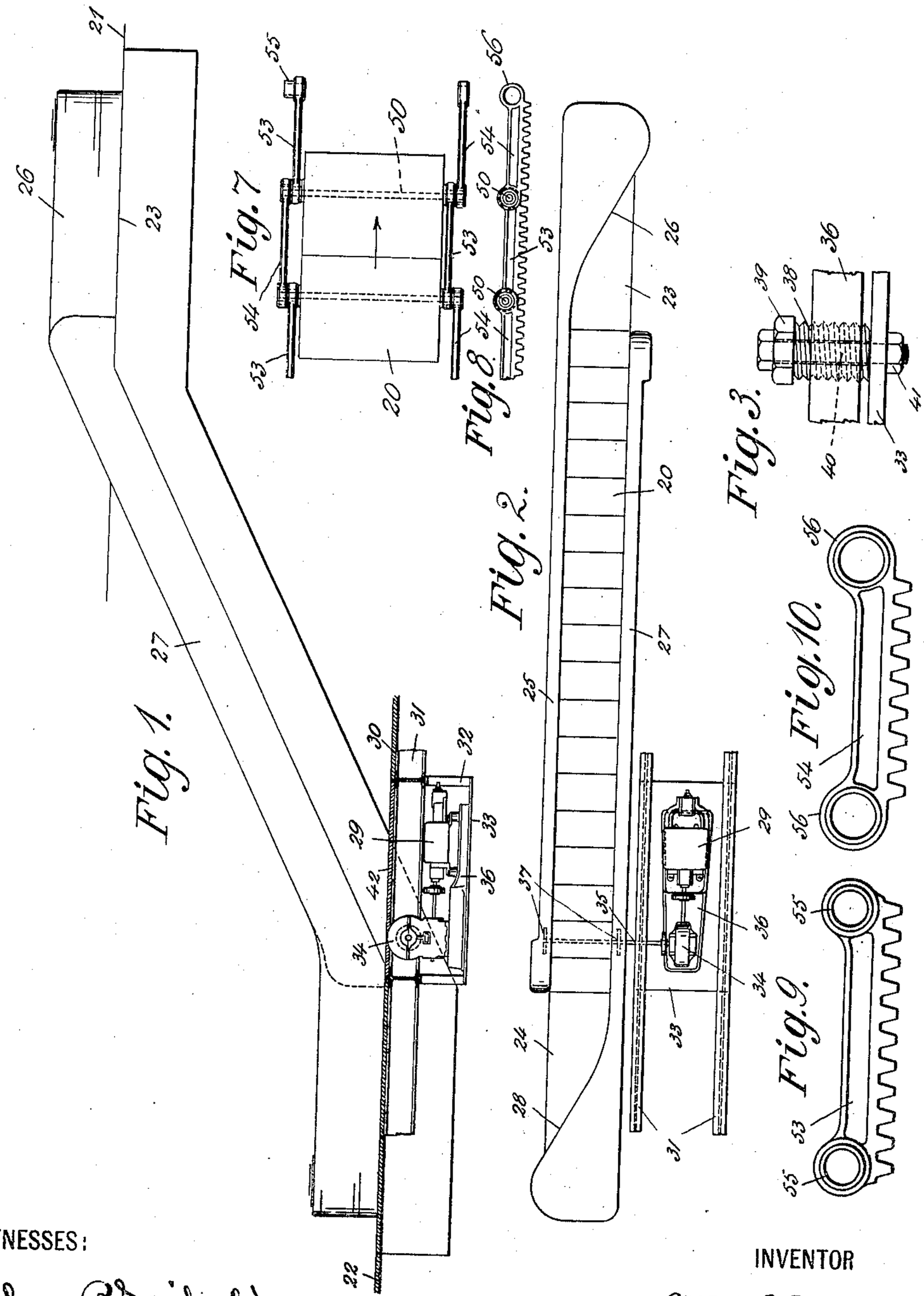
No. 898,009. PATENTED SEPT. 8, 1908.

C. D. SEEBERGER.

ELEVATOR.

APPLICATION FILED NOV. 6, 1905. RENEWED DEC. 9, 1907.

2 SHEETS—SHEET 1.



WITNESSES:

Arthur B. Seibold.

Elizabeth Molitor

INVENTOR

CHARLES D. SEEBERGER.

BY Coburn & McRoberts

HIS ATTORNEYS.

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2 SHEETS—SHEET 2.

Fig. 4.

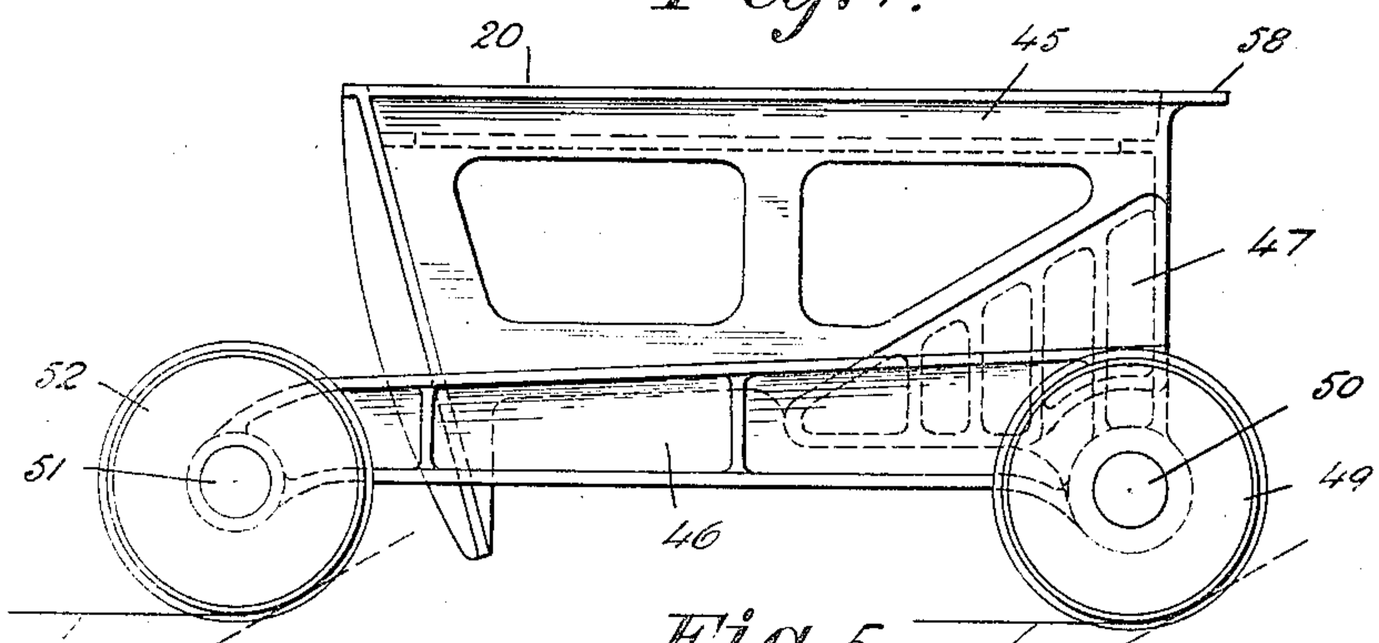


Fig. 5.

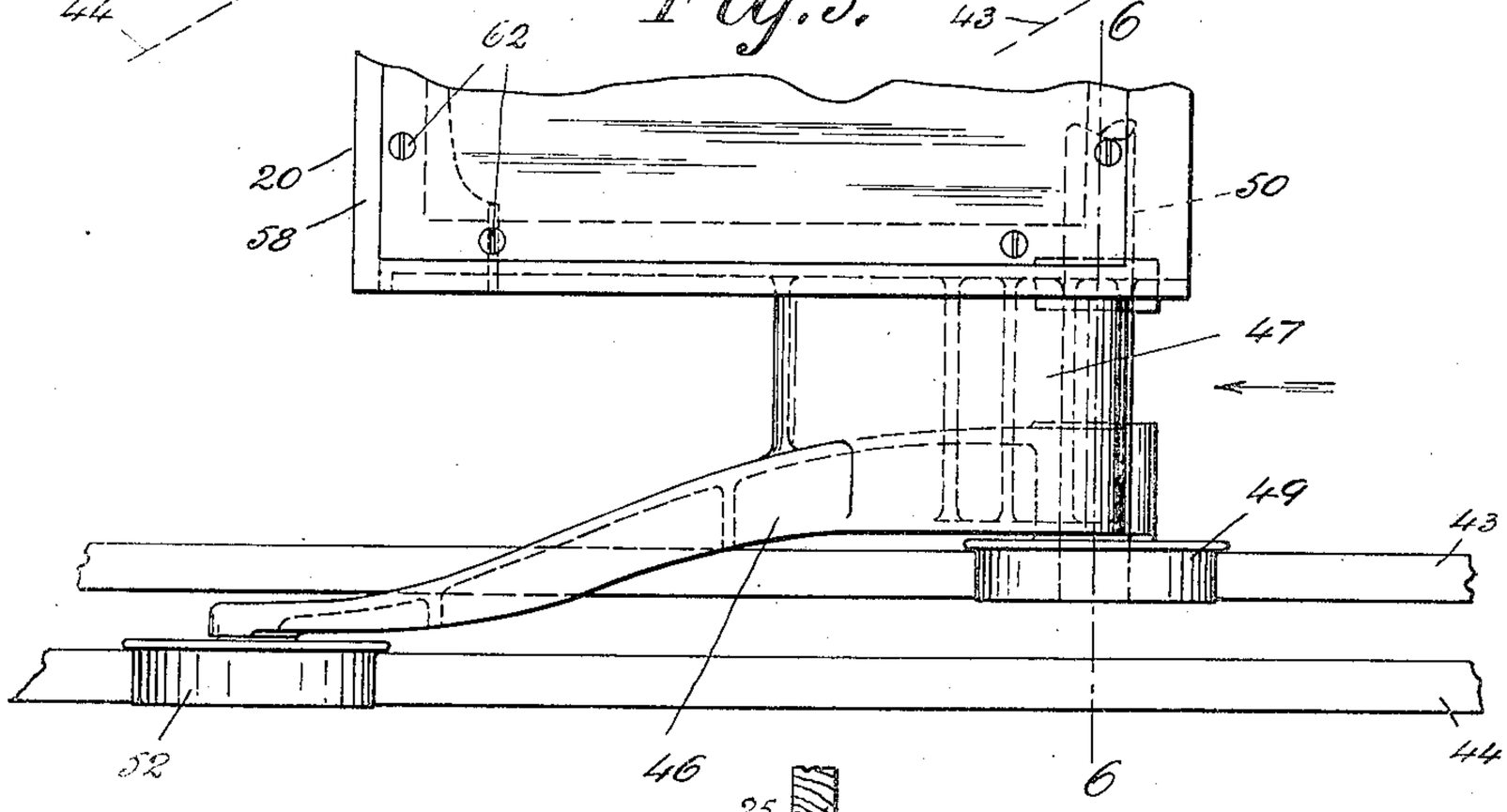
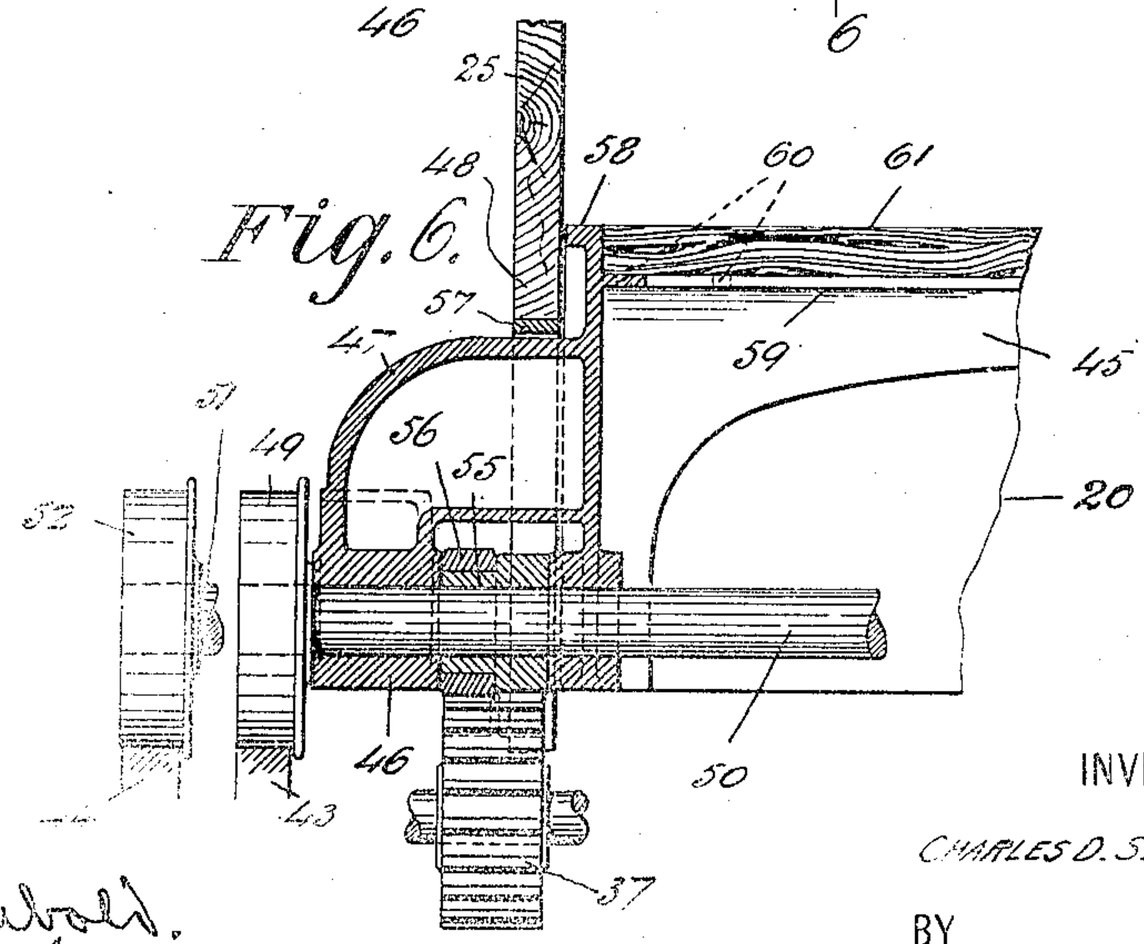


Fig. 6.



WITNESSES:

Arthur Strobel.

Edwin Walter

INVENTOR

CHARLES D. SEEBERGER.

BY

Edwin McPherson

HIS ATTORNEYS.

UNITED STATES PATENT OFFICE.

CHARLES D. SEEBERGER, OF YONKERS, NEW YORK.

ELEVATOR.

No. 898,009. Specification of Letters Patent. Patented Sept. 8, 1908.

Application filed November 6, 1905, Serial No. 285,958. Renewed December 9, 1907. Serial No. 405,782.

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 Elevators, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to conveyers and particularly to that class of conveyers known as traveling stairways and employed for transporting passengers or freight between different floors or levels.

The invention consists of the organizations and arrangements of parts hereinafter particularly described; and the objects and advantages thereof will be apparent from such description.

In the accompanying drawings—Figure 1 is a diagrammatic view of the traveling stairway, also illustrating the drive therefor; Fig. 2 is a plan view of the construction shown in Fig. 1; Fig. 3 is a detail view; Fig. 4 is an end view of one of the step units; Fig. 5 is a plan view of the same showing one end of the step; Fig. 6 is a sectional view on one side of the device taken at the line 6—6 of Fig. 5, looking in the direction of the arrow; Fig. 7 is a plan view of a fragment of the traveling stairway showing the connecting linkage; Fig. 8 is a view in side elevation of the linkage shown in Fig. 7; and Figs. 9 and 10 are views in side elevation of the male and female links, respectively.

In Figs. 1 and 2, I have shown a stairway adapted to be reversible, that is to say, to be driven in either direction so as to transport from an upper to a lower landing or level, or vice versa. The steps 20, which may be of any suitable character, such as that hereinafter described, and which are designed to be connected together to form an endless conveyer, are in step-like formation on the incline and at the upper and lower landings or levels 21 and 22, respectively, extend with their tread surfaces in the same horizontal plane to provide landing portions 23 and 24.

In the present arrangement, as shown in Figs. 1 and 2, a shunt is located at each end of the stairway but directed to the opposite side from that at the other end. To this end the balustrade 25 at one side of the conveyer terminates at its lower end at substantially the bottom of the incline, while its upper end, from about the top of the incline, extends diagonally across the upper landing portion 23 of the steps, as at 26, to provide a shunt to direct the passengers from the stairway on to the upper level or landing in ascending. The balustrade 27 at the opposite side of the conveyer terminates at its upper end at substantially the top of the incline while at its lower end it crosses, as at 28, the lower landing and acts to form an exit shunt for the stairway when the latter is employed for transporting passengers from the upper to the lower landing. By reason of this arrangement an exit shunt is provided at each end of the stairway whether it be used for ascending or descending, but such shunts are directed towards opposite sides. Suitable traveling handrails (not shown) may be employed and adapted to travel on the balustrades along the incline and shunts.

Associated with the conveyer or stairway is a suitable driving motor 29, which in the present embodiment of the invention is located at the side of the lower end of the conveyer and below the floor 30, shown in section in Fig. 1. The motor is supported from the floor framing, such as the girders 31, from which depend suitable hangers 32 carrying a platform or base 33. The motor 29 as well as the transmission gear case 34, through which motion is transmitted from the motor 29 to the drive shaft 35, rests on the platform 33. The motor and gear case are provided with a bed 36 which is preferably of pan-like form and adapted to catch and into which drains all oil dripping from the motor, gear case, etc. The shaft 35 is provided with suitable drivers, such as the pinions 37, for transmitting motion to the stairway.

In order to maintain the motor in a level position, the bed 36 is provided with means for adjusting the same towards or away from the platform 33. To this end the bed is drilled and tapped for threaded supporting feet, such as thimbles 38, Fig. 3, each of which is provided with a head 39 of such shape as to receive a suitable wrench, and bears at its lower end on the platform 33. By turning the thimbles 38 the clearance between the bed plate and platform may be varied to level the bed on its supporting platform. Each thimble may be locked in adjusted position by a headed bolt 40 passing through the thimble and the platform 33 and receiving a securing nut 41, which clamps the

thimble against the platform. This not only locks the motor in its adjusted position, but also secures the motor in a stable manner on the platform.

The floor 30 is provided with a suitable opening over the motor and gear case, and this opening is closed by a trap door 42, whereby access may be had to the motor and gear case through the floor.

The track circuit for the stairway on the upper or transporting run comprises, in the present instance, inner and outer tracks 43 and 44, the outer track on the incline, as indicated in dotted line in Fig. 4, being above the inner track. At the upper and lower landings the tracks are at the same level, as shown in Fig. 6. By reason of this arrangement of tracks, the steps, in the form in which they are herein embodied, are maintained with their tread surfaces horizontal and in step-like formation on the incline and in the same horizontal plane at the landings.

Each step unit comprises a frame, 45, and a wheel base consisting, in the present embodiment of the invention, of end yokes 46, such yokes preferably being integral with the frame and connected thereto by a web or step extension 47 so as to provide a one piece step structure. The web 47 may be hollow, as shown in Fig. 6, and is located below the top of the step frame so as to clear the curtain 48 at the bottom of the balustrade and which extends below the top of the step. The front wheel 49, looking up the stairway, which is adapted to the inner track 43 may be mounted on the step in any suitable manner. In the present instance the step is provided with an axle bar 50 passing through the ends of the step frame and the attached end of the yoke 46, as shown in Fig. 6, and each wheel 49 is mounted on the end of the axle bar projecting beyond the yoke. The axle bar need not extend inwardly beyond the end of the step frame, but preferably in order to provide a stronger structure it is continuous. The axle bar is located, in the construction illustrated, under the front side and slightly back of the front nosing of the step frame, and the yoke arm extends rearwardly beyond the step riser or back of the rear nosing and is provided at its free end with a suitable bearing or stub axle 51 on which is pivoted the rear wheel 52 which is adapted to the outer track 44. By locating the axle bar at the front of the step frame and extending the yokes beyond the step riser the entire weight of the passenger is between the wheels 49 and 52 so that any tendency of the step to tilt is avoided, and a wide wheel base is provided thereby insuring greater stability of the step on the tracks. As shown in Fig. 5, the free end of the yoke arm 46 is bent outwardly so as to cross the inner track to adapt the wheel carried thereby to the outer track.

The steps are connected together, to form an endless conveyer, by links 53 and 54, and these links, which are preferably in the form of male and female links, pivotally connect the axle bars 50. For this purpose each end of each male link 53 is provided with a sleeve 55 extending outwardly therefrom and pivoted on the associated axle bar between the end of the step frame and the yoke, as shown in Fig. 6, and the female links 54 have end collars 56 which pivot on the sleeves of the male links. The links are in the form of rack-bars and in the present instance each male link has its last tooth at each end under the pivot center or axle to which it is connected, while the female links have at each end a space under the pivot centers, as shown respectively in Figs. 9 and 10. By placing the teeth on the male links under the pivot centers I get the benefit of the strength of the stronger section of the male links, as the section of the female links is only a ring or collar at this point and is therefore relatively weaker than the male. The rack links are engaged by the driving pinions 37 to transmit motion to the stairway, and such pinions are wide enough, as shown in Fig. 6, to engage the links in their staggered relation.

In rack-bar linkage the transmission pinions exert a lifting action on the links and as the end or last tooth of each link leaves the pinion it exerts a tendency to tilt such link upwardly about its pivot and cause the other end of the link to rise. By omitting the end teeth in the line of the pivot of the female links, the tilting of such links under the action of the pinion is minimized, owing to the fact that no tooth is under the pivot center and the leverage of the pinion is reduced.

In order to counteract and entirely eliminate the tilting and lifting of the links I provide an upthrust device in association with the steps and so related to each pinion as to oppose the tilting and lifting action of the latter. In the present instance the upthrusts are arranged to coöperate with the step structure. To this end, and as shown in Figs. 4, 5 and 6, I employ the upper surface of the web or step extension 47 for cooperating with the upthrust, and this surface, where the driving pinions are located at the incline, is at the same inclination as the tracks. This surface coöperates with a suitable upthrust which consists in the present instance of a track or wear plate 57 secured to the under face of the curtain 48, and parallel with the line of movement of the steps, as shown in Fig. 6. The track 57 is located over the pinion 37 and extends to either side thereof substantially the distance between link centers according to the direction of movement, so as to be engaged by the extensions 47 of the steps as they pass thereunder, thereby preventing rising or tilting of the links under the action of the pinions. It

is to be understood that this construction exists at each end of the steps.

In order to distribute the wear due to the links, a link having its two end teeth under its pivot centers, in the present instance a male link (Fig. 9) is paired with, that is arranged opposite, (as shown in Fig. 7) a female link, (Fig. 10) which has a space at each end under its pivot centers. Another purpose is to minimize the danger of possible breakage of the end tooth on both male links at the same time. For example, in Fig. 7 the male link 53 on the right hand side would have its last tooth pushed up by the drive while the last male link 53 on the left hand side would have its end tooth pulled up. In other situations, as when passing under the drive pinion on the return, this would be reversed, and by utilizing the alternate arrangement of links shown I obtain the maximum of safety.

Assuming the stairway to move in the direction of the arrow, Fig. 7, when the pinion engages the last tooth on the leading link 53, exerting a tendency to tilt the same, the opposite female link 54 presents a space under the axle, so that the tilting action or tendency occurs on that side, and as the next pair of links are engaged by the pinions the tilting tendency is shifted to the opposite side by reason of the fact that the relative positions of the male and female links have been reversed, the male link now being upon the other side of the step. By the arrangement shown the tilting action is shifted to the sides of the steps in alternation so that wear is distributed between the two plates 57.

As shown in Figs. 4 and 6, the step frame is provided with a recess at its top, which recess is formed in the present instance by the step border 58 and a ledge or flange 59 which extends inwardly from the walls of the step frame. These flanges are provided with screw threaded openings 60, and the tread 61, the upper face of which is flush with the border and which may be made of any suitable material, is provided with screw openings through which pass screws 62 entering the ledge openings to secure the tread in place. The ledges may be formed integral with the step frame and then tapped for the step securing screws. This work may be done so accurately that no difficulty is experienced in making the screw holes in the tread register with tapped holes in the ledges of the step frame, thereby obviating the employment of separate strips to be secured to the step frame.

Having described my invention what I claim as new and desire to secure by Letters Patent of the United States, is—

1. A reversible conveyer having a shunt at each end, such shunts leading to opposite sides of the conveyer.

2. A conveyer consisting of an inclined run and a horizontal landing portion at each end, and a shunt for each landing portion, such shunts leading to opposite sides of the conveyer.

3. A conveyer consisting of an inclined run and a horizontal landing portion at each end, and a balustrade at each side of the incline and crossing one of the landings to provide a shunt therefor, such shunts leading to opposite sides of the conveyer.

4. In a device of the class described, a conveyer extending between different floors or levels, and a drive therefor, such as a motor, located at the side of the conveyer and supported under and by the floor framing.

5. In a device of the class described, a conveyer extending between different floors or levels, a driving motor located under the floor at one level and supported by the floor framing of such level, and a trap door closed opening in the floor over the motor permitting of access to the motor.

6. In a device of the class described, a conveyer, driving mechanism therefor, such as a motor, a platform, and adjustable supports for the motor and resting on the platform for leveling the motor.

7. In a device of the class described, a conveyer, driving mechanism therefor, such as a motor, a bed for the motor, a platform, and supports in threaded engagement with the motor bed and resting on the platform for leveling the motor.

8. In a device of the class described, a conveyer, a driving motor therefor having a bed, a platform, thimbles in threaded engagement with the bed and resting on the platform for leveling the motor, bolts passing through the thimbles and platform, and nuts on the bolts to clamp the thimbles in adjusted position.

9. In a device of the class described, a conveyer, a driving motor therefor, a bed for the motor adapted to catch oil, a support for the bed, and means to level the bed on the support.

10. In a device of the class described, a conveyer, a driving motor therefor, a gear case, a bed under the motor and case, a support for the bed, and means to level the bed on the support.

11. In a device of the class described, a step yoke having a single arm.

12. A step construction for traveling stairways supported at a point near the front nosing and at a point back of the rear nosing.

13. A step construction for traveling stairways supported back of the front nosing and back of the rear nosing.

14. In a device of the class described, a one-piece step and wheel-base.

15. A step construction for traveling stairways having a wheel-base integral with the step frame.

16. In a device of the class described, a

step and wheel-base consisting of a single casting.

17. In a device of the class described, a step unit consisting of a step having an integral wheel-base.

18. In a device of the class described, a step unit consisting of a step having a wheel-carrying arm integral therewith.

19. In a device of the class described, a step unit consisting of a step and integral wheel-carrying yokes.

20. In a device of the class described, a step unit consisting of a frame and a wheel-carrying yoke integral therewith and connected thereto at one end by a web.

21. In a device of the class described, the combination with inner and outer tracks, of a series of connected step units each consisting of a step frame and a wheel-carrying yoke, the latter being integral therewith and connected thereto at one end by a web and having its free end extending beyond the step nosing and crossing the inner track to adapt the wheel carried thereby to the outer track.

22. In a device of the class described, a step, a wheel, a wheel-carrying arm fixed to the step at one side and extending at its free end beyond the other side of the step, a second wheel being journaled on the free end of the arm.

23. In a device of the class described, the combination with inner and outer tracks, of a connected series of steps each of which is provided with a wheel-carrying axle at its front, and an arm fixed to the step and through which the axle passes and extending beyond the step riser and having a wheel at its free end adapted to the outer track.

24. In a device of the class described, the combination with inner and outer tracks forming a way, of a series of steps, an axle bar located adjacent one side of each step and having a wheel adapted to the inner track, an arm fixed to the step and extending in the direction of the other side of the step, a wheel on the free end of the arm, the arm crossing the inner track to adapt the wheel to the outer track, links connecting the axle bars, and means to move the steps on the way.

25. In a device of the class described, the combination with inner and outer tracks forming a way, of a series of steps, a wheel-carrying yoke integral with each step and connected at one end to and spaced therefrom by a web, an axle bar passing through the step at the side opposite the step riser, a wheel on the end of the axle bar adapted to the inner track, the free end of the yoke being extended beyond the step riser and crossing the inner track, a wheel on the free end of the yoke adapted to the outer track, and means to move the steps on the way.

26. In a device of the class described, steps each having an axle bar provided with a wheel, a yoke carrying the other wheel, links connecting the axles between the step frame and the yoke, a web connecting the step frame and yoke and located above the axle bar to clear the links, and means to move the steps.

27. In a device of the class described, steps each having a wheel carrying yoke spaced from the step frame and connected to the latter by an integral web, an axle on each end of the yoke, wheels on the axles, the axle of one wheel passing through the yoke and step frame, links pivoted on the latter axle between the yoke and step frame, and means to move the steps.

28. In a device of the class described, a step frame provided with a recess in its top and provided with integral ledges, a tread seated in the recess on the ledges, and means for securing the tread in place.

29. In a device of the class described, a step frame provided with a recess in its top and provided with integral ledges having screw openings, a tread seated in the recess and provided with screws engaging the openings.

30. In a device of the class described, a step frame having a recess in its top providing a border and having integral ledges provided with tapped holes, and a tread seated in the recess having its upper surface flush with the border and provided with screw holes registering with the ledge holes, and screws entering the holes to secure the tread.

31. In a device of the class described, a series of steps provided with wheel-carrying yokes having extensions, links connecting the steps, driving pinions engaging the links, and a guide located at the opposite side of the links and with which the yoke extensions cooperate to counteract the lifting action of the pinions.

32. In a device of the class described, the combination with a way having an inclined and a horizontal portion, steps adapted to the way and provided with wheel-carrying yokes, links connecting the steps, pinions engaging the links at the incline, a track over each pinion and with which the wheel-carrying yokes coöperate to prevent tilting of the links under the action of the pinions.

33. In a device of the class described, a series of steps connected by rack-links and having extensions, driving pinions engaging the rack-links, and an upthrust track associated with each pinion parallel with the line of movement of the links and coöperating with the extensions to counteract the tilting action of the pinions.

34. In a device of the class described, a series of steps connected by rack-links, a driving pinion engaging the rack-links, wheel-carrying yokes on the steps, and an upthrust

track associated with each pinion and coöperating with the step yokes to counteract the tilting of each link as the end tooth of the latter is engaged by the pinion.

35. In a device of the class described, the combination with a way having angularly disposed portions, a series of link-connected steps having yokes provided with wheels adapted to the way, pinions engaging the links, and a track coöperating with the surface of each yoke for counteracting the tilting of the links under the action of the pinions, such surfaces being parallel with the said track.

36. In a device of the class described, the combination with a way having angularly disposed portions, a series of link-connected steps adapted to the way, a pinion engaging the links, a wheel-carrying yoke for the steps, and a track coöperating with the yokes for counteracting the tilting of the links under the action of the pinion, the yoke having a bearing surface parallel with the track.

37. In a device of the class described, a series of connected steps, driving means therefor, and an upthrust, consisting of the step curtain, to resist the lifting and tilting action of the driving means.

38. In a device of the class described, a series of link-connected steps, a driving pinion engaging the links, and an upthrust to counteract the lifting and tilting action of the pinion and consisting of a curtain extending below the top of and engaged by the step structure.

39. In a device of the class described, a series of steps, rack-links connecting the steps, a pinion engaging the links, and a curtain extending below the top of the steps and having a track engaged by the step structure to counteract the tilting and lifting action of the pinion.

40. In a device of the class described, a series of steps, rack-links connecting the steps, a pinion engaging the links to drive the steps, a wheel-carrying yoke for the steps, and a curtain extending below the top of the steps and having a wear plate engaged by the yoke to avoid tilting and lifting of the links under the action of the pinion.

41. In a device of the class described, a series of steps, driving pinions therefor, and connecting links provided at each end with a space under the pivot centers to minimize tilting of the links under the action of the pinion.

42. In a device of the class described, a series of steps, and a chain of links pivotally connecting the steps, each alternate link having a space under its pivot centers, and a pinion engaging the links to drive the steps.

43. In a device of the class described, a series of steps, and a chain of links pivotally connecting the ends of the steps, each alternate link having a space under its pivot centers and being paired with a link having a tooth under its pivot centers, and means to drive the links.

44. In a device of the class described, a series of steps, links connecting the steps and arranged in opposite pairs, one of such pair having spaces under its pivot centers while the other has teeth under its pivot centers, and means to drive the links.

45. In a device of the class described, a series of steps, and links connecting the steps and arranged in opposite pairs, one of such pair having a space in the line of each pivot center and the other a tooth in the line of such pivot center, the pairs alternating with each succeeding step, and means to drive the links.

46. In a device of the class described, a series of steps, links connecting alternate steps, every alternate link having a tooth under each pivot center and being paired with a link having a space under each pivot center, and means to drive the links.

47. In a device of the class described, a series of steps, connections at each end of the steps consisting of alternating male and female links, each male link having a tooth under each pivot center and being paired with a female link having a space under each pivot center, and pinions engaging the links to drive the steps.

48. In a device of the class described, a series of steps, links pivotally connecting the steps at both sides, each alternate link on each side having a tooth under its pivot center, and driving pinions engaging the links to push and pull the teeth of alternate links on alternate sides of the steps.

49. In a device of the class described, a series of steps, connections at the ends of the steps consisting of alternating male and female rack-links, each male link having a tooth under each pivot center and being paired with a female link having a space under its pivot centers, pinions engaging the links, and an upthrust track for preventing lifting and tilting of the links under the action of the pinions.

50. In a device of the class described, a series of steps each of which is provided with an axle bar and wheel-carrying yokes, rack-links pivotally connecting the axle bars at each end of the steps, alternate links being provided with teeth in the line of the axle bars connected thereby and the alternating links having a space in the line of the axle bars, each of the former links being paired with one of the latter links, pinions engaging the links to drive the steps, and upthrust tracks coöperating with the step structure at each end to overcôme the tilting and lifting tendency of the pinions.

51. In a device of the class described, a se-

ries of steps, links connecting the steps, pinions engaging the links, opposite upthrust tracks, and means to cause the upthrusts to alternately oppose the tilting action of the links.

52. An inclined moving stairway having a shunt at each end.

53. An inclined stairway adapted to be moved in either direction, and a shunt at each end thereof.

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

CHARLES D. SEEBERGER.

Witnesses:

W. H. BRADY,

J. MCROBERTS.