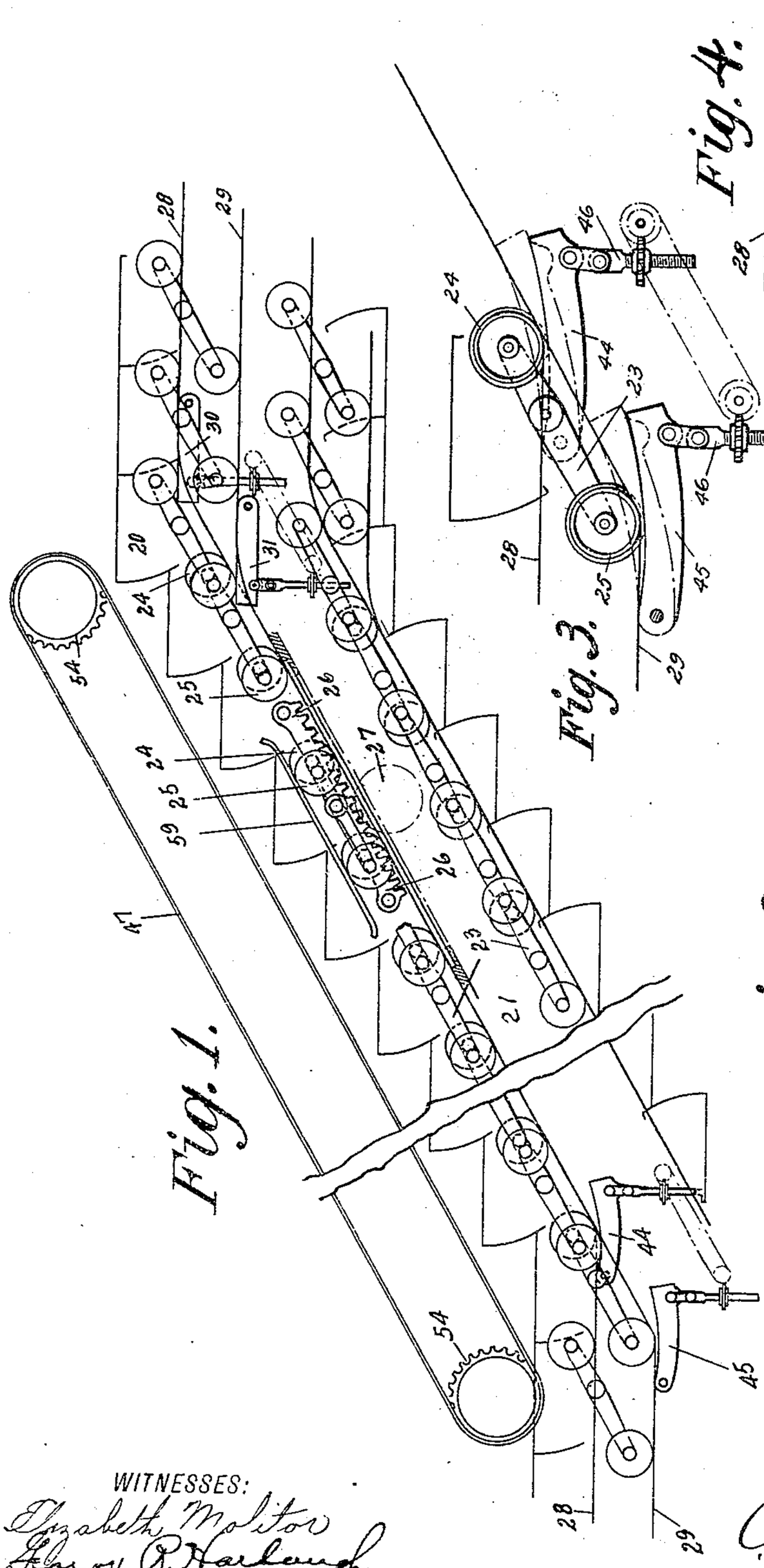

Fig. 1.

Fig. 3.

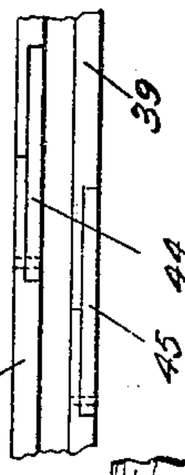

Fig. 4.

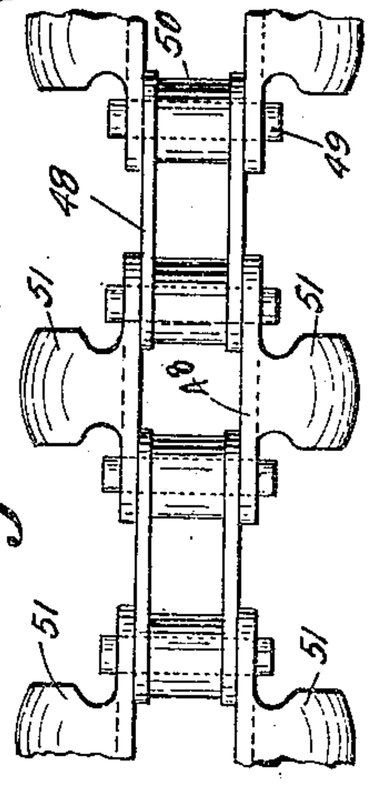

Fig. 9.

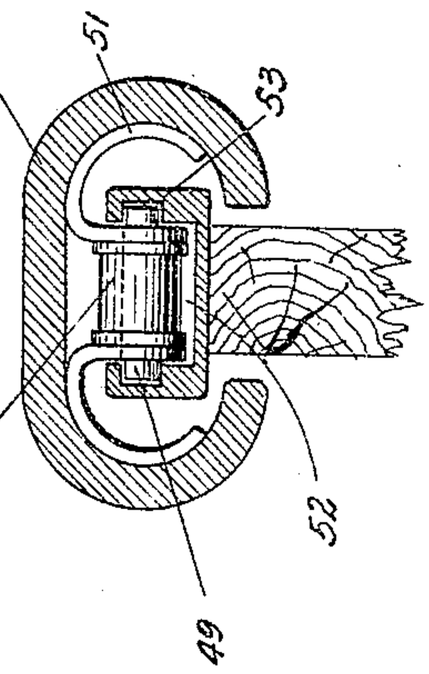

Fig. 8.

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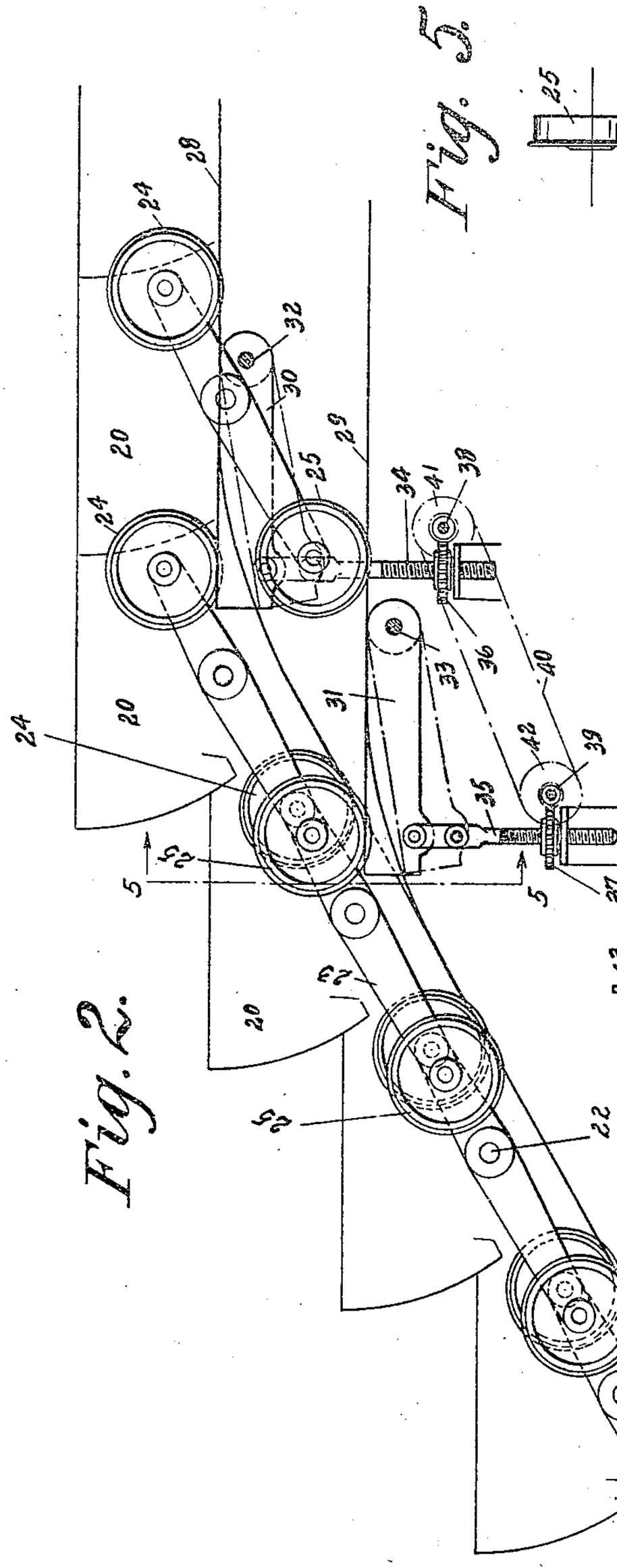

Fig. 2.

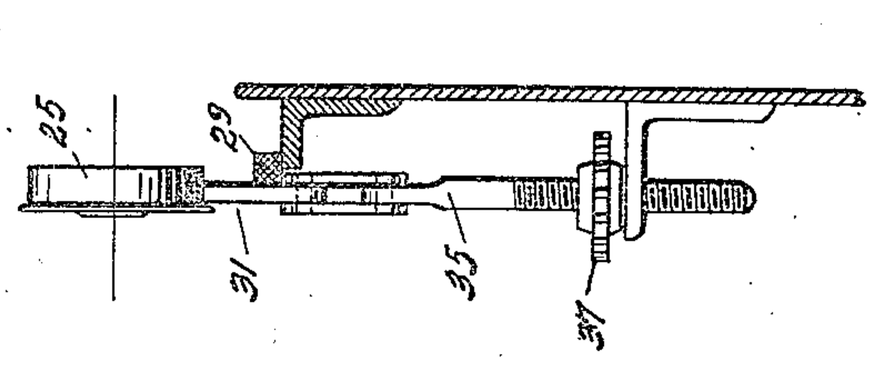

Fig. 3.

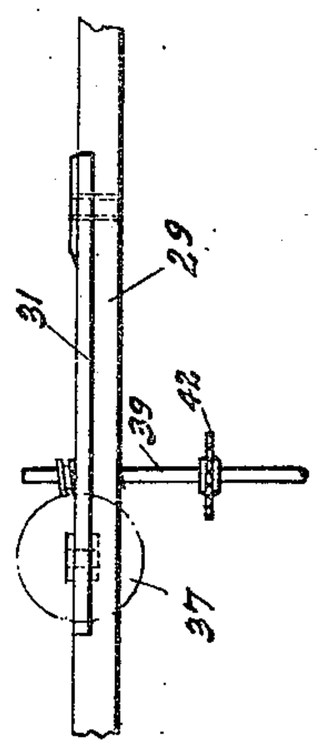

Fig. 6.

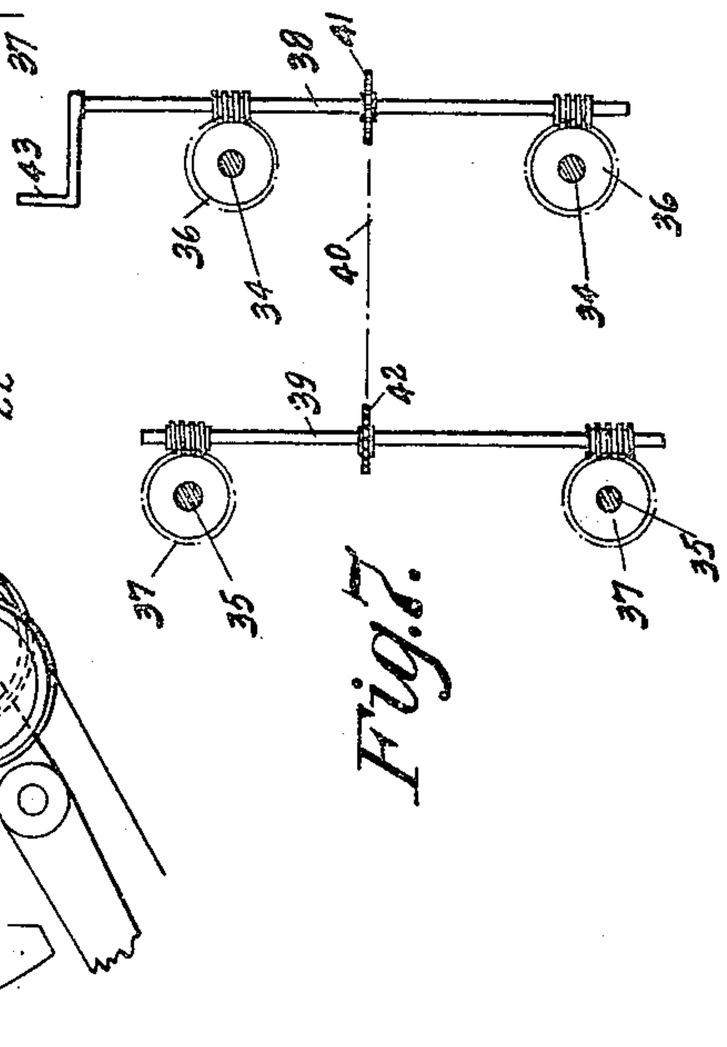

Fig. 4.

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3 SHEETS—SHEET 3.

Fig. 10.

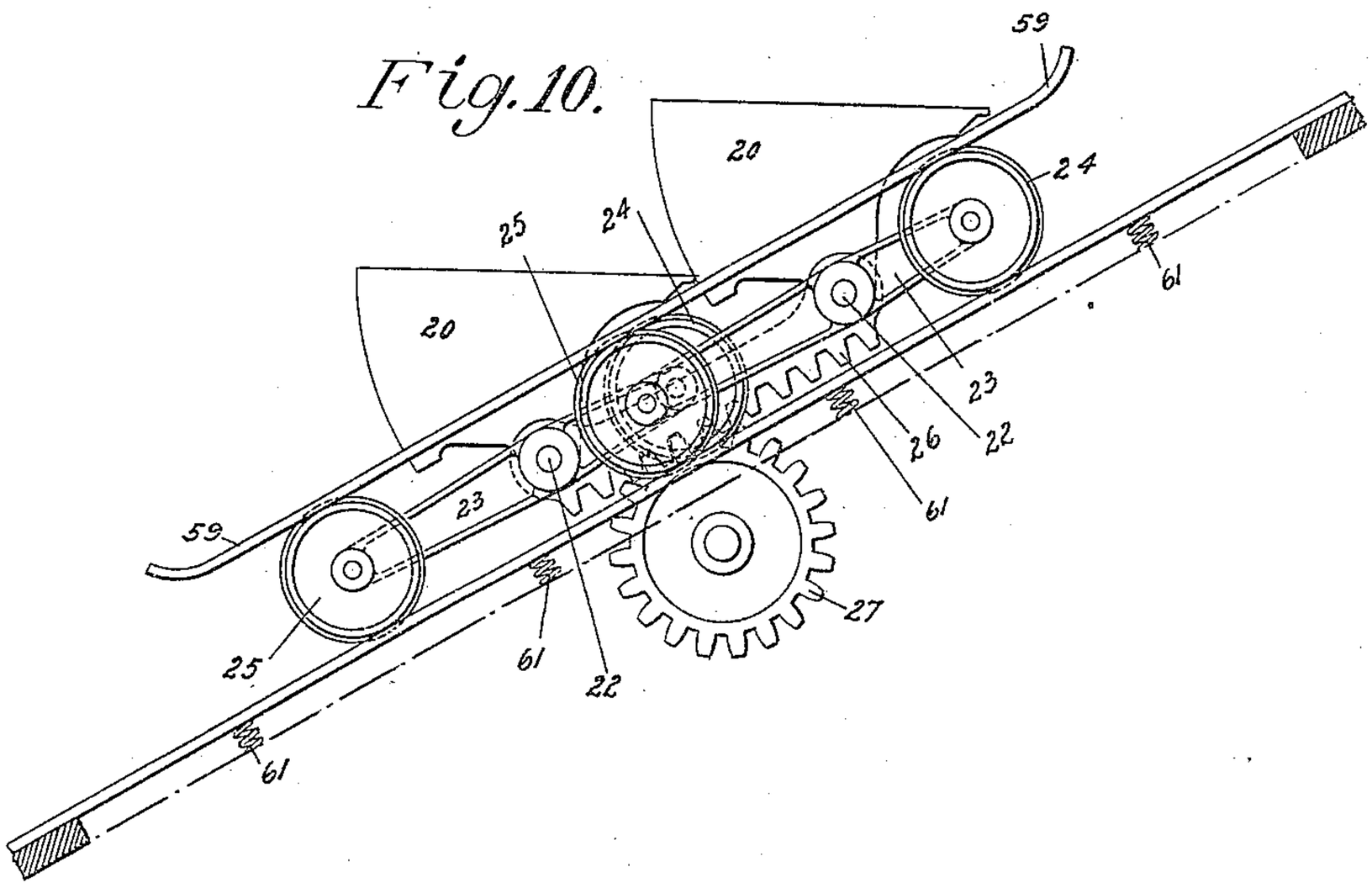


Fig. 11.

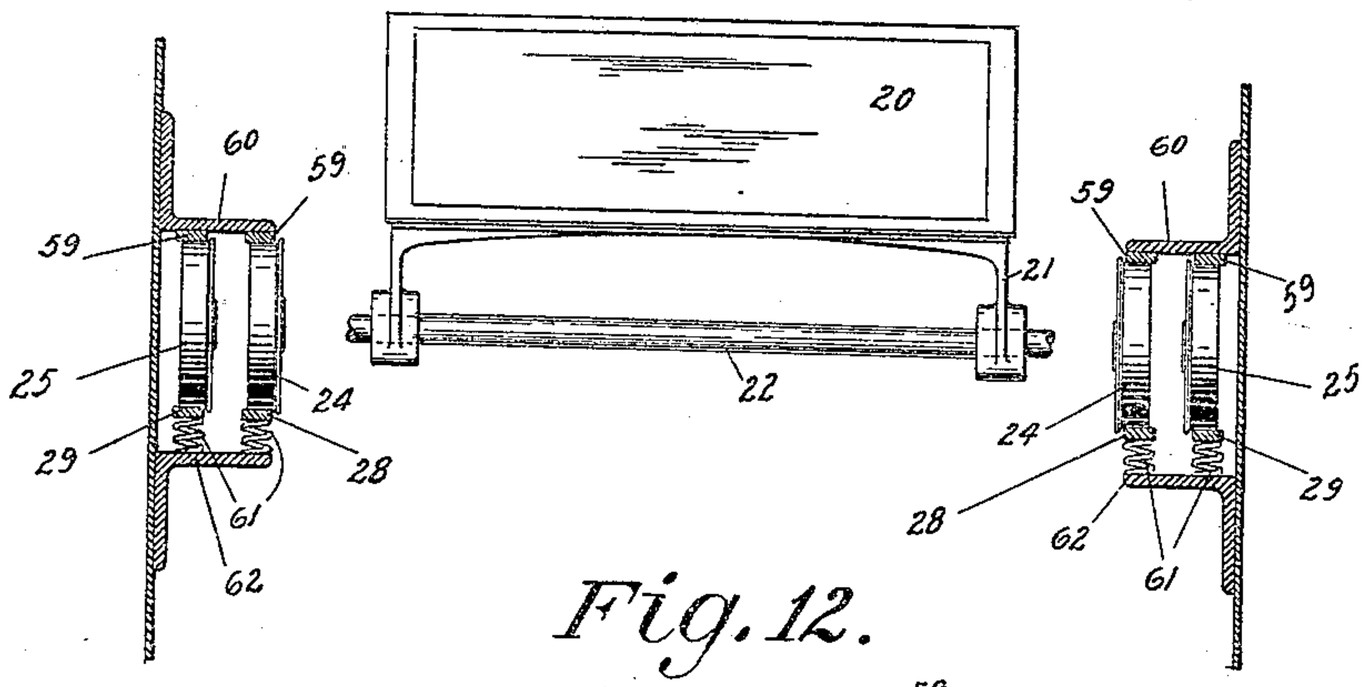
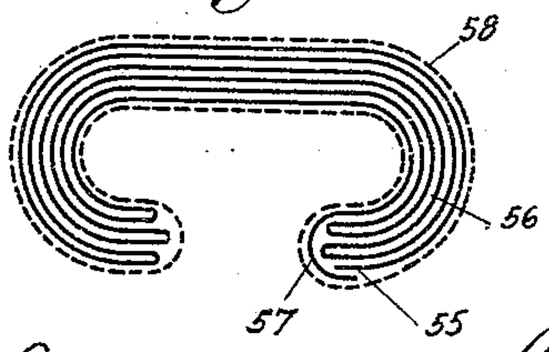


Fig. 12.



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CONVEYER.

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Application filed June 6, 1906, Serial No. 320,405. Renewed June 28, 1909. Serial No. 504,647.

To all whom it may concern:

Be it known that I, CHARLES D. SEEBERGER, a citizen of the United States, residing at Yonkers, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Conveyers, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to conveyers, and the several features of improvement are especially adapted for that class of conveyers exemplified by moving stairways extending between different levels and adapted under normal conditions of use to carry freight or passengers in either direction.

Certain features of the present invention relate to matters connected with the operation of the stairway as a conveyer, and another feature relates to means for making the height of the risers at the intersections of the inclined and horizontal runs conform to that of the balance of the steps when the machine is at rest and is used as an ordinary staircase.

In the accompanying drawings, which illustrate embodiments of the several features of my present invention: Figure 1 is a side view partly diagrammatic of a traveling stairway illustrating the application of several of the features of my present invention; Fig. 2 is a detail view on a somewhat enlarged scale showing means for squaring up the steps at the upper curve when the stairway is not running; Fig. 3 is a view in side elevation of the arrangement of parts of squaring up the steps at the lower curve when the machine is not running; Fig. 4 is a plan view of the parts shown in Fig. 3; Fig. 5 is a view on the line 5—5 of Fig. 2; Fig. 6 is a plan view of a section of the track at the upper curve; Fig. 7 is a plan view partly in section showing the arrangement of the parts for operating the tracks at the upper curve to square up the steps. Fig. 8 is a cross sectional view of a hand-rail and its driving sprocket chain; Fig. 9 is a top plan view of the sprocket chain of Fig. 8; Fig. 10 is a view in side elevation showing an arrangement of upthrust and spring track; Fig. 11 is a detail view showing the upthrust and spring track in cross section and one of the steps in elevation; and Fig. 12 is a cross sectional view of a form of hand-rail that may be employed.

Referring to the drawings, the numeral 20 indicates a series of steps each consisting of a suitable tread and riser supported upon a suitable frame 21. Each step frame is provided with a wheel-base consisting of an axle 22 whose ends project beyond the frame, and oppositely projecting arms 23 on the axle ends, and to which the front and rear step-supporting wheels 24 and 25, respectively, are secured in the usual manner. The rear arms of the wheel-base extend beyond the rear edge of the associated step to form wheel-bases wider than the steps, and they are deflected laterally so that the rear wheel of each step, when considering the steps as traveling in an ascending direction, is in a vertical plane outside of or beyond the plane of the front wheel of the next adjacent step. The axles of the series or line of steps are connected by rack-links 26, to which power is applied by means of a suitable drive sprocket 27 for imparting motion to the steps.

The conveyer is adapted to travel on upper and lower ways, each of which is provided with tracks upon which the step-supporting wheels run, and which extend on inclines between the levels and horizontally at the levels, the inclined and horizontal portions of the tracks being connected by suitable curves. Assuming that the stairway provides for transportation from a lower to an upper level, which arrangement may of course be reversed if desired by merely changing the direction of travel of the steps, the arrangement of tracks is such that the steps are in step-like formation on the incline and with their treads in the same horizontal planes at the landings, the change to and from step-like formation being gradual as the steps pass the connecting curves. The tracks are arranged so that the treads are horizontal on the incline and at both landings, and for this purpose the tracks for the front and rear wheels are arranged upon the same level on the incline, but at the landings the tracks 28 for the front wheels 24 are arranged in a plane above the tracks 29 for the rear wheels 25. The tracks at the end of each landing pass through suitable reversers (not shown) by which the direction of the travel of the steps is reversed from the ascending to the descending run and vice versa. It is of course understood that when the steps are adapted to carry or transport between more than two levels the tracks are correspondingly extended, the re-

versers being supplied at the ends of the machine whether it carries between two or more levels. It is obvious that as the steps pass from the incline to the upper horizontal landing, they gradually lose their step-like formation as their treads approach the same horizontal plane, by reason of the curved portions of the track between the incline and horizontal runs, and that the step upon the curve has less rise than the steps upon the incline. Whenever for any reason, as for repairs or replacement of parts, it is necessary to stop the machine, it is desirable to square up the step upon the curve so that its rise will be uniform with the rise of the steps upon the incline, thus providing for the use of the machine as a staircase in which the rise of all of the steps is uniform. For this purpose I provide the tracks 28 and 29 upon each side of the machine at the upper curve with movable sections 30 and 31, respectively, which in the normal operation of the machine as a traveling conveyer stand down flush with or below the line of the associated stationary portion of the track as shown in dotted lines in Fig. 2, but which when the machine is not running and it is to be used as a staircase may be raised above the line of the associated stationary portion so as to raise the step on the curve to make the height of its riser conform or correspond to the height of the risers of the steps upon the incline, as shown in full lines in Fig. 2. These movable track sections are so arranged and disposed as to coöperate respectively with the front and rear wheels of the step that may be upon the upper curve. The details of the movable sections may be arranged in a variety of ways, and for convenience of exemplifying this feature of my invention I have shown the movable sections as arranged in cut-away portions of the stationary tracks, as shown in Fig. 6. Each section is pivoted at one end, as at 32 and 33, respectively, to the frame of the machine, and its free end is provided with a pivoted rod, 34 and 35, respectively, whose lower screw-threaded end passes through a correspondingly tapped hub of a disk or wheel 36 and 37, respectively. The disks are revolubly supported upon the frame of the machine, and their perimeters are in the form of worm-wheels adapted to be operated by suitable worms. As before stated, the arrangement is duplicated on each side of the machine, as shown in Fig. 7, and in order to operate all of the disks 36 and 37 simultaneously, the pair 36 are connected with a common worm-shaft 38, and the pair 37 with a common worm-shaft 39, which in turn are connected by a chain 40 and sprockets 41 and 42. Power may be applied in any suitable manner, as by the crank-handle 43. It will thus be seen that when the machine for any reason is stopped the front and rear wheels of the step upon the curve at the upper end may be positioned in such manner as to be engaged by the movable sections 30 and 31, it being apparent from the constructions shown in Figs. 5 and 6 that the treads of the wheels overlap the split portions of the tracks at this point so that when the worm shafts are operated the sections 30 and 31 will be raised to the position of full lines in Figs. 2 and 5, to elevate the step somewhat above the level it would normally occupy when resting upon the curved portions of the track, thus making the height of the riser of that step conform to the height of the risers of the steps upon the incline. In practice the arrangement and relation of the parts is such that when the sections 30 and 31 are elevated the tread of the step resting thereupon comes flush with the treads of the steps upon the landing while the height of its riser equals that of the other steps.

At the curve at the intersection of the lower landing and inclined portion of the way, I provide means for squaring up the step located at the curve when the machine is stopped. For this purpose I provide means by which the step resting upon the tracks at the curve may be lowered so as to bring its tread flush with the treads of the other steps upon the lower landing and to make the height of the riser of the next leading step uniform with the height of the risers of the other steps on the incline. For this purpose I provide upon each side of the machine movable track sections 44 and 45, respectively, which are spaced apart a suitable distance to receive the front and rear wheels of the step. It is to be noted that the normal position of the tracks at this point is in a curve connecting the horizontal and inclined portions, and therefore the curved portions of the track constitute the movable sections. The movable sections normally occupy positions above that shown in dotted lines, and when they are lowered by any suitable means to the position shown in dotted lines, the wheels of the step resting thereupon will be correspondingly lowered. The movable sections may constitute the entire track width at this point, or as shown in Figs. 3 and 4 they may be merely split portions of the track adapted when in raised position to stand above the associated angular portions, shown by full lines in Fig. 3, and flush with the tracks of the horizontal and incline. When the sections of this split form are lowered, the associated angular portions constitute stops which prevent the wheels from sinking too far to properly aline the step, it being understood that the treads of the wheels overlap the split portions of the tracks in this form. The movable sections 44 and 45 may be operated by any suitable means such as screw

rods 46 coöperating with threaded disks as formerly described. The movable sections at both the top and bottom curves may be so related that when the machine is stopped, the supporting wheels of a step will rest upon each set of these sections, and then by raising the sections at the top curve and lowering the sections at the bottom curve the height of the riser of the steps at the intersections of the incline and horizontal portions may be made to conform to the height of the risers of the rest of the steps, so that the machine will then constitute a staircase which may be used as such until the machine is again ready for operation as a traveling stairway, at which time the sections will be appropriately moved so that the step-supporting wheels will run upon the tracks in the usual manner of this class of devices.

While I have shown and described a specific mechanism for conforming or truing up the steps, it will be understood that my invention in this respect is not confined to the matter here disclosed but that any suitable means may be employed for this purpose without departing from the spirit and scope of my invention.

A suitable hand-rail 47 is usually provided, which in its most approved form is an endless belt running over pulleys located at the top and bottom of the incline. It has been found that when a sprocket-chain is embedded in or rigidly connected with the body of the rail, the rail becomes disintegrated and broken by passing around the pulleys; the rail of course travels in a path of larger radius than the chain in passing around the pulleys, with the result that the rail stretches and breaks and becomes loosened from the chain. In order to obviate this objection I provide a drive-chain in which the driving action or effect is applied to the rail between the pulleys, and which allows for slippage of the rail on the drive while passing around the pulleys. For this purpose I provide a sprocket chain which is in frictional contact with the rail, preferably by means of frictional points which are free to slide upon the rail when the latter passes around the top and bottom pulleys. As shown in Figs. 8 and 9 this driving chain consists of links 48 which are suitably connected by means of pins 49 provided with suitable spacing rings or washers 50 to give the desired width to the chain. Each alternate pair of links is provided with wings 51 which project laterally from the chain to engage the inner surface of the hand-rail. The contour of the wings will preferably be made to conform to the particular form of hand-rail employed; in this class of machines it is customary to use a hand-rail which is C-shape in cross section, and as shown in Fig. 8, the wings are curved outwardly and downwardly to conform to the inner contour of this rail. The chain for driving the hand-rail is guided in any suitable manner, and for this purpose I provide a suitable channel 52 in the top of the balustrade in which the chain may travel, the channel being provided with lateral grooves 53 adapted to receive the projecting ends of the pins 49 as shown in Fig. 8. The sprocket chain is driven by any suitable means such as the driving sprockets 54 which may be located at either or both ends of the run. By this arrangement the frictional points or wings are free to slide within the rail when the latter passes around the top or bottom pulleys, thereby automatically adjusting the length of the rail to the length of the driving chain and preventing the disintegration or breaking of the rail. In this construction the drive effect of the sprocket chain is on the incline portion and not at the turns produced by the pulleys, the slippage of the rail upon the chain due to the unequal radii occurring at these latter places. The hand-rail may be made in any suitable manner, and as shown in Fig. 12, it is composed of a series of layers or plies of suitable material, such as canvas. In the form shown the plies or layers are arranged by forming an outer ply 55 in the general contour desired and folding the material so as to bring the inner plies 56 within the outer ply, the finishing edge 57 of the inner ply overlapping the edge of the outer ply 55 in order to protect the raw edge of the latter. It is customary in this class of devices to connect the plies together by suitable material, such as rubber or other material, in which the plies may be suitably embedded or by which they may be suitably cemented together. The dotted line 58 in Fig. 12 indicates the general contour of the finished rail.

In certain forms of traveling stairways it is desirable to employ an upthrust for the step-wheels which resists the lifting action of the drive. It is customary to position this upthrust in fixed relation to the tracks so that the wheels while resting on the tracks just clear the upthrust, which however acts upon them if the drive tends to lift them off the track, as frequently occurs, especially when the load is excessive. Where the upthrust and track are fixed in rigid relation to each other the wheels will clear on the track when lifted against the upthrust, thus making the movement uneven and unsteady. In order to prevent this action I provide an automatically adjustable track section which will follow any tendency of the wheels to rise from the track and will compensate for the slight excess of width between the track and upthrust, so that the wheels will roll on the upthrust but not lose contact with the track. This may be accomplished in various ways, and in Figs. 10 and 11, I have

illustrated a form of device for this purpose. The numeral 59 indicates a suitable upthrust located over the step-wheels, and supported upon suitable brackets 60 attached to the frame work of the machine. These upthrusts are in the form of rails located in the lines of the wheels and tracks, and the track sections below the upthrusts are mounted upon springs 61 which react against brackets 62 attached to the frame. The springs tend to force the tracks slightly in the direction of the upthrusts, so that when the step-wheels are forced against the upthrust by the lift of the driving sprockets acting against the rack links 26, the springs will raise the tracks sufficiently to maintain them in contact with the wheels. This prevents jars from the return of the wheels from the upthrust to the normal track-level.

Having described my invention what I claim is—

1. In a device of the class described, a way providing an inclined and horizontal trackage, a series of steps normally traveling on said way, and means to equalize the risers when the steps are stationary.

2. In a device of the class described, a way providing an inclined and horizontal trackage, a series of steps normally traveling on said way, and means at the intersection of the inclined and horizontal portions of the run to equalize the risers when the steps are stationary.

3. In a device of the class described, a way providing an inclined and horizontal trackage, a series of steps normally traveling on said way, and movable members at the intersection of the inclined and horizontal portions of the run to raise a step above its normal line of travel.

4. In a device of the class described, a way providing an inclined and horizontal trackage, a series of steps normally traveling on said way, and movable members at the intersection of the inclined and horizontal portions of the run to lower a step below its normal line of travel.

5. In a device of the class described, a way providing an inclined and horizontal trackage, a series of steps normally traveling on said way, and movable track-sections to equalize the risers when the steps are stationary.

6. In a device of the class described, a way providing an inclined and horizontal trackage, a series of steps normally traveling on said way, and movable members normally below the line of travel of the steps at the top of the incline, and means to raise said movable members above the trackage.

7. In a device of the class described, a way providing an inclined and horizontal trackage, a series of steps normally traveling on said way, and movable members normally in the line of travel of the steps at the foot of the incline, and means to lower said movable members below the trackage.

8. In a device of the class described, a way providing an inclined and horizontal trackage, a series of steps normally traveling on said way, each step having a pair of front and rear wheels, movable members arranged in pairs corresponding to said wheels at the top of the incline, and means to raise said members above the trackage.

9. In a device of the class described, a way providing an inclined and horizontal trackage, a series of steps normally traveling on said way, each step having a pair of front and rear wheels, movable members arranged in pairs corresponding to said wheels at the foot of the incline, and means to lower said members below the normal track-level.

10. In a device of the class described, a way providing an inclined and horizontal trackage, a series of steps normally traveling on said way, each step having a pair of front and rear wheels, movable members arranged in pairs corresponding to said wheels at the top of the incline, said members being pivoted at one end, and means to raise the free ends of said members above the track-level.

11. In a device of the class described, a way providing an inclined and horizontal trackage, a series of steps normally traveling on said way, each step having a pair of front and rear wheels, movable members arranged in pairs corresponding to said wheels at the foot of the incline, said members constituting the trackage, and means to lower the members below their normal level.

12. In a device of the class described, a way providing an inclined and horizontal trackage, a series of steps normally traveling on said way, each step having a pair of front and rear wheels, movable members arranged in pairs corresponding to said wheels at the top of the incline, said members being pivoted at one end and provided with threaded rods at their free ends, tapped disks coöperating with said rods, and means to simultaneously operate the disks.

13. In a device of the class described, a way providing horizontal runs at different levels and an intermediate inclined run, a series of steps normally moving in step-formation on said inclined run and with their threads in alinement on the horizontal runs, and means to equalize the rise of the steps intermediate the horizontal runs.

14. In a device of the class described, a way providing horizontal runs at different levels and an intermediate inclined run, a series of steps normally moving in step-formation on said inclined run and with their treads in alinement on the horizontal

runs, and means to equalize the rise of the steps at the intersection of the inclined and horizontal runs.

15. In a device of the class described, a way providing horizontal runs at different levels and an intermediate inclined run, a series of steps normally moving in step-formation on said inclined run and with their treads in alinement on the horizontal runs, means at the top of the incline to raise the step at the intersection of the upper horizontal and inclined runs, and means at the bottom of the incline to lower the step at the intersection of the lower horizontal and inclined runs.

16. In a device of the class described, a series of moving steps, tracks for said steps, a drive for said steps, an upthrust, and an automatically adjustable track-section opposite the upthrust.

17. In a device of the class described, a series of moving steps, tracks for said steps, a drive for said steps, an upthrust, and a spring-actuated track section opposite the upthrust.

18. In a device of the class described, a series of wheeled steps, tracks for said steps, a drive for moving said steps on the tracks, an upthrust to take the lifting action of the wheels under the stress of the drive, and a spring-section of track to keep in contact with the wheels.

19. In a device of the class described, a series of wheeled steps, tracks for said steps, a drive for moving said steps on the tracks, an upthrust above the normal path of and engaging the wheels when the latter are lifted by the drive, and an adjustable track-section opposite the upthrust.

20. In a device of the class described, a series of wheeled steps, tracks for said steps, a drive for moving said steps on the tracks, an upthrust above the normal path of and engaging the wheels when they are lifted by the drive, and means to raise the track to preserve its contact with the wheels when lifted.

21. In a device of the class described, a traveling hand-rail, and a drive having wings frictionally engaging the rail.

22. In a device of the class described, an endless hand-rail, pulleys around which the rail passes, and a drive having wings frictionally engaging the rail.

23. In a device of the class described, an endless hand-rail, pulleys around which the rail passes, and an endless drive passing over the pulleys and frictionally engaging the rail between the pulleys.

24. In a device of the class described, an endless hand-rail, pulleys around which the rail passes, and a drive chain passing over the pulleys and having wings frictionally engaging the rail.

25. In a device of the class described, an endless hand-rail having inturned edges, pulleys around which the rail passes, and a drive chain within the rail having frictional engagement with the rail at intervals.

26. In a device of the class described, an endless hand-rail having inturned edges, pulleys around which the rail passes, and a drive chain within the rail having lateral wings frictionally engaging the inner surface of the rail.

27. In a device of the class described, an endless hand-rail, pulleys around which the rail passes, and a drive-chain interposed between the pulleys and rail and frictionally engaging the rail at intervals.

28. In a device of the class described, a balustrade having a channel in its top, pulleys at the ends of the balustrade, an endless chain passing around the pulleys and guided in said channel, wings on the chain, and a hand-rail inclosing and frictionally engaging said wings.

29. In a device of the class described, a balustrade having a channel in its top provided with lateral grooves, pulleys at the ends of the balustrade, an endless chain having pins adapted to said grooves, lateral wings on alternate links of said chain, and a hand-rail substantially C-shape in cross-section frictionally engaging said wings.

30. In a device of the class described, an endless hand-rail, pulleys around which the rail travels, a drive-chain interposed between the rail and pulleys and having wings engaging the rail and free to slide thereon when the rail passes around the pulleys.

31. In a device of the class described, an endless hand-rail, pulleys around which the rail travels, an interposed drive-chain inside the rail and in frictional contact therewith throughout the entire length of the chain.

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

CHARLES D. SEEBERGER.

Witnesses:
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EDMUND E. FIELD, Jr.