No. 617,779.

Patented Jan. 17 1899.

C. D. SEEBERGER.

ELEVATOR.

(Application filed Dec. 23, 1895.)

(No Model.)

10 Sheets—Sheet 1.

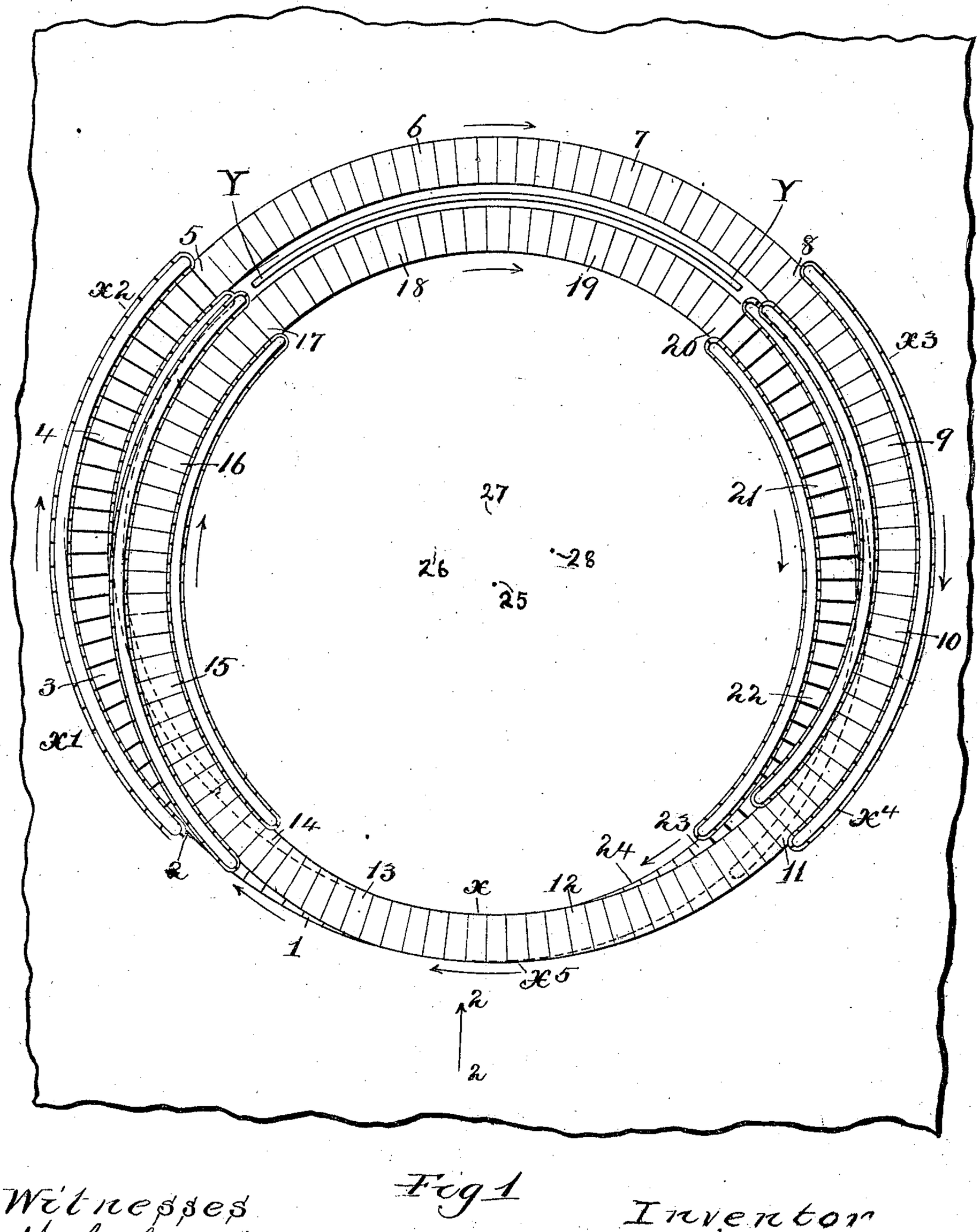

Fig 1

Witnesses
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10 Sheets—Sheet 2.

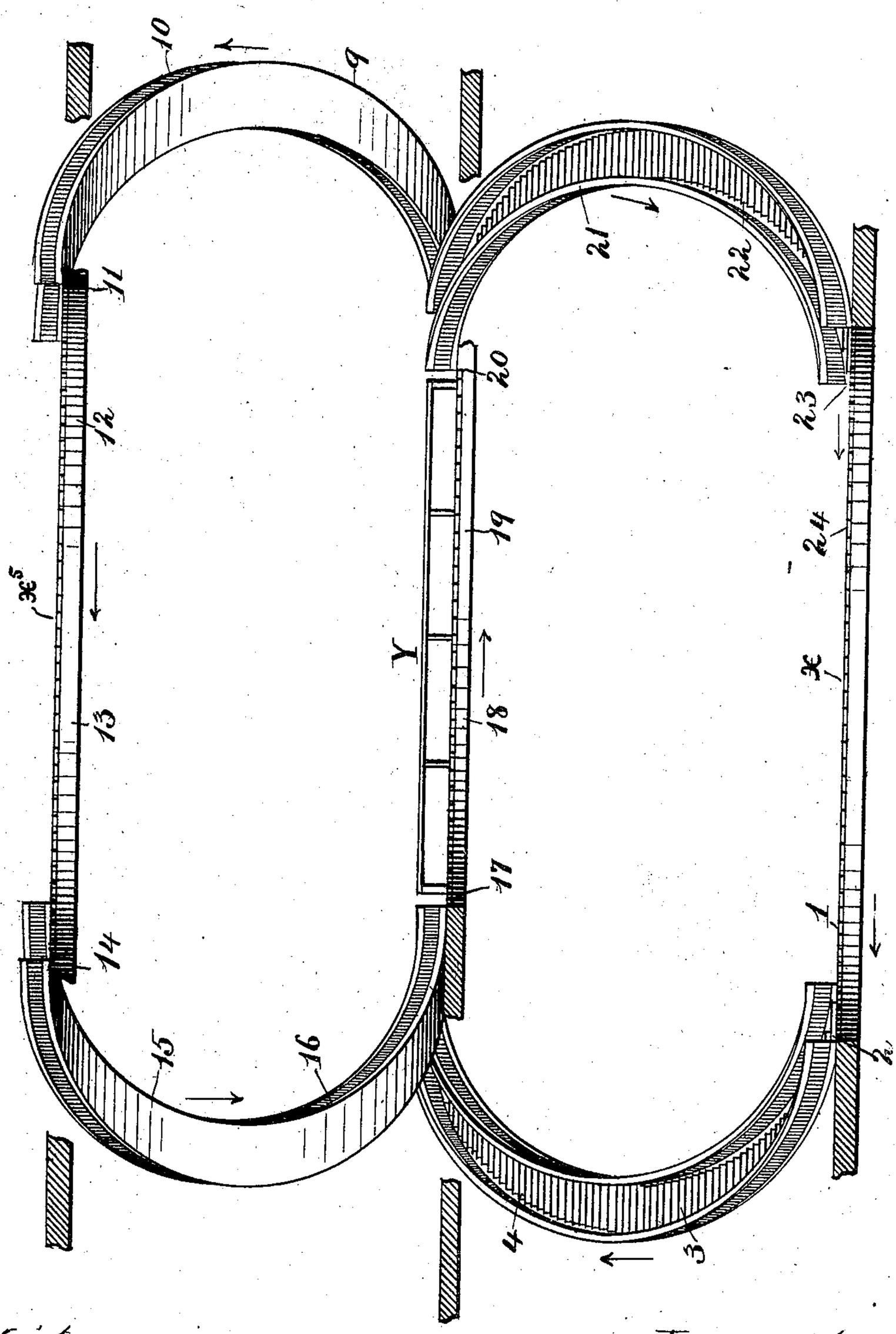

Fig 2

Witnesses
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ELEVATOR.

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(No Model.) 10 Sheets—Sheet 3.

Fig 3

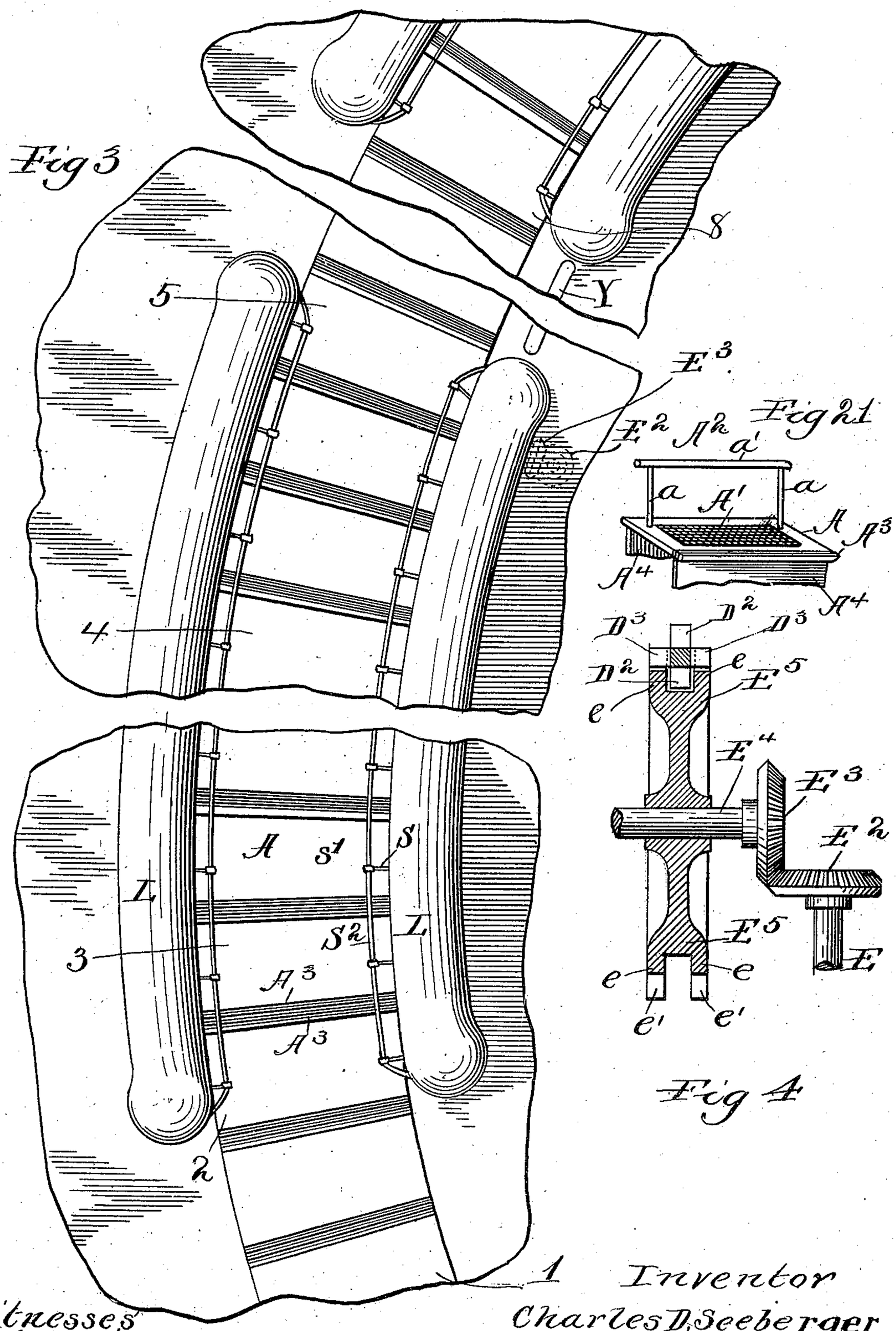

Fig 21

Fig 4

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10 Sheets—Sheet 4.

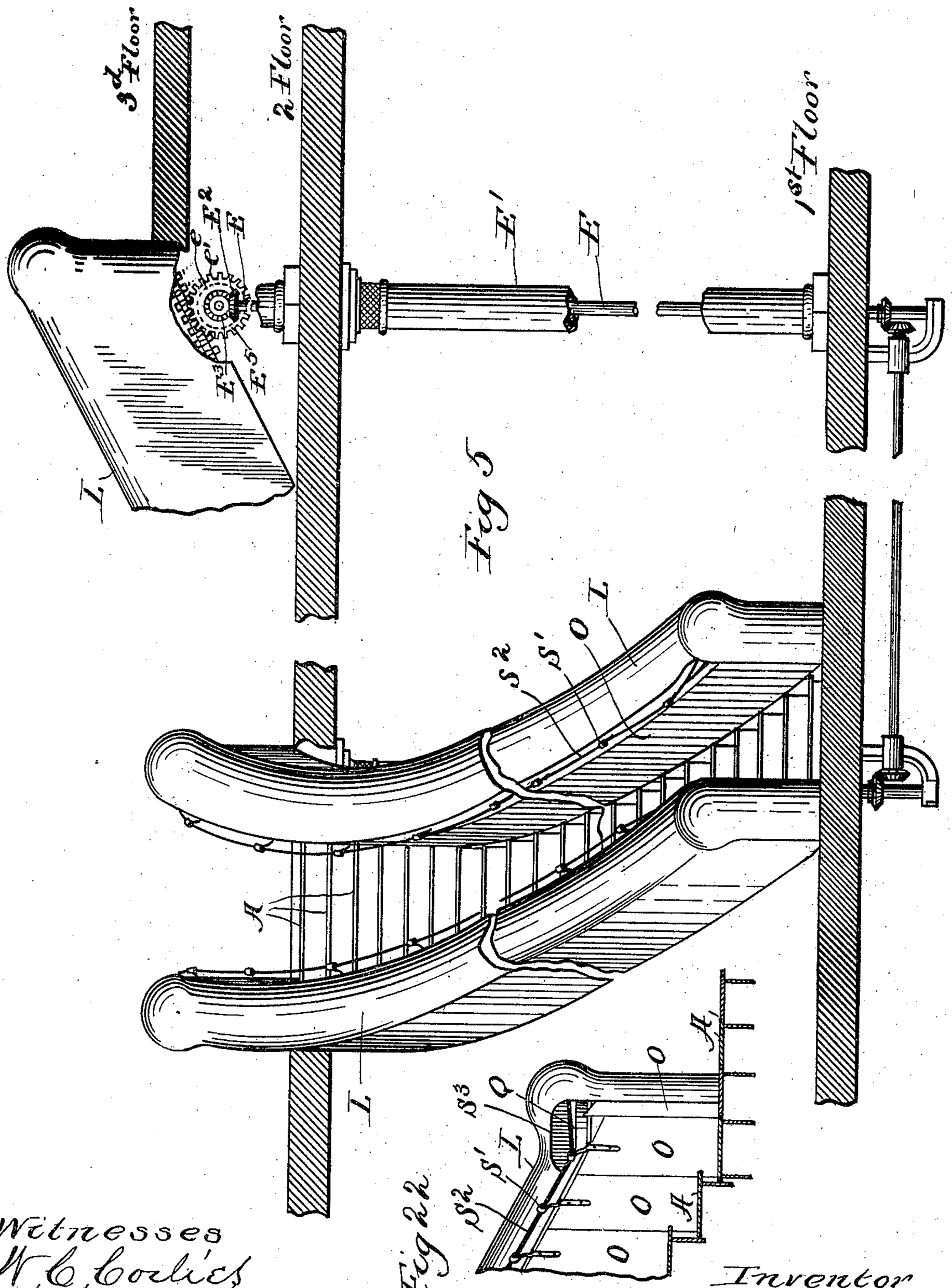

Fig 5

Fig 22

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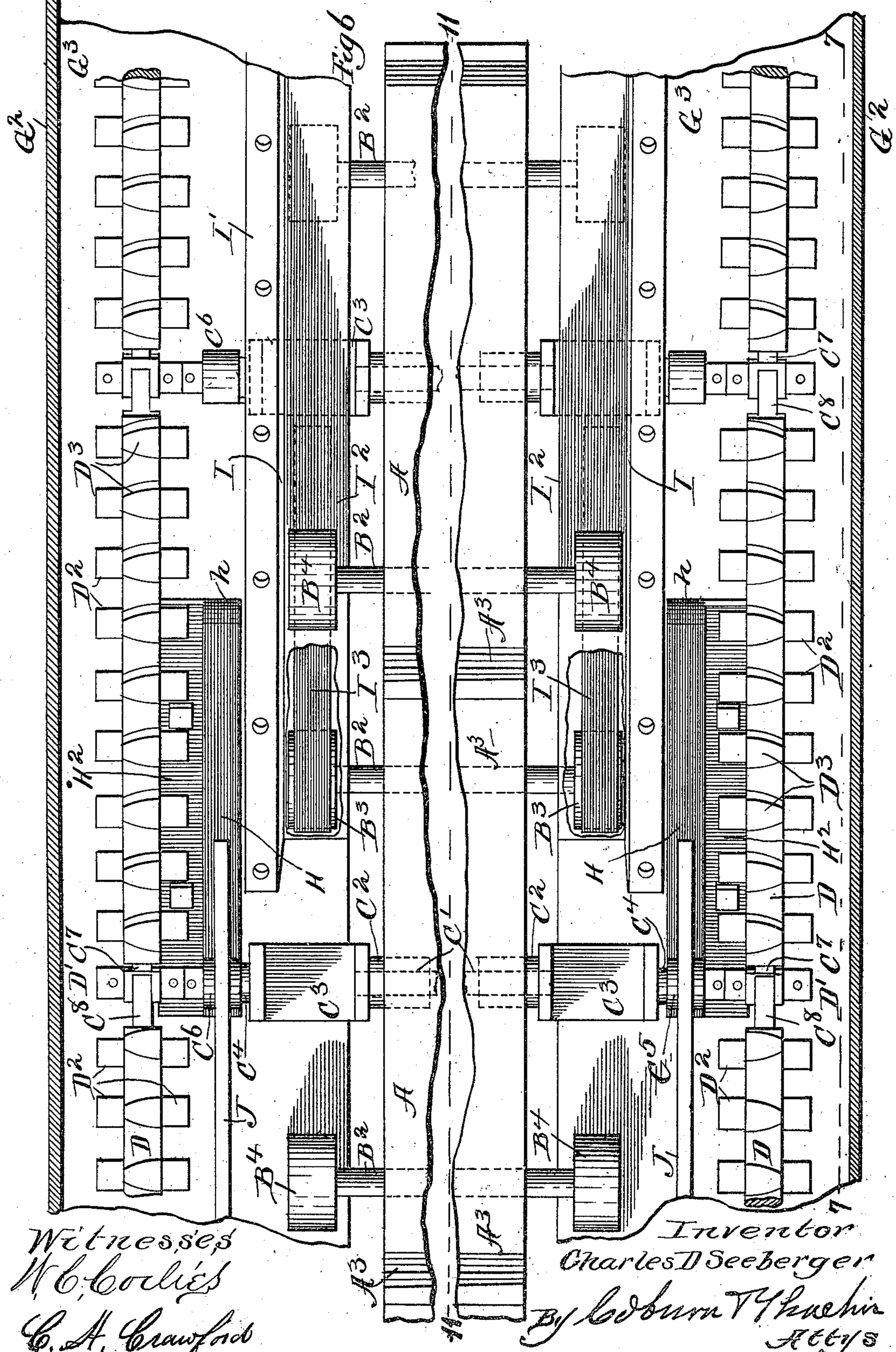
(No Model.) 10 Sheets—Sheet 5.



Witnesses,
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C. D. SEEBERGER.

ELEVATOR.

(Application filed Dec. 23, 1895.)

(No Model.) 10 Sheets—Sheet 6.

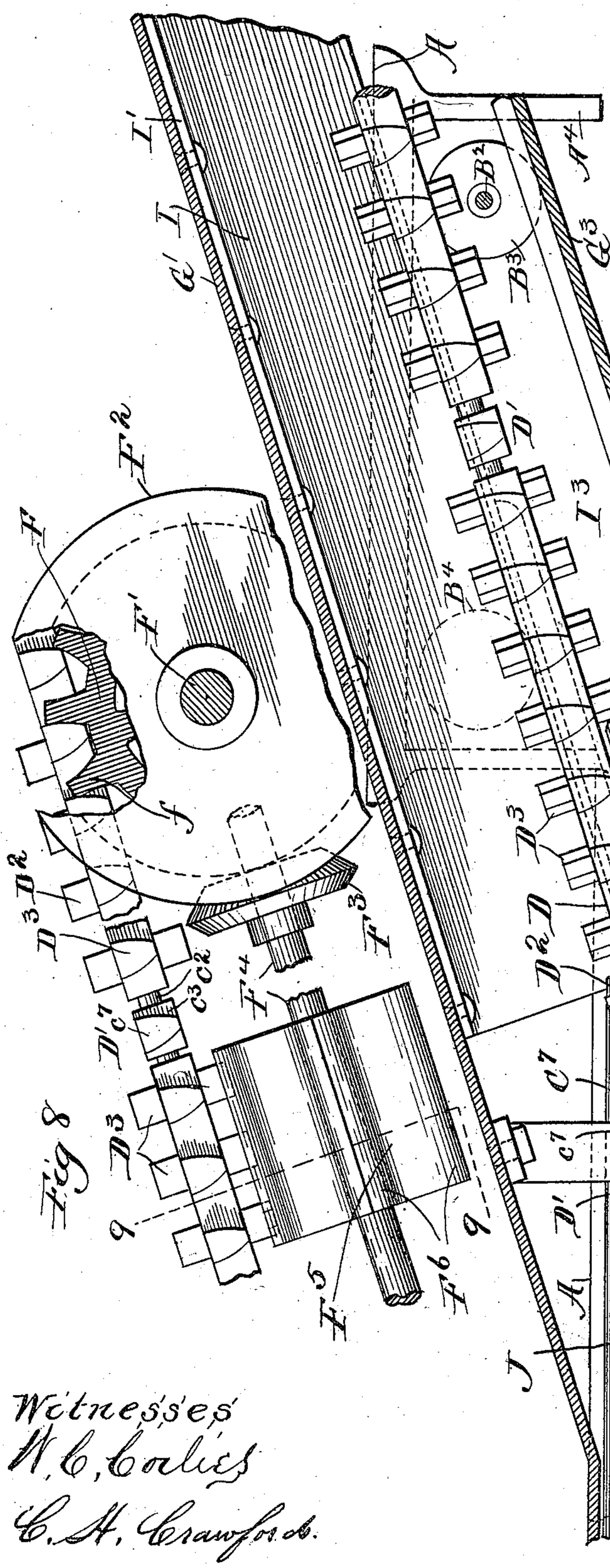

Fig. 8

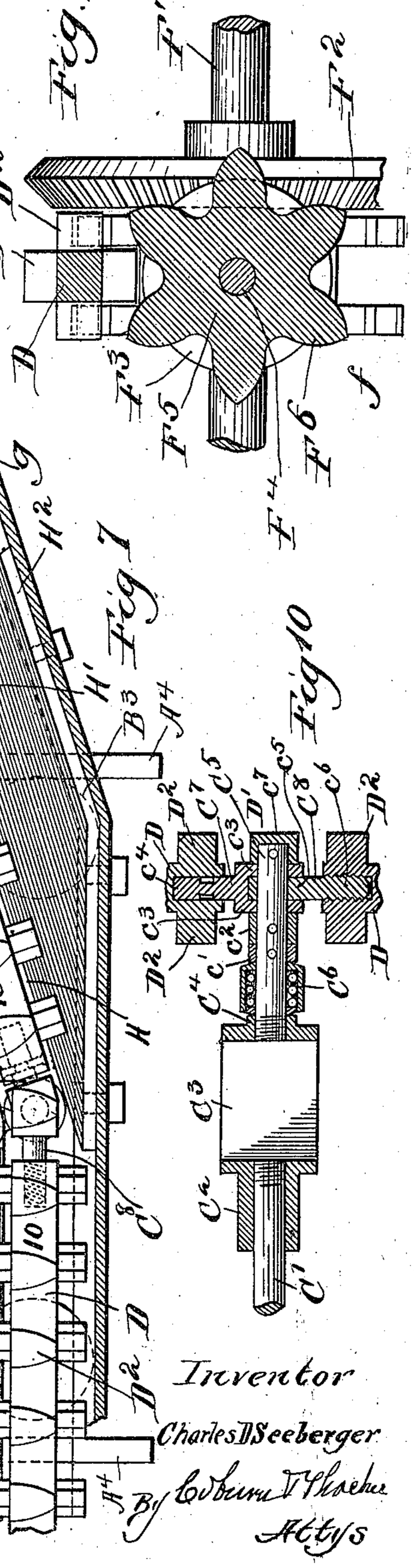

Fig. 9.

Fig 10

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(Application filed Dec. 23, 1895.)

(No Model.) 10 Sheets—Sheet 7.

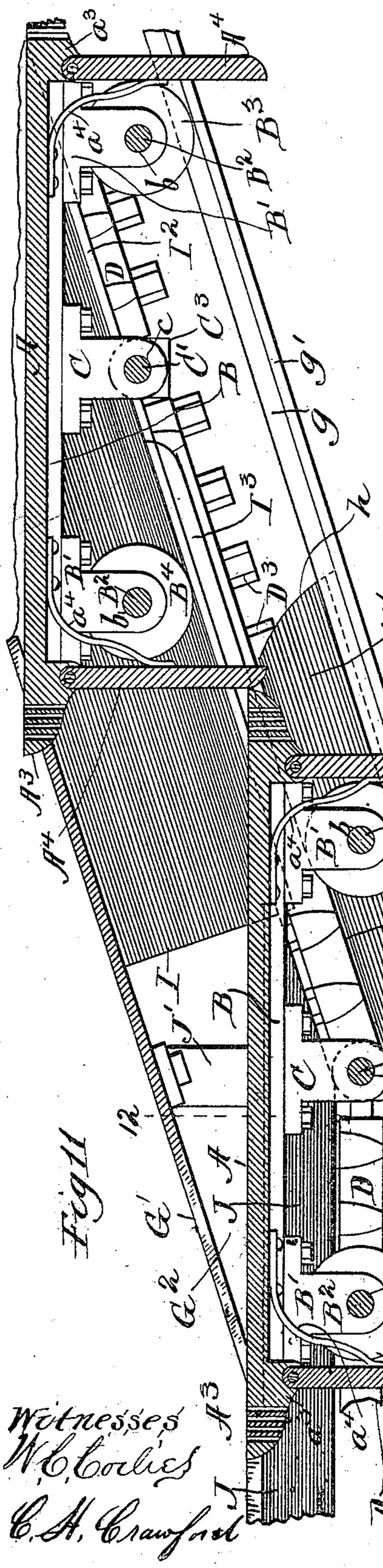

Fig 11

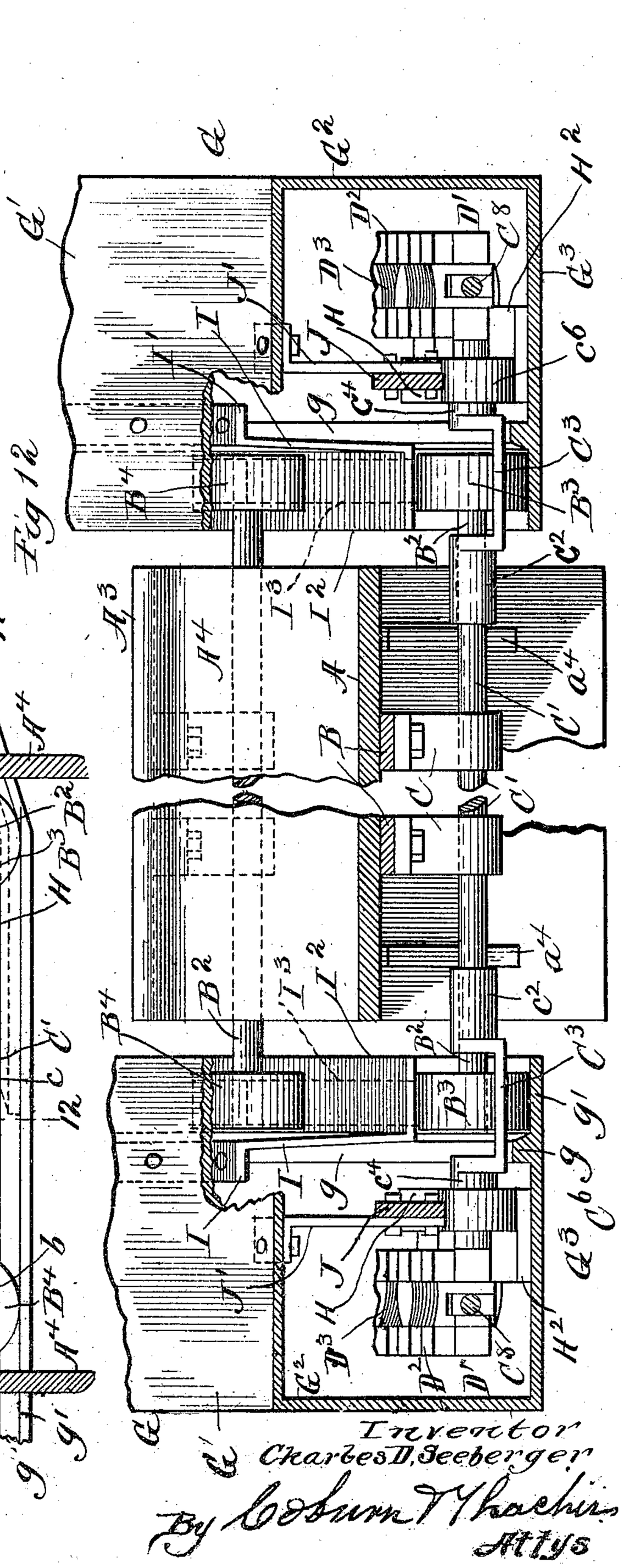

Fig 12

Witnesses,
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No. 617,779. Patented Jan. 17, 1899.

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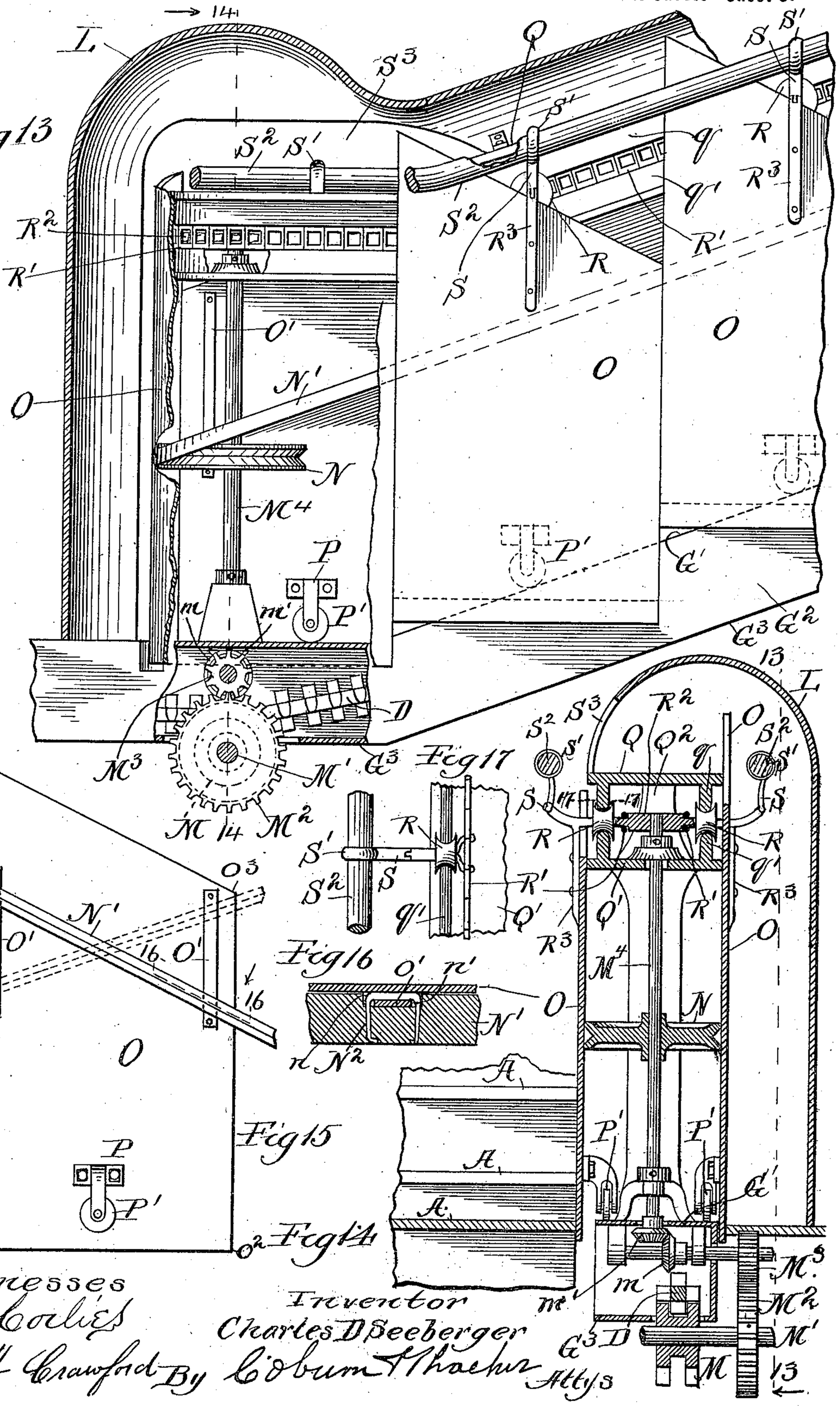
ELEVATOR.

(Application filed Dec. 23, 1895.)

(No Model.) 10 Sheets—Sheet 8.

Fig 13



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ELEVATOR.

(Application filed Dec. 23, 1895.)

(No Model.) 10 Sheets—Sheet 9.

Fig 18

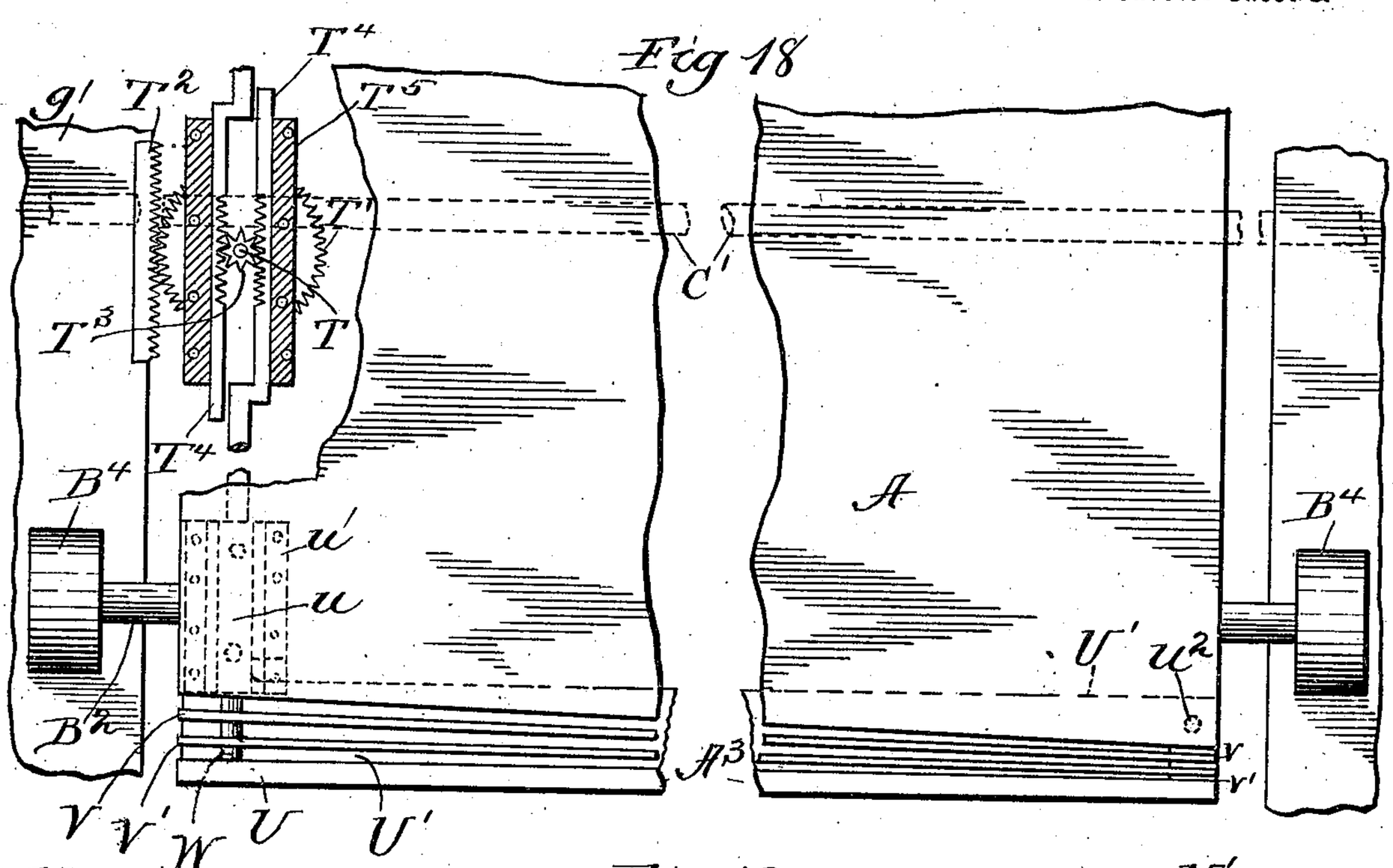


Fig 19

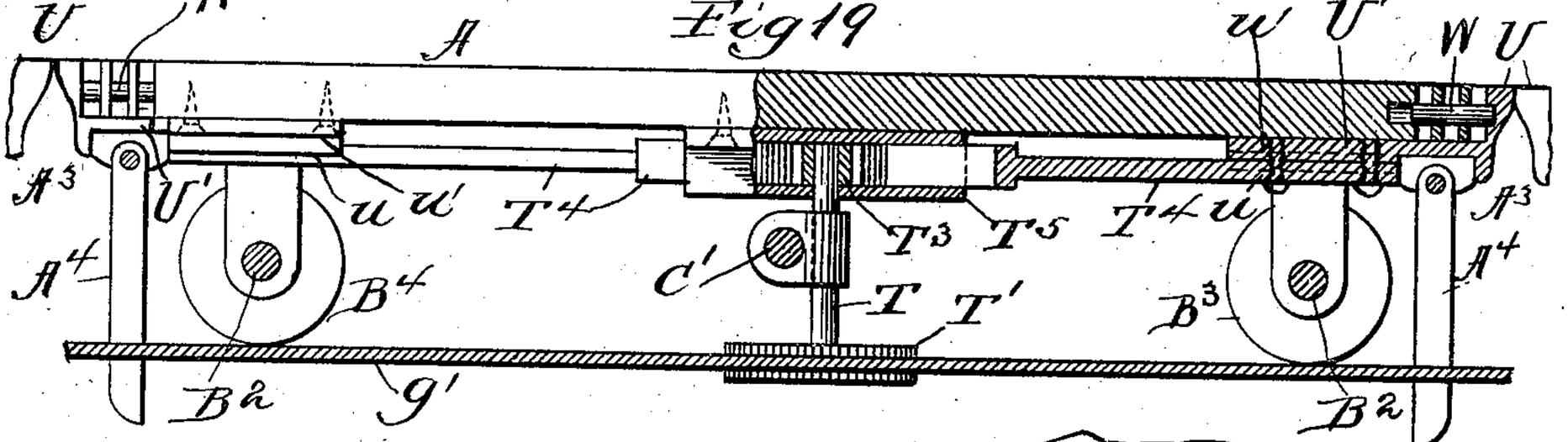
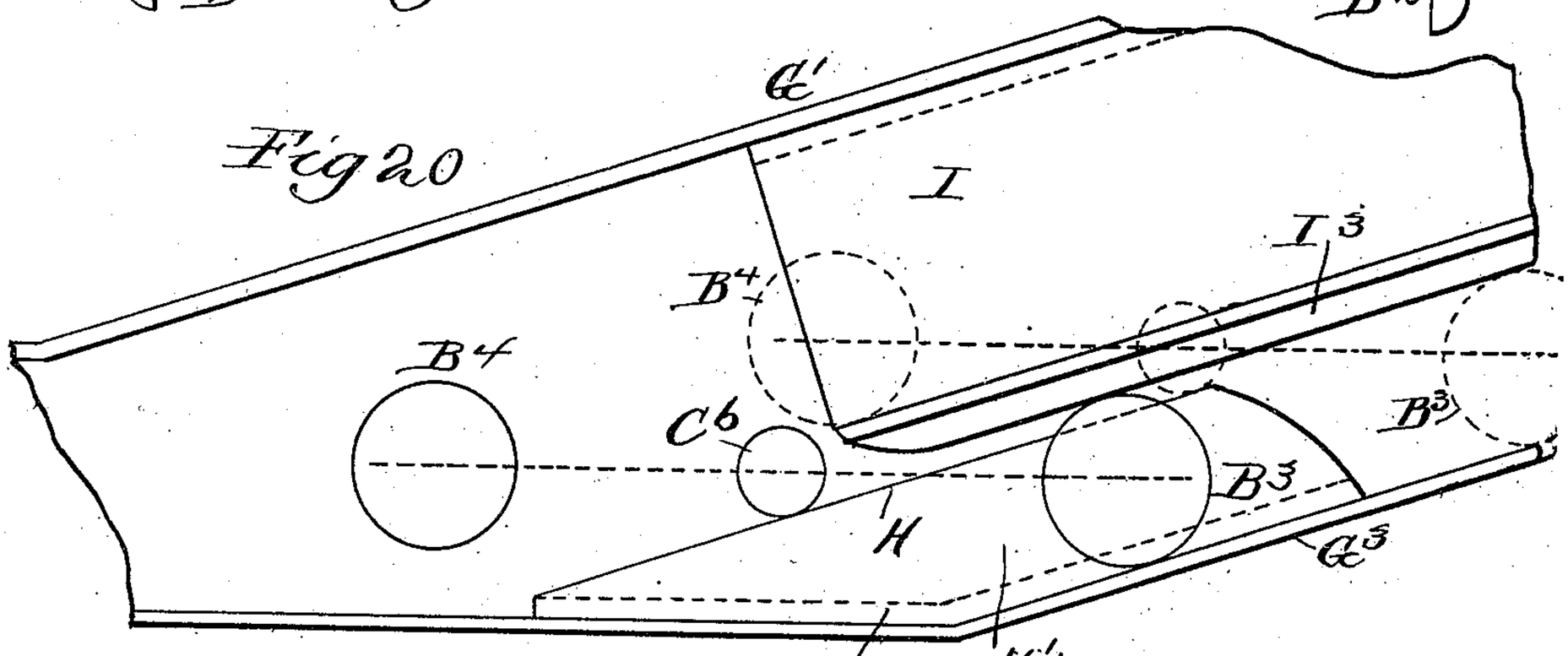


Fig 20



Witnesses
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(Application filed Dec. 23, 1895.)

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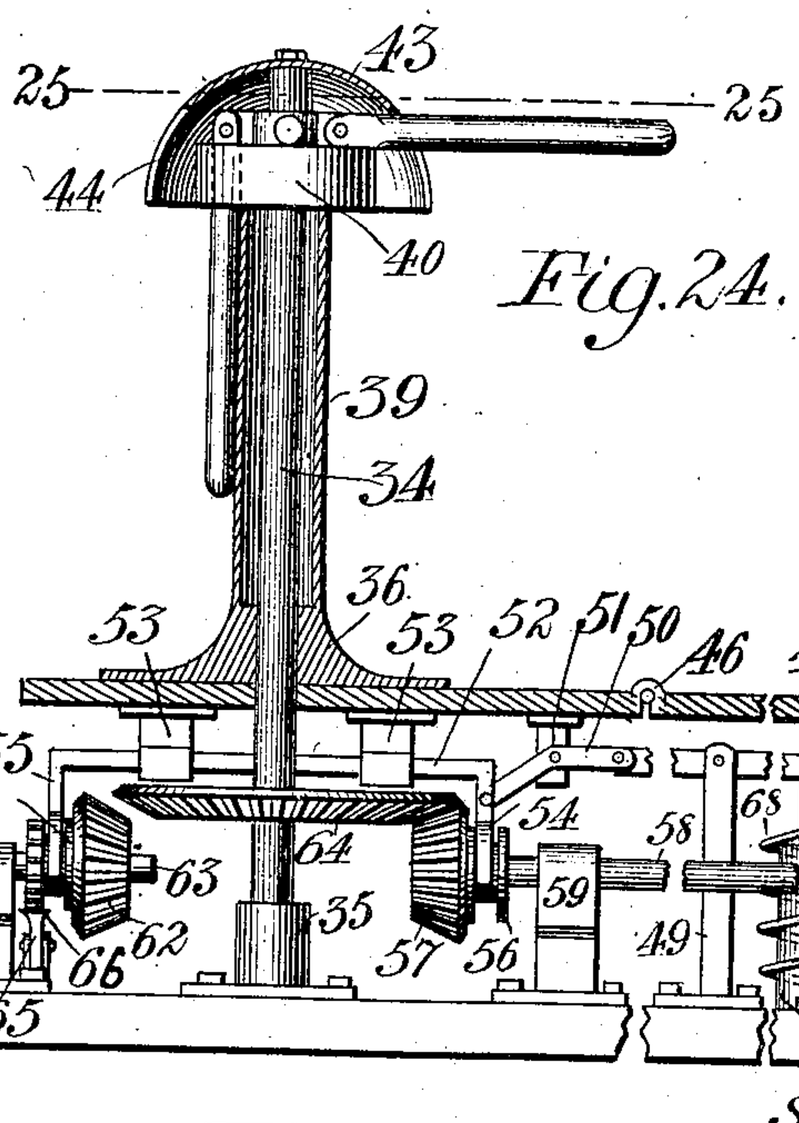

Fig. 24.

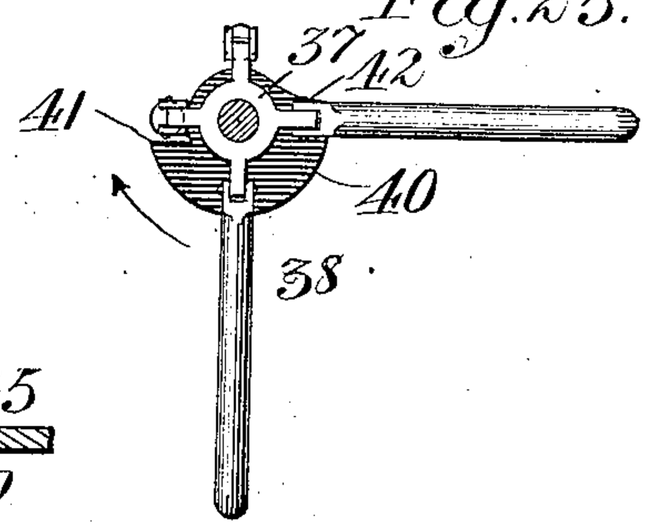

Fig. 25.

Fig. 26.

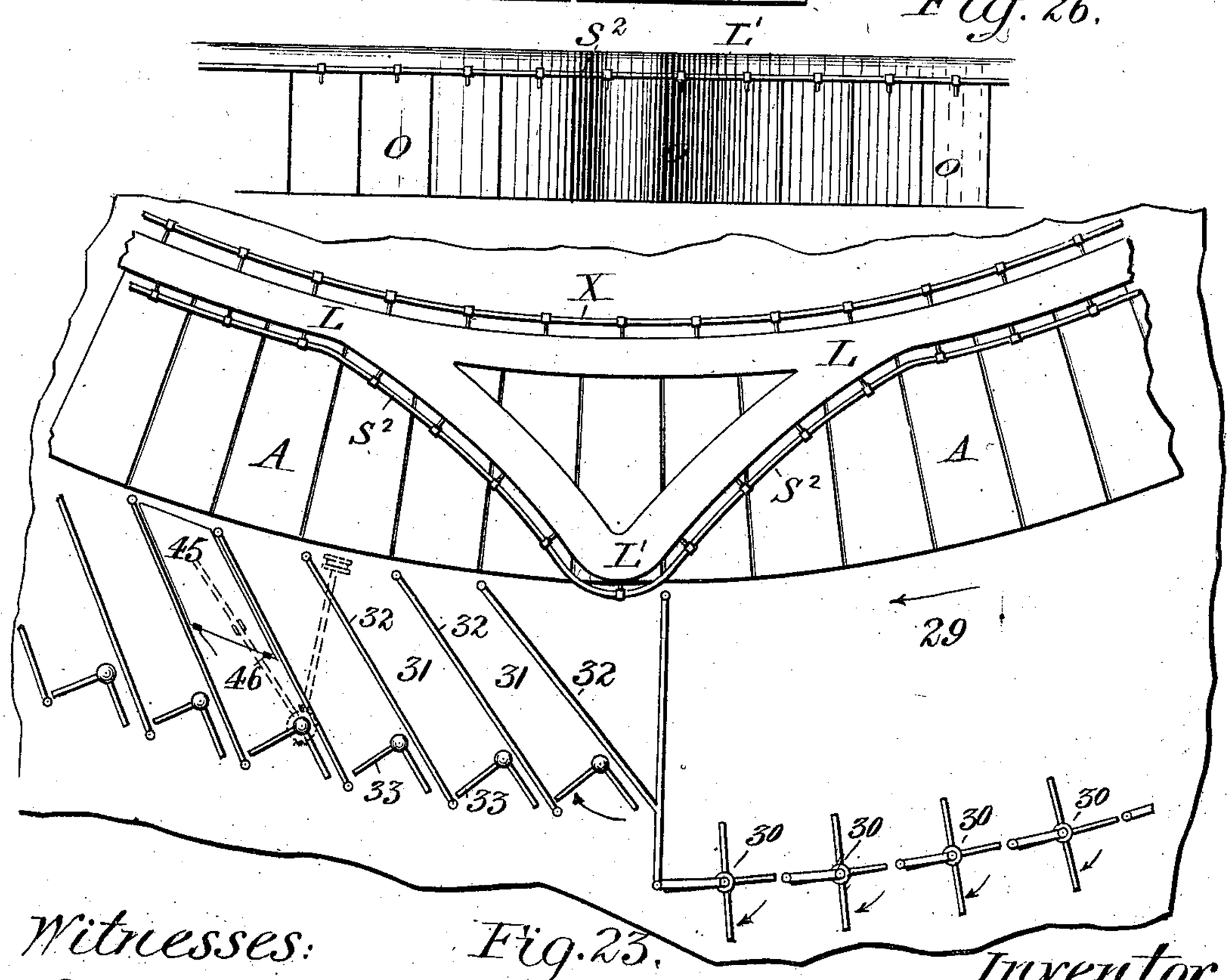

Fig. 23.

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Louise Serage

Inventor:
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UNITED STATES PATENT OFFICE.

CHARLES D. SEEBERGER, OF CHICAGO, ILLINOIS.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 617,779, dated January 17, 1899.

Application filed December 23, 1895. Serial No. 573,068. (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 plan view of my elevator. Fig. 2 is an elevation in the direction of the arrow 2 2 of Fig. 1. Fig. 3 is a plan of an ascending or descending portion of the elevator, showing the wainscoting hoods and hand-rails. Fig. 4 is a detail view of the mechanism for supplying the power. Fig. 5 is an elevation of two ascending or descending portions of my elevator, with parts thereof broken away, showing devices for transmitting power. Fig. 6 is a plan of a portion of my elevator where it is taken at a point where its ascent commences, the upper parts of the track-casings being removed to show the tracks and chain-bars. Fig. 7 is a vertical section along the line 7 7, Fig. 6. Fig. 8 is an enlarged detail view of the mechanism for varying the length of the chain-bars. Fig. 9 is a vertical section on the line 9 9 of Fig. 8. Fig. 10 is a detail view, in horizontal section, of the attachment of the chain-bars to the moving steps of the elevator. Fig. 11 is a vertical longitudinal section on the line 11 11, Fig. 6. Fig. 12 is a vertical cross-section on the line 12 12, Fig. 11. Fig. 13 is an elevation of a portion of the mechanism for operating the wainscoting and the hand-rail, with a portion of the hood covering the same removed, being a section on the line 13 13 of Fig. 14. Fig. 14 is a vertical section on the line 14 14 of Fig. 13. Fig. 15 is an elevation of one of the panels of which the wainscoting is composed. Fig. 16 is a section along the line 16 16, Fig. 15. Fig. 17 is a horizontal section along the line 17 17 of Fig. 14, showing the attachment of the hand-rail. Fig. 18 is a plan of a portion of one of the moving steps or platforms, showing the mechanism for adjusting the nosing of the said step. Fig. 19 is a side elevation of such a step, a part of which is broken away and shown in vertical section. Fig. 20 is a diagrammatic view of the operation of the several tracks and rollers at the several points of the commencement of the ascent of my elevator. Fig. 21 is a perspective of one of the steps or platforms, showing the mat and hand-rail with which I may provide the same. Fig. 22 is a detail view of the lower part of one of the hoods shown in Fig. 5, looked at from the elevator side. Fig. 23 is a plan of devices and arrangements for the admission to and exit from the elevator. Fig. 24 is a vertical section, on a larger scale, of one of the turnstiles for controlling admission to the elevator. Fig. 25 is a detail plan view of the turnstile-arms on line 25 25 of Fig. 24. Fig. 26 is a front elevation of the wainscoting shown in Fig. 23.

As is well known, it has been the usual practice to give a vertically-reciprocating and an intermittent movement to the carrying device—that is, the said carrying device (the elevator-cage) is alternately raised and lowered in a suitable shaft or well, stopping at each end of its course and at intermediate points, if desired. Such an arrangement has necessarily two principal defects. First, the elevator is operative at any given moment for carrying purposes only at that point where the cage happens to be at that moment. Throughout the rest of the length of the shaft or well the elevator is not available at that moment. At every such moment and at all times, therefore, such an elevator is operative and available only to a very limited extent as compared with the space occupied by the mechanism. Second, the continual necessary stopping of such an elevator, including the slowing down before and the gradual starting after each stop, the opening and closing of the door, and the exit and entrance of passengers, usually consumes several times the time occupied by the actual transit of the cage and constitutes a still further and greater limitation upon the capacity of this type of elevator.

Another type of elevating mechanism which has been devised, but has not, so far as I am aware, been put in use, consists of an endless series of interconnected trucks or steps, which remain horizontal whether moving horizontally or on an incline, in the nature of a moving stairway and moving platforms; but in every such prior construction of which

I am aware there has always been a large proportion of the elevating mechanism not available for carrying purposes. Over part of their travel the trucks or steps are necessarily out of use.

It is the object of my invention to avoid these defects, which must exist in all cases where elevators of either type are employed, and which defects are particularly conspicuous in the large department stores, where it is desirable to transport a considerable mass of people from one floor to another. To obtain this object, I have devised an elevating mechanism that is continuous both in construction and in function. At every point along its extent this mechanism is available and operative for carrying purposes, and its movement is continuous and uninterrupted.

My invention further relates to elevating apparatus of the class described in which certain features of construction are employed, said features consisting mainly of the use of curves in the ways or tracks, by which I am enabled to construct my elevating apparatus very compactly as regards to the space occupied thereby and at the same time by availing myself of all the possible carrying-surface of the stairway to transport a large number of persons by using a comparatively small structure.

It will be obvious that the broad principle of my invention may be employed in practice in many and various forms. I shall limit the following description, however, and the drawings illustrative thereof to one specific arrangement, without intending to imply, nevertheless, that my invention is thus restricted.

Referring now to the drawings, Figs. 1 and 2 show more or less diagrammatic views of my elevator as a whole, the former in plan and the latter in elevation in the direction of the arrow 2 2 in the former. 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. 2, 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. 1. The arrows in the two figures are placed in corresponding positions and indicate the directions of the movement above described.

In practice it is not to be presumed that passengers will make the continuous trip above outlined. Persons upon the first floor desiring to ascend will board the elevator somewhere along the curve 23 24 1 2 and will be carried upward to the second floor. Those who wish to get off there will do so. Those wishing to ascend to the third floor will remain upon the elevator or will board the same somewhere along the curve 5 6 7 8 and will be carried upward to the third floor. The same principle will prevail as to the descent portions of my elevator.

The elevator will be moved, preferably, at a speed of about two miles per hour. A passenger will find no difficulty, therefore, in stepping upon or off from one of the component steps or platforms of the elevator where the said steps are moving in horizontal direction. The said steps remain severally and individually horizontal during both the ascent and descent of the elevator. It is not intended, however, that passengers shall enter or leave the elevator at such points. In order to insure the passengers being in the right position for the ascent or descent upon a step or platform, the top or tread A of each step may be provided with a mat A′, as shown in Fig. 21, to indicate the space upon which the passenger should stand. To prevent the possibility of the passenger's falling during the transit, the said step may be provided with a supporting device A^2, which may consist of a single post a or of two such posts and a rail a', as shown in Fig. 21, or of any other convenient device of which the passenger can take hold. I may go further and construct upon each of the steps or platforms of my elevator one or more seats adapted to hold one or more persons. This modification I have not thought necessary to illustrate.

I shall now describe the construction and interconnection of the individual steps or platforms which constitute my elevator, particular reference being had to Figs. 11 and 12. Each step or platform comprises a horizontal portion or tread A, upon the forward and rearward ends of which are formed nosings A^3, the particular constructions of which will be later described. At each of the said ends of the platform, in downwardly-projecting lugs a^3, is pivoted the upper end of a vertical piece A^4, which corresponds to that part of a stair called the "rise." It will be obvious

that when the elevator ascends the rearward of the two parts A^4 upon each platform will be exposed and operative. When the elevator descends, the forward of the said two parts upon each step will be exposed and operative. A spring a^4 may be arranged in any convenient manner to exert its tension upon the part A^4 and cause the lower end of the same when exposed, as above described, to bear against the nosing of the adjacent step or platform. Two bars B B extend longitudinally along the bottom of A. At each end of each of the said bars is secured a bracket B', in the lower part of which is formed a bearing *b* for an axle B^2, upon the ends of which axle are mounted the forward wheels B^3 and the rearward wheels B^4. At the center of each of the bars B is secured a further bracket C, in the lower end of each of which is formed a bearing *c* for an axle-bar C'. To each of the ends of the axle-bar C' is secured a casting consisting of two sleeves C^2 and C^4, connected by an offset portion C^3. In each outer sleeve C^4 is secured an axle C^5. (Shown in Fig. 10.) Upon this axle and next to the sleeve C^4 is mounted the roller C^6, which is preferably provided with ball-bearings. A washer *c'* is secured upon the axle next to the roller C^6 and holds the same in position. Next to *c'* upon the said axle is secured the tooth-shaped part c^2, which forms one of the teeth D' of the sprocket-chain. Next to c^2 upon the same axle is mounted the chain-bar attachment-piece C^7, which comprises two perforated ears c^3 c^3, the said piece C^7 being threaded upon and pivotally connected with the said axle by means of these perforations, and its swivel portion c^4, upon which is swiveled one end of the chain-bar D. A second chain-bar attachment-piece C^8 comprises a perforated ear c^5, which is threaded upon the axle C^5 between the two ears c^3 c^3 just described, and a screw-threaded portion c^6, which is screwed into the end of another chain-bar D. In this way each two adjacent chain-bars are connected together and are connected to one of the steps or platforms. Upon the extreme end of the axle C^5 is rigidly attached the cap-piece c^7, which also is tooth-shaped to correspond with the opposite part c^2 and thus form teeth D' D' similar to those mounted upon the chain-bars D. The sprocket-chain through which movement is supplied to my elevator consists of chain-bars D, attached to each other and to the moving platforms, as just described. Each bar D is four-sided. Upon each of the four sides are mounted teeth, those teeth upon the sides normally vertical being lettered D^2 and those upon the sides normally horizontal being lettered D^3.

The power-supplying mechanism may preferably be located at the head of each ascending portion of the elevator, as shown in Fig. 5. The several mechanisms may be connected by shafting, as there shown, or the power may be distributed to the said mechanisms in other and obvious ways. In the construction I have illustrated in the drawings the vertical shafts E are mounted within the columns E'. The upper end of the shaft carries a bevel-gear E^2, which meshes with a second bevel-gear E^3, as is shown particularly in Fig. 4. The gear-wheel E^3 is keyed upon a shaft E^4, upon which is also secured the sprocket-wheel E^5. The sprocket-wheel E^5 is constructed with two annular ribs *e e*, extending around the edges of the perimeter of the same, each of the said ribs carrying the oppositely-disposed teeth *e' e'*. As the sprocket-wheel engages with the sprocket-chain the teeth *e' e'* of the sprocket-wheel bear against the teeth D^2 D^2 of the chain-bar, while the lower teeth D^3 of the chain-bar pass without engagement through the space between the annular ribs *e* of the sprocket-wheel. Only those teeth of the chain-bar, therefore, are operative which are mounted upon the vertical sides of the chain-bar when it engages with the sprocket-wheel.

Theoretically my elevator might be formed of two perfect circles of different diameters, internally tangent one to the other when looked upon from above, as in Fig. 1, and such is the apparent construction shown in the plan view of the said figure. In practice, however, unless these circles be considerably larger than it will generally be desirable and convenient to construct them it will be necessary in order to allow head-room along the ascending portion 2 3 4 5 and the descending portion 20 21 22 23 to form the outer circle shown in Fig. 1 not as a perfect circle merely larger in diameter than the inner circle there shown, but as a compound circle or curve—that is, the inner circle in Fig. 1 is drawn from the point 25 as a center, with a constant radius, which may be called Z. Of the outer circle the curve between X on the first floor and X' and between X^4 and X^5 on the third floor (in all one hundred and twenty degrees) is drawn from the point 27 as a center and with a radius larger than Z, which may be called Z', the curve between X' and X^2 (sixty degrees) is drawn from the point 26 as a center and with a radius equal to Z again, the curve between X^2 and X^3 (one hundred and twenty degrees) is drawn from 25 as a center and with a radius equal to Z', and the curve between X^3 and X^4 (sixty degrees) is drawn from the point 28 as a center and with a radius equal to Z. Now if the elevator were to travel continually along the same circle or along circles of the same diameter the chain-bars on the outer side of the moving platforms would be longer than those on the inner side, but would bear a fixed and constant proportion thereto, this proportion varying inversely as the distance of the inside and outside of the platform from the center of the said circle or circles. If, however, the elevator has to travel during part of its course along a circle of a given radius and during another part of its course along a circle of a greater radius, which would be the

case in the construction exhibited in Fig. 1 if the outer circle there shown be considered a perfect circle, then that proportion between the length of the outer chain-bars and the inner chain-bars which would be adapted for the smaller circle would not be adapted for the larger circle. Each outer chain-bar would have to be reduced to a length more nearly approaching that of the corresponding inner chain-bar, since if the outer circle were made infinitely great the outer and inner chain-bars would be of the same length. In the case of such a construction it would be necessary to arrange at the point X some device by which the length of the outer chain-bars could be decreased, or, what is the same thing, the length of the inner chain-bars be increased, as at this point the circle would commence to expand. Also at the point X^5, vertically above the said point X, it would be necessary to arrange a similar mechanism for making a change of the reverse character. Inasmuch, however, as the outer circle shown in Fig. 1 in its practical construction is a compound circle, as explained hereinabove, it will be necessary to employ four further mechanisms such as those just referred to, one at X′ to adapt the chain-bars to the sharper curve between that point and X^2, another at X^2 to restore the relative lengths of the chain-bars as they stood before reaching the point X′, a third at X^3 like that at X′, and a fourth at X^4 like that at X^2. The two original mechanisms, one at X on the first floor and another at X^5 upon the third floor and vertically above the first, have been already referred to. The mechanism which I employ for effecting these changes in the length of the chain-bars is illustrated particularly in Figs. 8 and 9. A sprocket-wheel F is mounted just beyond the point at which it is desired to effect this change in such a position that its teeth *f* will engage with the teeth D^3 D^3 of the chain-bars, which teeth D^3 D^3, as shown in Fig. 8, are upon the sides of the chain-bars D, which at this point are vertical, as will presently be explained. The sprocket-wheel F is thus rotated by the passage of the successive chain-bars, and thereby rotates the shaft F′, upon which it is mounted. Upon the shaft F′ is mounted the bevel-gear F^2, which meshes with the bevel-pinion F^3, mounted upon a counter-shaft F^4. Upon the other end of the counter-shaft F^4 is mounted the pinion F^5, of an elongated form, as shown in Fig. 8, each of the teeth F^6 of which will engage with a determined number of the teeth D^3 of the chain-bars, thereby rotating the chain-bar in a plane perpendicular to that of its length and of the direction of its movement. Now it has been seen that one end of each chain-bar has a swiveled attachment and the opposite end has a screw-threaded attachment. The effect of such rotation, therefore, will be to lengthen or shorten the screw-threaded attachment, according to the direction in which the screw-thread runs. Supposing, therefore, that at the point considered it be desired to adapt the proportion of the chain-bars to the beginning of a smaller circle by lengthening the outer chain-bar, this mechanism would be so arranged that the screw-threaded attachment of each outer chain-bar would be partially unscrewed as the chain-bars passed in succession this mechanism. It will of course be necessary to place the sprocket-wheel F and the pinion F^5 at such a distance apart that the two will not be in contact at any time with the same chain-bar, which I have indicated by breaking away part of the shaft F^4, Fig. 8. If the pairs of teeth D^2 and the pairs of teeth D^3 were opposite each other upon the chain-bars, it would result from this lengthening of the screw-threaded attachment that the teeth nearest to the said attachment would be at a greater distance from the teeth D′ than would the adjacent teeth upon the next chain-bar or than any two adjacent pairs of teeth upon the same chain-bar from each other. This discrepancy might in some cases cause unevenness in the running of my apparatus at those points where the chain-bars thus lengthened are engaged by the sprocket-wheels which supply power thereto. To remedy this, I divide up this discrepancy between all the successive pairs of teeth upon each chain-bar by the arrangement which I shall now describe. Considering that chain-bar, the upper and forward end of which is shown at the left-hand side of Fig. 8, it will be seen that the pairs of opposite teeth D^3, mounted upon the top and bottom of the chain-bar, are slightly in advance of those pairs of teeth shown mounted upon the side of the chain-bar at that point. The distance represented by this advance is made in the case of the teeth adjacent to the point of connection with the platform equal to that amount by which it is found necessary to increase the length of the chain-bar when the same is to be increased, as above described. The next pair of teeth D^3 are placed a less distance in advance of the corresponding teeth D^2, the third pair a still less distance, and so on until the last pair of teeth D^3 next to the swiveled end of the chain-bar are approximately opposite the corresponding teeth D^2. In order to illustrate the operation of this mechanism, we may suppose that the necessary increase of length of each chain-bar is three-tenths of an inch and that the pitch of the screw-thread attachment C^8 is one-tenth of an inch approximately. The sprocket-wheel F, the bevel-gear F^2, and bevel-pinion F^3 will in such a case be so constructed that the passage of one chain-bar will so operate the sprocket-wheel F as to revolve the pinion F^5 sufficiently to cause the chain-bar with which it contacts to make three and a quarter rotations and to leave the teeth D^3 upon the vertical sides of the chain-bar, while the teeth D^2 will be on the top and bottom thereof. Now by the construction of the teeth D^3 with relation to the teeth D^2 this increase of length

of the chain-bar is divided up among all the intervals between the teeth D^3, so that each interval will be increased one-tenth of the whole three-tenths-inch increase of the length of the chain-bar as compared with the intervals between the teeth D^2. The chain-bar a portion of which is shown at the right-hand side of Fig. 8 is represented as having thus been rotated, bringing the teeth D^3 into operative position on the vertical sides of the bar, while the teeth D^2 are now on the top and bottom thereof. The sprocket-wheels which supply power to the outside sprocket-chains will be formed to fit whichever set of teeth D^2 or D^3 are in operative position at the points where power is supplied.

The tracks for my elevator I form, preferably, as follows: Upon each side of the elevator I construct a casing G, forming in cross-section three sides of a rectangle opening inward, the three sides being respectively the top G′, the vertical side G^2, and the bottom G^3, as shown particularly in Fig. 12. Upon the bottom G^3 and near the inner edge thereof is placed a flange or rib *g*, by which there is formed a track *g′* on each side of the elevator, adapted to receive the wheels B^3 and B^4 when the elevator is running horizontally. Where the elevator is so traveling horizontally, the rollers C^6 are not operative. As each platform, however, comes into the position shown on the left-hand side of Fig. 11, where it commences its ascent, there is arranged in each of the casings G a roller-track H, supported by the bracket H′, secured to the track-casing by the flange H^2. These tracks H are arranged in such a position and at such an angle that as the wheels B^3 move up the ascending portion of the track *g′* the rollers C^6 will travel upon the track H, whereby the step or platform continues to retain a horizontal position, the rear wheels B^4 becoming for the time inoperative. This position of one of the steps is shown in the diagrammatic view in Fig. 20 A bracket I, carrying a flange along its upper edge, is bolted to the top of the casing G′. To the lower edge of the bracket is secured a track I^2. This bracket and track are so constructed that as the platform continues its ascent the rear wheels B^4 enter upon and travel upon the said track I^2. At this point the support of the rollers C^6 becomes unnecessary, and their tracks H are therefore discontinued, as shown at H, whereby the rollers C^6 become again inoperative.

I prefer to discontinue the tracks H immediately after the rear wheels enter upon and travel upon the track I^2 not only because the additional friction of the rollers C^6 is a waste of energy, but also because the employment of three distinct rollers at each end to furnish a bearing while moving on the inclined portions would tend to make the step unstable if there should be the slightest variation in the relation of the three tracks with which the two wheels and the rollers coöperate.

On account of the extension of the axle C′ beyond the planes of the wheels B^3 and B^4 it becomes necessary to employ the offset portions C^3 in said axles previously referred to in order to prevent any interference between the track I^2 and the axle C′, which interference would occur when traveling on the inclined portions of the tracks unless the portions of the axle C′ directly beneath the tracks I^2 were offset, as shown.

As is shown in Fig. 20, when the platform has just commenced its ascent before the rear wheels B^4 have entered upon the tracks I^2 there might be a tendency for the rear end of the step to tip downward. This tendency is checked by forming upon the lower side of the track I^2 an upthrust track I^3, against which the forward wheels B^3 will immediately bear if there be such tendency of the rear end of the step to tip downward with the axle C′ as the pivotal point. Another upthrust track is formed of a track proper, J, attached to the upper side of the track-casing G′ by the brackets J′. This upthrust track is arranged over the path of the rollers C^6 and along those portions of the elevator just before the commencement of each ascent. In case, therefore, that there be any tendency on the part of the step before commencing its ascent to be lifted by the upward pull of the sprocket-chains the roller C^6 will contact with and bear against the upthrust track J and counteract such tendency.

At each point where the elevator commences an ascent and at each point where it ends a descent it will be necessary to provide the track constructions hereinabove described. At each point where the elevator ends an ascent or commences a descent it will be necessary to provide the said track constructions, with the exception of the upthrust tracks J.

Along the sides of those parts of my elevator where it ascends or descends I find it desirable to provide something in the nature of a balustrade on the stairway to afford protection and support to the passengers as they are transported upward and downward. To this end I have devised and I construct an endless wainscoting and hand-rail, which travel upward or downward, according as the elevator ascends or descends, upon each side of the elevator and in close proximity thereto. Figs. 3 and 5 show general views of this construction. Figs. 13 to 17, inclusive, show detail views thereof.

L L are hoods or casings mounted above the track-casings G and are opened on the side toward the elevator. At the lower end of each hood is mounted a sprocket-wheel M in such a position as to engage with and be rotated by the sprocket-chains D upon a shaft M′. The shaft M′ carries a gear-wheel M^2, meshing with the gear-wheel M^3, which through the bevel-gears *m* and *m′* imparts movement to the

shaft M^4, suitably journaled in an upright position within the hood. The shaft M^4 carries a V-pulley N, which moves the endless V-belt N', the said belt passing about a similar pulley or sheave at the upper end of the hood. The V-belt N' is cut out at intervals, as at n, and each of these transverse grooves is provided with a staple N^2, in the manner shown in Fig. 16, whereby a space n' is left between the head of the staple and the belt. The wainscoting is formed of a series of panels O, of the shape shown particularly in Fig. 15, $o\ o'\ o^2\ o^3$ forming the vertical sides thereof, $o'\ o^2$ being the horizontal bottom edge thereof and $o\ o^3$ being the upper and slanting edge of the said panel O, the slant being the same as the angle of ascent or descent of the elevator. The inside of each of the panels O is provided with two vertical strips O' O', which are threaded loosely in the spaces n' formed in the belt N', as hereinbefore described. Further, each of the panels O is provided on its inner side with one or more brackets P, each carrying a roller P', the track upon which the said rollers bear being most conveniently formed upon the top G' of the track-casing G. There is formed along the upper part of and within the hood a framework comprising an upper flat bar Q and a lower one Q', the two being connected together and spaced by the posts Q^2. This framework as a whole may be supported from the track-casing. From the bottom of Q extend downward two ribs or flanges q. From the top of Q' extend upward two corresponding ribs or flanges q'. These ribs $q\ q'$ form slotted guides or tracks adapted to receive the rollers R. The rollers R are secured upon the sprocket-chain R', which is moved by the sprocket-wheel R^2, mounted upon the top of the shaft M^4. Each roller R is attached by a bracket R^3 to one of the panels O, and thus forms a support and guide for the upper part of the panel, as does the roller P' for the lower part thereof. To each of the brackets R^3 is pivoted an arm S, the outer end of which carries a ring S'. Through the rings S' is threaded an endless cord or hand-rail S^2. The hand-rail S^2 passes out from within the hood, on the side next to the elevator, through the aperture S^3 in the hood. (Shown in Fig. 22.) The operation of these devices is apparent from the above description of their construction. To suppose, for the sake of illustration, that Figs. 13 and 14 of the drawings show the lower end of the hood at a point where the elevator commences to ascend, the shaft M^4 will revolve in such direction that the panels O are carried downward when in the position shown in Fig. 13, will pass around the shaft at the lower end of the hood, and move upward in close proximity with the upward-moving elevator and at the same rate of speed therewith. The object of pivoting the arms S upon the brackets R^3 is to permit the said arms to swing upward when the panels pass around the mechanism at the lower end of the hood, and thus avoid the straining or stretching of the hand-rail which would otherwise ensue. The panels O are preferably made of some flexible material to permit their passing around the said mechanism at the lower end of the hood. The said panels are so shaped and mounted that as they descend upon that side away from the elevator their upper diagonal edges $o\ o^3$ will stand in some such relation to each other as shown in Fig. 13. When, however, the panels commence their ascent upon that side in proximity to the elevator, the edges $o\ o^3$ will form a continuous straight line parallel to the angle of ascent of the elevator, as shown in Fig. 22, this change of position of the panels with reference to each other being permitted by their sliding attachment to the supporting V-belt. By this construction it will be obvious that the passenger will always have the support of a hand-rail during his ascent or descent, and should such passenger fall he will be prevented by the wainscoting from falling off from the elevator, and the movement of the wainscoting will prevent his being in any way caught thereby, as might be the case with a motionless balustrading.

I have in my description of the individual steps referred to a nosing A^3 at the front and rear ends of each step or platform. This nosing is preferably constructed so as to be elastic in order that it may prevent the formation of spaces or cracks between the adjacent steps when the elevator changes its course from one of the larger circles, hereinabove described, to a smaller circle. Such elasticity on the part of the nosing may be had by constructing the nosing of some elastic material, such as rubber. I may find it preferable in practice, however, to provide a positive adjustment to adapt the nosing to the changes in relative position of the adjoining steps, and one form of such positive adjustment I have illustrated in the drawings. Toward the middle of the under side of each step or platform is mounted a short upright shaft T in any suitable manner, the lower end of which shaft carries a toothed wheel T', so placed as to engage with a toothed rack T^2, secured to the track q' at those points where it is desirable to effect the adjustment of the nosing. The upper end of the shaft T is provided with a small toothed pinion T^3, which engages with the sliding toothed bars T^4, held within the guides T^5 upon the bottom of the step. The outer edge U of the nosing is rigidly attached to or is made integral with a flat plate U', pivoted under the edge of the step or platform at one end, as at u^2. The free end of the plate U' is bolted to an enlargement u of the rod T^4, which enlargement is adapted to slide backward and forward in the guides u'. Between the outer edge of the nosing U and the edge of the top of the step proper are mounted two or more spring-bars V V', one end of each thereof being rigidly attached, as at $v\ v'$, the other ends being free to slide horizontally upon the pin

W as a guide in such manner that they tend to divide up into equal spaces the distance between the outer nosing U and the edge of the top of the platform. The whole of this mechanism is so arranged that the adjustment of the nosing will adapt itself to the changes in distance between the adjacent steps.

Between those two portions of my elevator which run horizontally and parallel to each other upon the second floor, as shown in Fig. 1, I arrange a hand-rail Y. (Shown in Figs. 1 and 2.)

In Fig. 23 I have shown in plan an arrangement of turnstiles for controlling entrance to and exit from the elevator and a device for compelling passengers to leave the elevator. These devices, in case they be employed, will preferably be located at such a point as X upon the first floor. The elevator at this point moves horizontally in the direction indicated by the arrow in Fig. 23. At the said point X the hood L, with its wainscoting and hand-rail, is curved outward, forming an angular projection L′ across the direction of travel of the elevator. As the passenger arrives upon the first floor and approaches from the right, as shown in Fig. 23, this barrier, formed by the projection L′, the said passenger is supposed to step from the elevator onto the floor 29. In case he does not so do, however, he is carried forward against the said barrier, whereupon the resultant of the diagonal motion of the wainscoting and ~~the forward move~~ment of the elevator will be to push the passenger sidewise from the said elevator upon the floor 29. Arrived upon the said floor the passenger will leave the elevator by one of a series of exit-turnstiles 30, of ordinary construction, adapted to turn in but one direction. (Indicated by the arrows.) Entrance to the elevator is to take place through the passage-ways 31, formed and separated from each other by the railings 32. At the entrance to each passage-way is stationed a turnstile 33, which consists of a vertical shaft 34, mounted in suitable bearings, one of which, 35, is located below the floor and the other, 36, upon the floor. Upon the upper end of the shaft 34, which may extend from three to four feet above the floor, is mounted a collar 37, to which are pivoted to move in vertical planes the arms 38, preferably four in number. A hollow column 39 surrounds that portion of the shaft 34 which extends above the floor and is provided at its upper end with a cam device 40, which lies directly underneath and close to the collar 37. The cam 40, commencing with the vertical edge, is cut away abruptly at 41 and is sloped outward again to its original edge at 42. Mounted upon the upper end of the shaft 34 and extending downward to cover the collar 37 and cam 40 I construct a hemispherical hood 43, provided with slots 44 opposite to the arms 38 and adapted to permit the arms to rise upward to a horizontal position. From this description of the construction it will be apparent that as the shaft 34 is turned in the direction of the arrow of Fig. 25, each of the arms 38 will drop into a vertical position when it reaches the point 41 and will be brought upward again into a horizontal position as it passes over the part 42 of the cam 40. This construction is economical of space and permits the arrangement of the passages 31 close together and side by side.

That portion of the floor at the end of each passage-way 31 nearest to the elevator is constructed in the form of a pivoted float or trap 45, hinged to the floor proper at the points 46 upon one of its edges. To the bottom of the float 45 I attach a bracket 47, to which is pivoted one end of a lever 48. The said lever is pivotally supported upon the post 49, and its remaining end is pivoted to one end of the bell-crank lever 50. The said bell-crank lever 50 is pivotally supported from the bracket 51. Its remaining end is pivotally connected to the bar 52, which is adapted to slide back and forth horizontally in the guides 53. This sliding bar 53 is provided at its ends with downwardly-projecting forked arms 54 and 55. The forked arm 54 engages with a sleeve 56, which is made integral with or rigidly adapted to the bevel-gear 57. The said sleeve 56 and gear 57 are keyed upon the shaft 58 and at the same time are adapted to slide horizontally upon the said shaft while remaining so keyed thereto. The horizontal shaft 58 ~~is~~ mounted in suitable bearings 59, and on its end opposite to that which carries the gear 57 is mounted the sprocket-wheel 60, which lies in the path of and is adapted to be rotated by the passage of the chain-bars D. The downwardly-projecting forked arm 55 engages with the sleeve 61, to which is attached the bevel-gear 62, the said sleeve and gear being loosely mounted upon the stub-axle 63. I preferably adapt the said gear 62 to rotate in only one direction upon the said axle by means of a pawl 65 and ratchet device 66 or any equivalent construction. The vertical turnstile-shaft 34 carries near its lower bearing a bevel-gear 64, adapted to mesh with the gear 57 or with the gear 62, according to with which one the said gear 64 is in engagement. The operation of these devices is as follows: When there is no weight upon the float 45, the gear 57 engages with the gear 64 and the turnstile-shaft 34, with its arms, is rotated by the movement of the elevator. When a passenger passes through the rotating turnstile 33 and steps upon the floor 45, the downward movement of the float throws the gear 57 out of engagement with the gear 64 and brings the gear 62 into engagement with the said gear 64. The turnstile thereupon ceases to rotate. Moreover, by the pawl-and-ratchet device attached to the gear 62 the turnstile is locked against any further rotation in the same direction. Inasmuch, however, as the gear 62 is free to turn one way the turnstile can be rotated in a direction opposite to that

of its normal movement by a passenger who has once entered, but wishes to return without going upon the elevator.

The float 45 is provded with any convenient spring device which will restore it to its normal position when not carrying any weight. In some cases I may find it desirable to give to the said spring device such tension that it will require the weight of two intending passengers instead of the weight of but one to depress the float and throw the gear 57 out of engagement with the gear 64. This construction may be adopted when the platforms A are adapted to the accommodation of two passengers each. The said spring device for restoring the float to its normal position and recommencing the rotation of the turnstile is constructed to operate in combination with a dash-pot or other equivalent device, which will be so regulated that the passenger who wishes to return through the turnstile without going upon the elevator will be given sufficient time for so doing before the turnstile recommences its rotation, as aforesaid.

It will be evident from a consideration of the mode of operation of the above-mentioned turnstiles controlling the entrance to the elevator that they are designed to act synchronously, as it were, with the traveling surface of the elevator or other conveying apparatus, so as to prevent the crowding upon the conveying apparatus of more than a certain number of passengers, a feature which is evidently very desirable, and I desire to claim such a construction broadly without any limitation as to the exact form of mechanism or construction to be employed therein.

To illustrate the construction last above described, I show in Fig. 24 a dash-pot 67, surrounded by a coiled compression-spring 68, the upper end of which is attached to the piston 69 of the dash-pot. The said piston 69 is pivoted to the lever 48, above described.

The passages 31 are arranged, as shown in Fig. 23, obliquely to the direction of movement of the elevator at that point. This arrangement is for the purpose of causing the passenger to have a movement in the same direction as the movement of the elevator and of approximately the same speed at the point where he enters upon the elevator.

The preceding description and the accompanying drawings, illustrating the same, are restricted to one specific form of construction for embodying the principles of my invention. My invention is not therefore limited to this or any other specific form; but

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

1. As an elevating apparatus, endless circular tracks which have the form of a double spiral comprising two or more endless curves when projected on a horizontal plane, the said tracks through part of their length being horizontal, through part inclined; an endless series of interconnected platforms adapted to move along the said tracks; means for moving the said platforms; and devices adapted to keep the said platforms in a horizontal position throughout their movement.

2. As an elevating apparatus, endless circular tracks extending horizontally on a certain level, ascending to a second level, extending horizontally thereon, ascending to a third level, extending horizontally thereon, descending to the said second level, again extending horizontally thereon, descending to the said first level, and extending horizontally thereon to the starting-point, the whole forming a double spiral, the one circle of which in horizontal projection lies within the other; an endless series of interconnected platforms adapted to move along the said tracks; and devices adapted to keep the said platforms in a horizontal position throughout their movement.

3. In an elevating apparatus, an endless series of interconnected platforms, A, provided with the wheels B^3 B^4, and the rollers C^6; tracks, g', through part of their extent horizontal, and through part inclined, upon which the said wheels are adapted to move; secondary inclined tracks, I^2, mounted over the inclined portions of the tracks g'; short guide-tracks, H, adapted to receive the rollers C^6 and guide the said wheels B^4 upon the secondary tracks I^2, whereby the said platforms remain severally horizontal throughout their movement; and means for moving the said series of platforms.

4. In an elevating apparatus, an endless series of interconnected platforms provided with the wheels B^3 and B^4 and with the rollers C^6; tracks g' through part of their extent horizontal, through part inclined, adapted to receive the said wheels; secondary tracks, I^2, mounted above the inclined portions of the tracks g'; short guide-tracks, H, adapted to receive the rollers C^6 and guide the wheels B^4 onto the tracks I^2; upthrust-tracks I^3 against which wheels B^3 are adapted to bear, located beyond the end of each ascent and before each descent of the tracks; and means for moving the said series of platforms.

5. In an elevating apparatus, an endless series of interconnected platforms provided with the wheels B^3 and B^4, and with the rollers C^6; tracks g' through part of their extent horizontal, through part inclined, adapted to receive the said wheels; tracks I^2 mounted above the inclined portions of the tracks, g'; short guide-tracks, H, adapted to receive the rollers C^6, and guide the wheels B^4 onto the tracks I^2; upthrust-tracks, J, against which the rollers C^6 are adapted to bear, located before the beginning of each ascent of the tracks; and means for communicating movement to the said series of platforms.

6. In an elevating apparatus, an endless series of interconnected platforms provided with the wheels B^3 and B^4, and with the rollers C^6; tracks g' through part of their extent horizontal, through part inclined, adapted to receive the said wheels; tracks I^2 mounted

above the inclined portions of the tracks, *g'*; short guide-tracks, H, adapted to receive the rollers C^6, and guide the wheels B^4 onto the tracks I^2; upthrust-tracks, J located before the beginning of each ascent of the tracks, against which the rollers C^6 are adapted to bear; upthrust-tracks, I^3, against which the wheels B^3 are adapted to bear, located beyond the end of each ascent and before each descent of the tracks; and means for communicating movement to the said series of platforms.

7. In an elevating apparatus, an endless series of interconnected platforms provided with the wheels B^3 B^4, and with the axle-bar, C, offset connections C^3, and rollers C^6; tracks *g'* adapted to receive the wheels B^3 B^4, through part of their extent horizontal, through part inclined; secondary tracks I^2 mounted above the inclined portions of the tracks *g'*; guide-tracks, H, adapted to receive the rollers C^6, and guide the wheels B^4 upon the secondary tracks I^2; upthrust-tracks I^3 projecting within the offset portions C^3 of the roller-supports, and adapted to bear against the wheels B^3; and means for moving the said series of platforms.

8. In an elevating apparatus, an endless series of interconnected platforms, provided with the wheels B^3 B^4, and with the axle-bar C', offset connections C^3 and rollers C^6, whereby the axles of the wheels and rollers may be brought in the same horizontal plane on the inclined parts of the tracks *g'*; tracks *g'* adapted to receive the wheels B^3 and B^4, through part of their extent horizontal, through part inclined; secondary tracks I^2 mounted above the inclined portions of the tracks *g'*; guide-tracks H adapted to receive the rollers C^6 and guide the wheels B^4 upon the secondary tracks I^2; and means for moving the said series of platforms.

9. In an elevating apparatus, an endless series of platforms, A, provided with wheels, B^3 B^4; tracks, *g'*, upon which the said wheels are adapted to move, through part of their extent horizontal, through part inclined; secondary tracks I^2 mounted above the inclined portions of the tracks *g'*; devices adapted to guide the wheels B^4 upon the tracks I^2; connecting-bars, D, pivoted at their opposite ends to centrally-disposed supports carried by the adjoining platforms; and means for moving the said series of platforms.

10. In an elevating apparatus of the general type described, the steps A; connecting-bars D pivotally secured at opposite ends to the adjacent platforms; and means for moving the platforms.

11. In an elevating apparatus of the general type described, the platforms A; the centrally-disposed axle-bars C'; the chain-bars D connecting the adjacent platforms, and provided with teeth, and sprocket-wheels adapted to engage with the said teeth and communicate motion to said platforms.

12. In an elevating apparatus of the general type described, the platforms A; the centrally-disposed axle-bars C'; the chain-bars D pivotally connected therewith, and provided with the teeth D^2 and D^3; and the sprocket-wheels E^5, provided with the flanges, *e*, and teeth, *e'* adapted to engage with the said chain-bars and supply motion to the said platforms.

13. In an elevating apparatus of the general type described, the series of platforms A; the chain-bars D connecting the adjacent platforms; automatic means for changing the length of the chain-bars; and means for moving the platforms.

14. In an elevating apparatus of the general type described, the series of platforms A adapted to move over two or more curves of different radii; chain-bars D connecting the adjacent platforms and on opposite sides thereof, the chain-bars upon one side of the said platforms being connected at one end by a swiveled attachment, at the other by a screw-threaded attachment; automatic devices adapted to rotate the said chain-bars and change the length thereof; and means for moving the said series of platforms.

15. In an elevating apparatus of the general type described, adapted to move over two or more curves of different radii the series of platforms A; the chain-bars D connecting the adjacent platforms and on opposite sides thereof, these chain-bars upon one side of the platforms A being each connected at one end by a swiveled attachment, at the other by a screw-threaded attachment; projections mounted upon the sides of the said chain-bars; a pinion, F^5, adapted to engage with the said projections and rotate the said chain-bars; means for supplying movement to the said pinion from the movement of the apparatus; and means for moving the apparatus.

16. In an elevating apparatus of the general type described, a series of platforms A adapted to move over two or more curves of different radii; chain-bars D provided with teeth, D^2, connecting the adjacent platforms and on opposite sides thereof, the chain-bars upon one side of the said platforms being each connected at one end by a swiveled attachment, at the other by a screw-threaded attachment; a pinion F^5 adapted to engage with the said teeth D^2 and rotate successively the chain-bars D; the sprocket-wheel, F, adapted to engage with and be rotated by successive chain-bars D; devices connecting the sprocket-wheel F with the pinion F^5; and means for supplying movement to the said elevating apparatus.

17. In an elevating apparatus of the general type described, a series of platforms A adapted to move over two or more curves of different radii; the chain-bars D connecting the adjacent platforms and on opposite sides thereof, the chain-bars upon one side of the platforms being each connected at one end by a swiveled attachment, at the other by a screw-threaded attachment; teeth, D^2 and D^3,

mounted upon the said chain-bars, substantially as described; the sprocket-wheel F, adapted to engage with and be rotated by the successive chain-bars; means for transmitting the movement of the sprocket-wheel F to a pinion F^5; the pinion F^5 adapted to engage with and rotate the chain-bars D; the sprocket-wheels, E^5, adapted to engage with the chain-bars D, and communicate motion to the apparatus.

18. In an elevating apparatus substantially as described, the series of platforms A; chain-bars D; teeth D' D^2 D^3; the sprocket-wheels E^5; the sprocket-wheels F; the pinion F^5; connections between the said sprocket-wheels F and the said pinion F^5, constructed and operating substantially as described.

19. In an elevating apparatus of the general type described, the combination, with a series of tracks or ways comprising horizontal and inclined portions, of a series of movable steps coöperating with said ways and having their tread-surfaces horizontal to form a continuous landing on the horizontal portions of the tracks and a moving stairway on the inclined portions, the tread-surfaces of the steps each having a portion in the center of the step, but not extending to the edges of the adjacent step, constructed differently from the rest of the tread-surface so as to make it evident to a person standing on the steps, when they form a continuous landing, whether or not he is standing upon a single step or upon more than one, substantially as and for the purpose specified.

20. In an elevating apparatus of the general type described, the combination, with a series of tracks or ways comprising horizontal and inclined portions, of a series of movable steps coöperating with said ways and having their tread-surfaces horizontal to form a continuous landing on the horizontal portions of the tracks and a moving stairway on the inclined portions, the tread-surfaces of the steps each being provided with a raised mat A' in the center of the step, but not extending to the edges of the adjacent steps, so as to make a pronounced depression between the adjacent steps when they form a continuous landing, whereby the passenger will know whether or not he is standing upon a single step, substantially as and for the purpose specified.

21. In an elevating apparatus of the general type described, the combination, with a series of tracks or ways comprising horizontal and inclined portions, of a series of movable steps coöperating with said ways and having their tread-surfaces horizontal to form a continuous landing on the horizontal portions of the tracks and a moving stairway on the inclined portions, and a rail A^2 upon each step adapted to afford support to a passenger standing upon the step, substantially as and for the purpose described.

22. In an elevating apparatus of the general type described, the platforms A provided with tread-surfaces, portions of each of which are expansible, for the purpose specified.

23. In an elevating apparatus of the general type described, the platforms A provided with expansible nosings A^3, for the purpose specified.

24. In an elevating apparatus of the general type described, adapted to move along curves of different radii the platforms A; the adjustable nosings, A^3; and automatic devices adapted to adjust the said nosings to fill the intervals between the said platforms.

25. In an elevating apparatus substantially of the type described, the platforms A; the pivoted nosing-plate, U U'; and automatic means for adjusting the free end of the said plate to fill the interval between the adjacent platforms.

26. In an elevating apparatus of the type described the platforms A; the pivoted nosing-plate, U U'; the rod, T^4; the tooth-pinion, T^3; the ratchet-wheel, T'; and the stationary rack, T^2, operating substantially in the manner and for the purpose described.

27. In an elevating apparatus substantially of the type described, the platforms A; the pivoted nosing-plate, U U'; the spring-bars, V V'; and means for adjusting the free end of the pivoted plate, operating substantially in the manner and for the purpose described.

28. In an elevating apparatus of the general type described, the platforms A; the risers A^4; and the springs, a^4, adapted to hold the said risers in contact with the adjacent platforms.

29. In an elevating apparatus of the general type described, the platforms A; the nosings, A^3; the pivoted risers, A^4; and the springs, a^4, adapted to hold the free edges of the risers in contact with the nosings, substantially as described.

30. In an elevating apparatus of the general type described, the platforms A; the expansible nosings, A^3; the risers, A^4, pivotally attached at their upper edges to the said platforms; and the springs, a^4, adapted to hold the lower and free edges of the risers in contact with the expansible nosings of the adjacent platforms.

31. In an elevating apparatus, a series of platforms, A, in combination with endless wainscotings at the sides of the said platforms but separate therefrom, adapted to move with the said platforms along part of the travel of the said platforms, in the general manner described.

32. In an elevating apparatus, a series of platforms adapted to move upon an incline in combination with wainscotings adapted to move at the sides of and at the same rate of speed as the said platforms.

33. In an elevating apparatus, a series of platforms adapted to move upon an incline; a wainscoting adapted to move by the sides of and at the same rate as the said platforms; and hand-rails carried by, and moving with the said wainscoting.

34. In an elevating apparatus of the general type described, the hoods, L; the traveling wainscoting, O; and the hand-rail, S^2, operating in the general manner and for the purpose described.

35. In an elevating apparatus of the general type described, a wainscoting adapted to travel at the sides of the said apparatus along the inclined portions of the same, the said wainscoting comprising an endless belt, N'; a series of panels, O, attached to the said belt; and pulleys N, adapted to support and move the said belt.

36. In an elevating apparatus of the general type described, wainscotings mounted at the sides of the inclined portions of the said apparatus, the said wainscotings comprising the panels, O; the endless belt, N', vertically-sliding connections between the said panels and the said belt; guides, P', for the said panels; and pulleys, N, adapted to support and move the said belt.

37. In an elevating apparatus of the general type described, the hoods, L, open on the sides adjacent to the said apparatus; the endless wainscoting, O, adapted to move with the said elevating apparatus, and return in a contrary direction within and inclosed by the said hoods.

38. In an elevating apparatus of the general type described, a traveling wainscoting comprising the shafts, M^4; the pulleys, N; the belt, N'; the panels, O; vertically-sliding connections between the said panels and the said belt; rollers, P'; tracks upon which the said rollers move; and means for communicating motion to the said shaft, M^4, from the movement of the rest of the apparatus.

39. In an elevating apparatus of the general type described, the traveling hand-rail device comprising the shafts, M^4; means for communicating motion to the said shafts from the movement of the rest of the apparatus; sprocket-wheels R^2, carried by the said shafts; sprocket-chain, R'; rollers attached to the said sprocket-chain; guides for the said rollers; arms carried by the said rollers; and an endless hand-rail, S^2, carried by the said arms.

40. In an elevating apparatus of the general type described, the sprocket-wheels, M; the vertical shafts, M^4; connections between said sprocket-wheels and said shafts; pulleys, N; the endless belt, N'; wainscoting-panels, O; sprocket-wheels, R^2; the sprocket-chain, R'; rollers, R; guides for the said rollers; and the brackets, R^3, connecting the said rollers and the wainscoting-panels, O, constructed substantially in the manner and for the purpose specified.

41. In an elevating apparatus, a series of moving platforms, A, in combination with entrance-passages, 31, arranged at an incline to the direction of movement of the said conveying apparatus, substantially as described and for the purpose specified.

42. In an elevating apparatus of the general type described, the turnstiles, 33, adapted to control the admission of passengers; and devices for communicating the movement of the conveying apparatus to rotate the said turnstiles.

43. In an apparatus of the class described, the continuously-moving conveying-surface, with entrance mechanism operated automatically and synchronously therewith to regulate the number of entrances in accordance with the capacity of the conveying-surface.

44. In an apparatus of the class described, the continuously-moving conveying-surface, with a turnstile operated automatically and synchronously therewith to regulate the number of passages in accordance with the capacity of the conveying-surface.

45. In an apparatus of the class described, the continuously-moving conveying-surface, with a turnstile operated automatically and synchronously therewith by the same source of power to regulate the number of passages in accordance with the capacity of the conveying-surface.

46. In an apparatus for conveying passengers of the general type described, the passage-way, 31; the turnstile, 33; the pivoted float, 45; devices for communicating the movement of the conveying apparatus to rotate the said turnstile; and devices connected to the float adapted to break the said communication when the float is depressed.

47. In an apparatus for conveying passengers of the general type described, a device for controlling entrance to the said apparatus comprising a rotating turnstile, 33, carrying a gear, 64; a shaft, 58, rotated by the movement of the apparatus; a gear-wheel, 57, adapted to slide upon and turn with the said shaft; a pivoted float, 45; and devices connecting the said float with the said gear, 57, adapted to throw it out of engagemont with the gear, 64, when the said float is depressed.

48. In an apparatus for conveying passengers of the general type described, a device for controlling entrance to the said apparatus comprising the passage-way, 31, a turnstile, 33; a float, 45 held yieldingly in a normal position; a shaft, 58; the gear-wheel, 57, adapted to slide on and move with the said shaft; the gear-wheel, 62, locked against rotation in one direction; the sliding bar, 52, connected with the gears 57 and 62; the gear-wheel, 64, mounted upon the turnstile-shaft; and lever devices connecting the said float with the said sliding bar, 52, all constructed and operating substantially in the manner specified.

49. In a conveying apparatus, a series of moving platforms A, connected to move together, with horizontal and inclined ways for said platforms, in combination with a device for compelling the landing of passengers consisting of a wainscoting O moving diagonally across the path of the platforms upon a horizontal portion of the ways, substantially as and for the purpose described.

50. In a conveying apparatus for conveying passengers, a series of moving platforms

in combination with a shunting device consisting of a wainscoting, and a hand-rail, S^3, moving across the path of the said platforms at the point of exit, substantially as described.

51. In an elevating apparatus, a series of platforms having tread-surfaces and connections between said platforms to which the propelling power is applied forming an endless carrier, with ways leading to and from different horizontal planes, said ways being so constructed and arranged as to retain the platforms with their tread-surfaces uppermost throughout their movement.

52. In an elevating apparatus, a series of platforms having tread-surfaces, links to which the propelling power is applied connecting said steps and forming an endless carrier; with ways leading to and from different horizontal planes, said ways being so constructed and arranged as to retain the platforms with their tread-surfaces uppermost throughout their movement.

53. In an elevating apparatus, a series of platforms having tread-surfaces and connections between said platforms to which the propelling power is applied forming an endless carrier, with inclined ways leading to and from different horizontal planes, said ways being so constructed and arranged as to retain the platforms with their tread-surfaces horizontal and uppermost throughout their movement.

54. In an elevating apparatus, a series of platforms having tread-surfaces, links to which the propelling power is applied connecting said steps and forming an endless carrier; with inclined ways leading to and from different horizontal planes, said ways being so constructed and arranged as to retain the platforms with their tread-surfaces horizontal and uppermost throughout their movement.

55. In an elevating apparatus, the series of platforms having tread-surfaces, means for propelling said platforms, and ways leading to and from different horizontal planes, said ways being so constructed and arranged as to retain the platforms with their tread-surfaces uppermost and available for transportation throughout their entire movement and without interfering with adjacent platforms, substantially as described.

56. In an elevating apparatus, the series of platforms having tread-surfaces, means for propelling said platforms, and ways leading to and from different horizontal planes, said ways being so constructed and arranged as to retain the platforms with their tread-surfaces uppermost, horizontal, and available for transportation throughout their entire movement, substantially as described.

57. In an elevating apparatus, the series of platforms having tread-surfaces, means for propelling said platforms, and ways leading to and from different horizontal planes, said ways provided with means to retain the platforms with their tread-surfaces uppermost and free from interfering with adjacent platforms, substantially as described.

58. In an elevating apparatus, the series of platforms having tread-surfaces, means for propelling said platforms, and ways leading to and from different horizontal planes, said ways being curved throughout their length and constructed so as to retain the platforms with their tread-surfaces uppermost and free from interfering with the adjacent platforms, substantially as described.

59. In an elevator, a movable stairs and landing comprising a series of steps, and tracks or guideways having inclined and horizontal portions, the inclined portion being curved, the steps on the horizontal portion of the guideway having their upper surfaces in alinement and forming a movable level landing of practically unbroken continuity, and forming winding stairs on the inclined portions.

60. In an elevator, a movable stairs and landing comprising a series of steps, and tracks or guideways having inclined and horizontal portions, the horizontal portion being curved, and the steps when on the horizontal portion of the guideway having their upper surfaces in alinement and forming a movable level landing of practically unbroken continuity

61. In an elevator, a movable stairs and landing comprising a series of steps, and tracks or guideways having inclined horizontal portions curved throughout their length, the steps on the horizontal portion of the guideway having their upper surfaces in alinement and forming a movable level landing of practically unbroken continuity, and forming winding stairs on the inclined portion.

62. In an elevator, a movable stairs and landing comprising a series of steps, and tracks or guideways curved throughout a portion of their length and having inclined and horizontal portions, the steps on the horizontal portion of the guideway having their upper surfaces in alinement and forming a movable level landing of practically unbroken continuity.

63. In an elevator, a movable stairs and landing comprising a series of steps, and tracks or guideways curved through a portion of their length, the steps on the horizontal curved portion of the guideway having their upper surfaces in alinement and forming a movable landing of practically unbroken continuity.

64. In an elevating apparatus, a series of platforms having tread-surfaces; means for moving said platforms; and substantially circular tracks for said platforms, which tracks have the form of a double spiral comprising two or more endless curves when projected on a horizontal plane, the said tracks connecting different horizontal planes, and arranged to keep the tread-surfaces uppermost throughout the movement of said platforms

65. In an elevating apparatus, substantially circular tracks which have the form of a double spiral comprising two or more endless curves when projected on a horizontal plane, the said tracks connecting different horizontal planes; a series of platforms adapted to move along said tracks; and means for moving said platforms, substantially as described.

66. In an elevating apparatus, substantially circular tracks which have the form of a double spiral comprising two or more endless curves when projected on a horizontal plane, the said tracks connecting different horizontal planes; a series of platforms adapted to move along the said tracks; means for moving said platforms; and devices for keeping said platforms in a horizontal position throughout their movement.

CHARLES D. SEEBERGER.

Witnesses:
H. GORDON STRONG,
ALOYSIA HELMICH.