(No Model.) 5 Sheets—Sheet 1.

C. M. HOLLINGSWORTH.

PASSENGER RAILWAY SYSTEM.

No. 474,657. Patented May 10, 1892.

Fig 1.

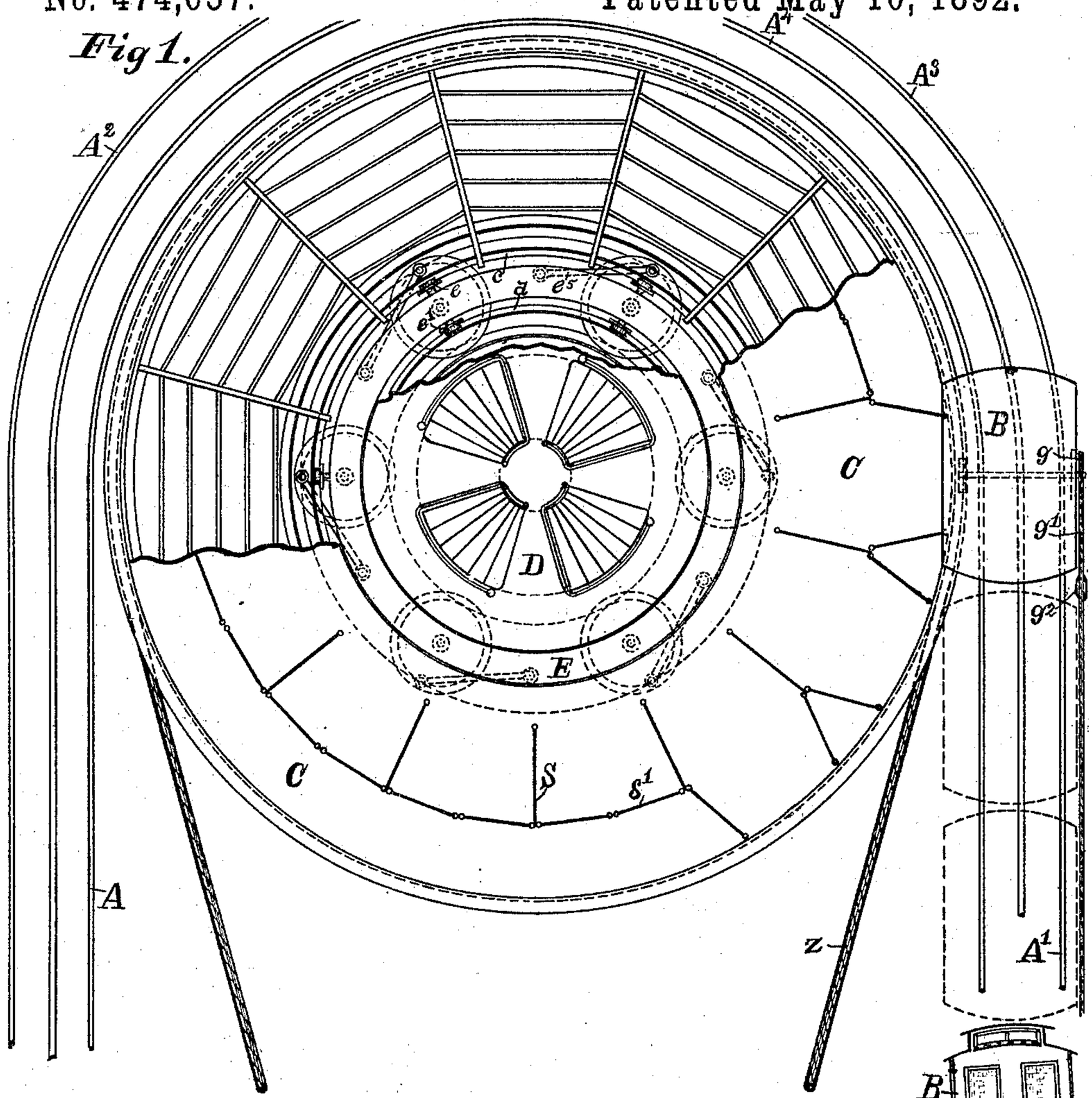


Fig 2.

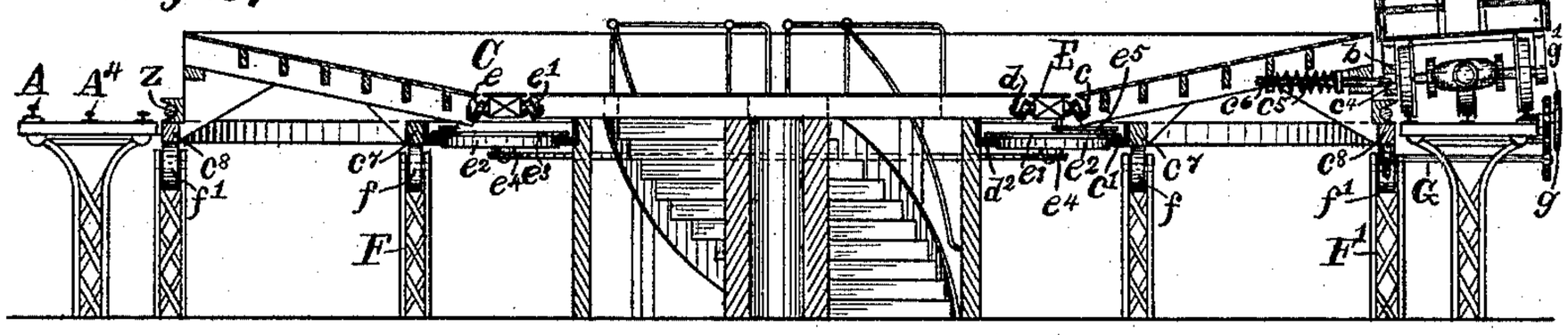
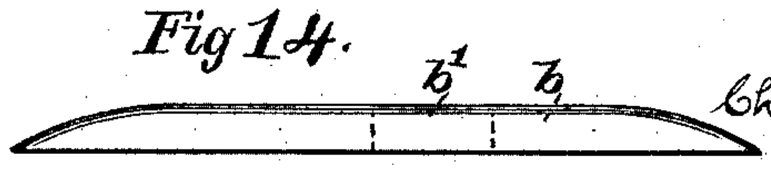


Fig 14.



WITNESSES.

Frank. Weiller.

Albert H. Bates

INVENTOR.

Charles M. Hollingsworth

By his attorney

E. L. Thurston

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 5 Sheets—Sheet 2.

C. M. HOLLINGSWORTH.

PASSENGER RAILWAY SYSTEM.

No. 474,657. Patented May 10, 1892.

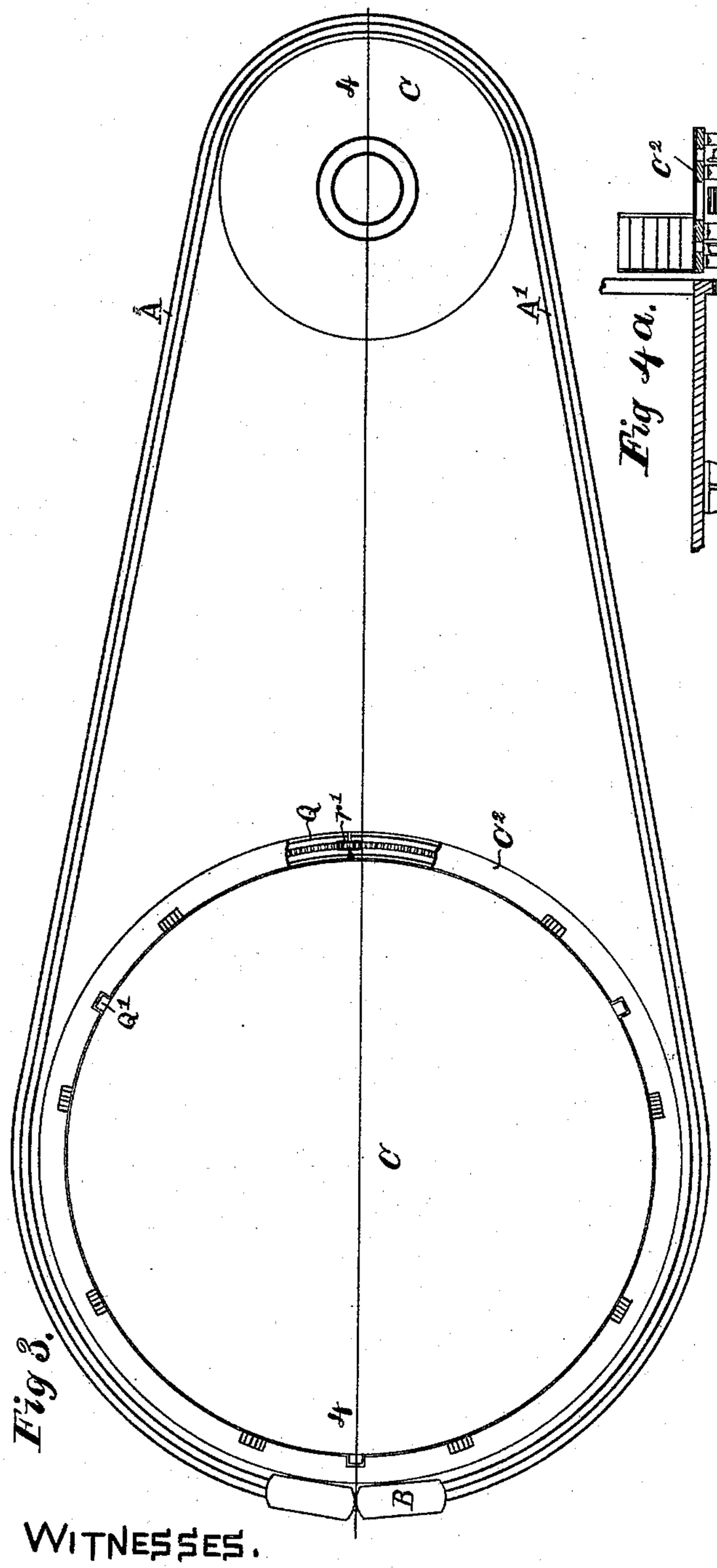


Fig 3.

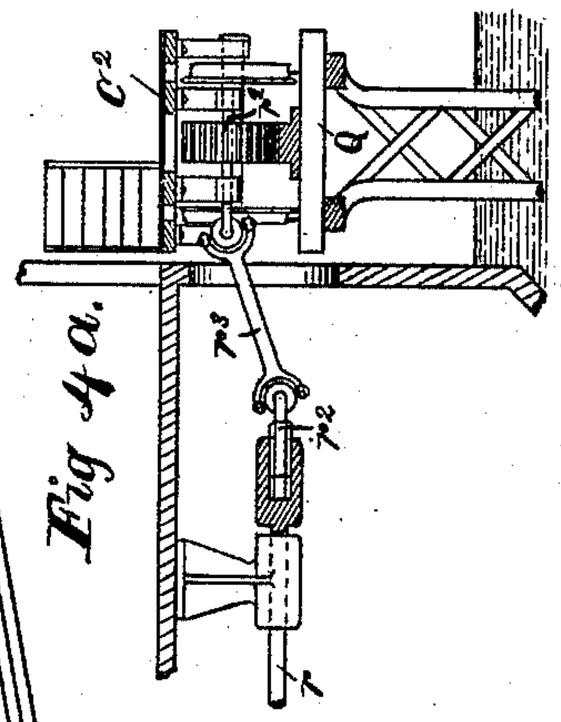


Fig 4a.

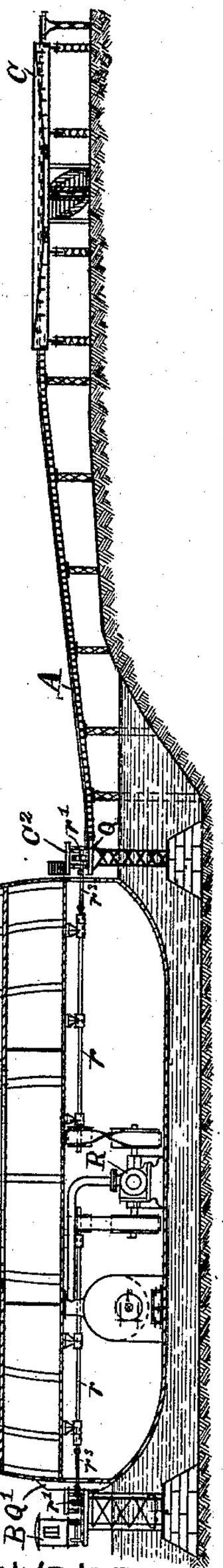


Fig 4.

WITNESSES.

Frank. Moiller.

Albert H. Bates

INVENTOR.

Charles M. Hollingsworth

By his attorney

E. L. Thurston

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 5 Sheets—Sheet 3.

C. M. HOLLINGSWORTH.

PASSENGER RAILWAY SYSTEM.

No. 474,657. Patented May 10, 1892.

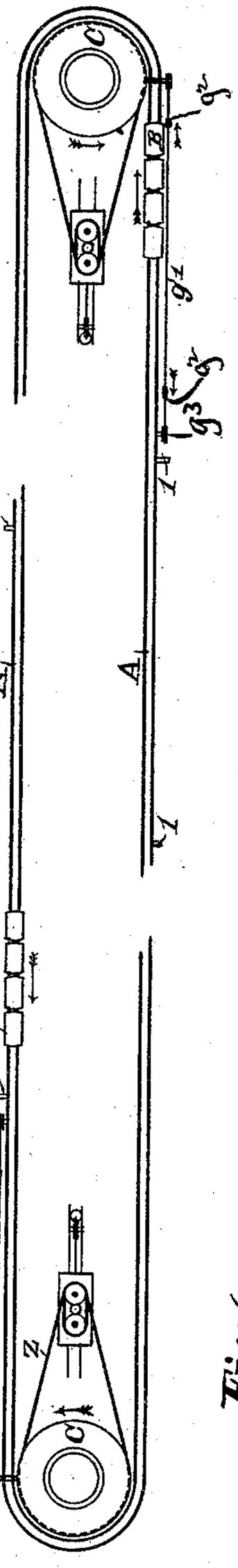


Fig 5.

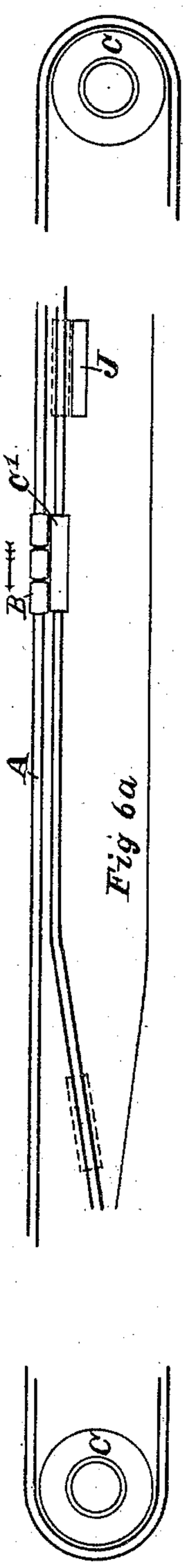


Fig 6a

Fig 6.

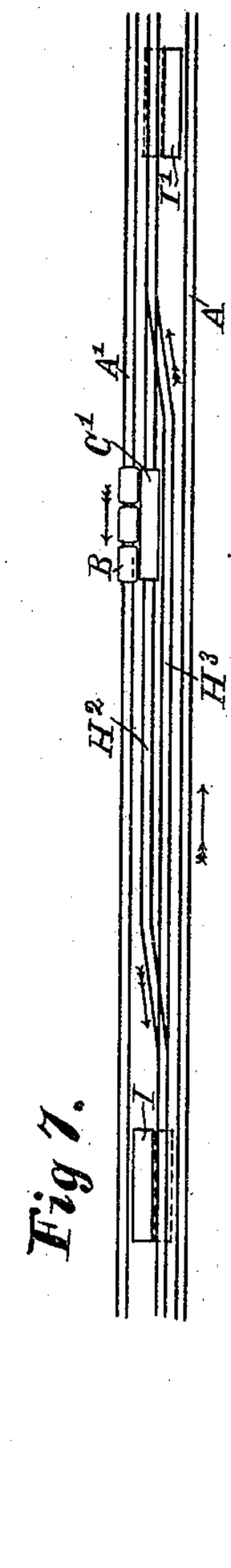


Fig 7.

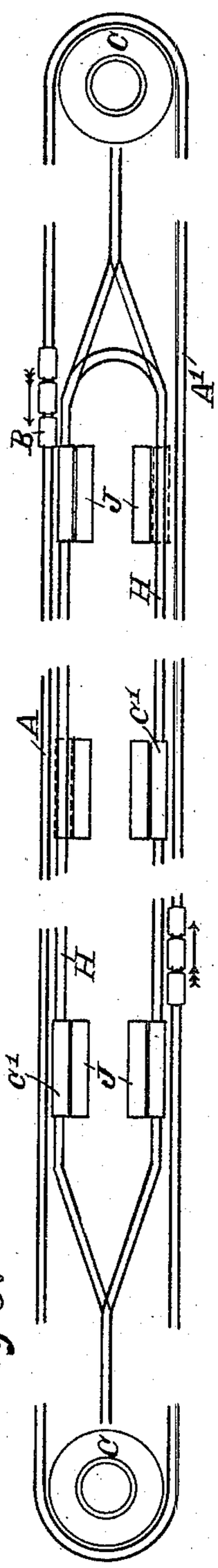


Fig 8.

WITNESSES.

Frank. Mfiller.

Albert H. Bates

INVENTOR.

Charles M. Hollingsworth

By his attorney

E. L. Thurston

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 5 Sheets—Sheet 4.

C. M. HOLLINGSWORTH.

PASSENGER RAILWAY SYSTEM.

No. 474,657. Patented May 10, 1892.

Fig 9.

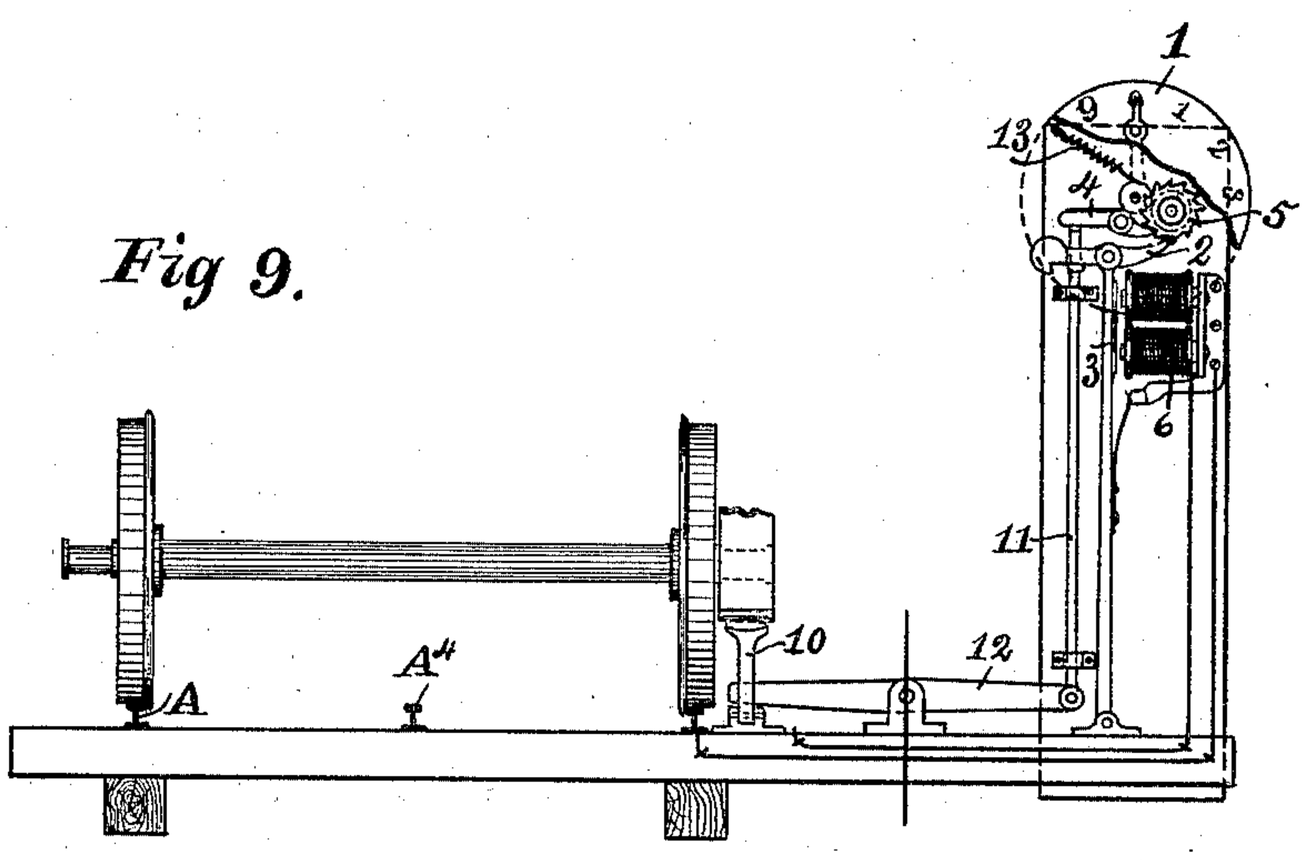


Fig 10.

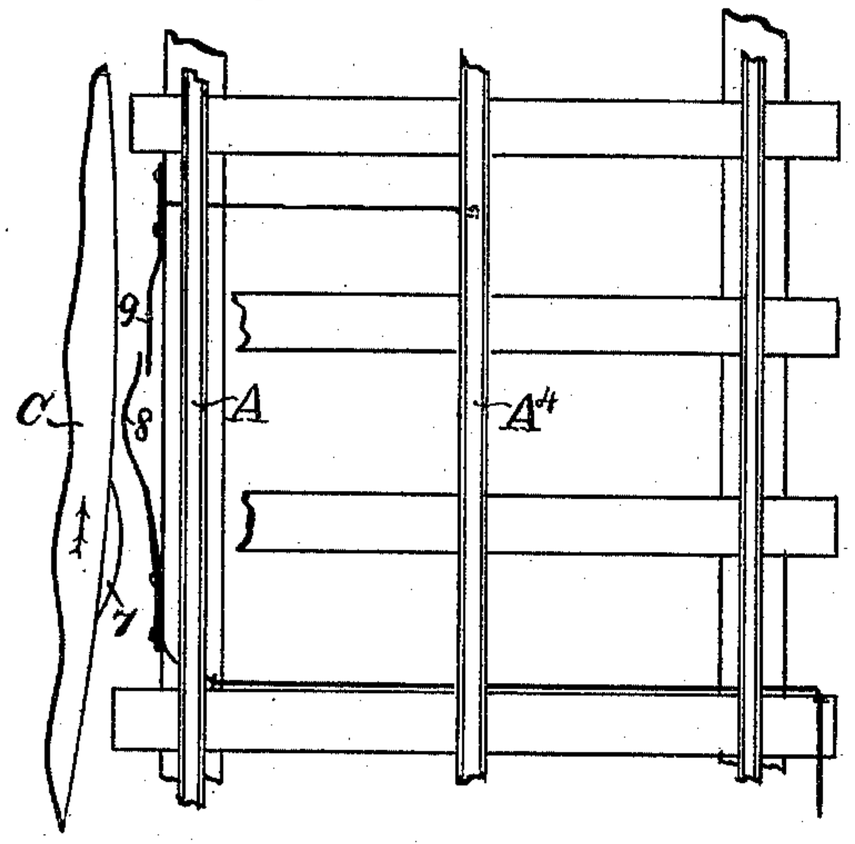
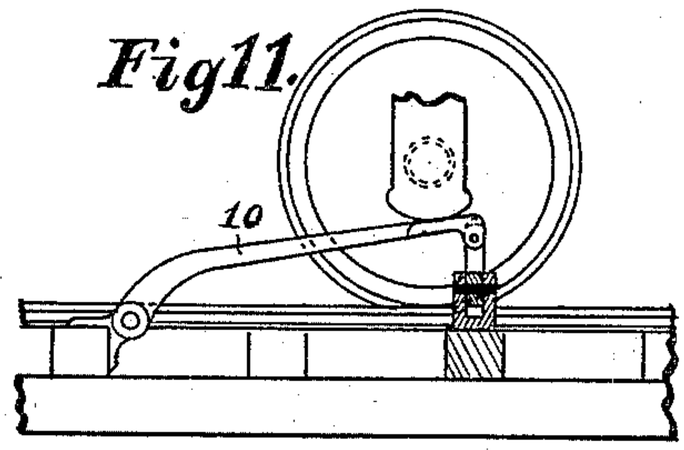


Fig 11.



WITNESSES.

Frank. Miller.

Albert H. Bates.

INVENTOR.

Charles M. Hollingsworth

By his attorney

C. L. Thurston

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 5 Sheets—Sheet 5.

C. M. HOLLINGSWORTH.

PASSENGER RAILWAY SYSTEM.

No. 474,657. Patented May 10, 1892.

Fig 12.

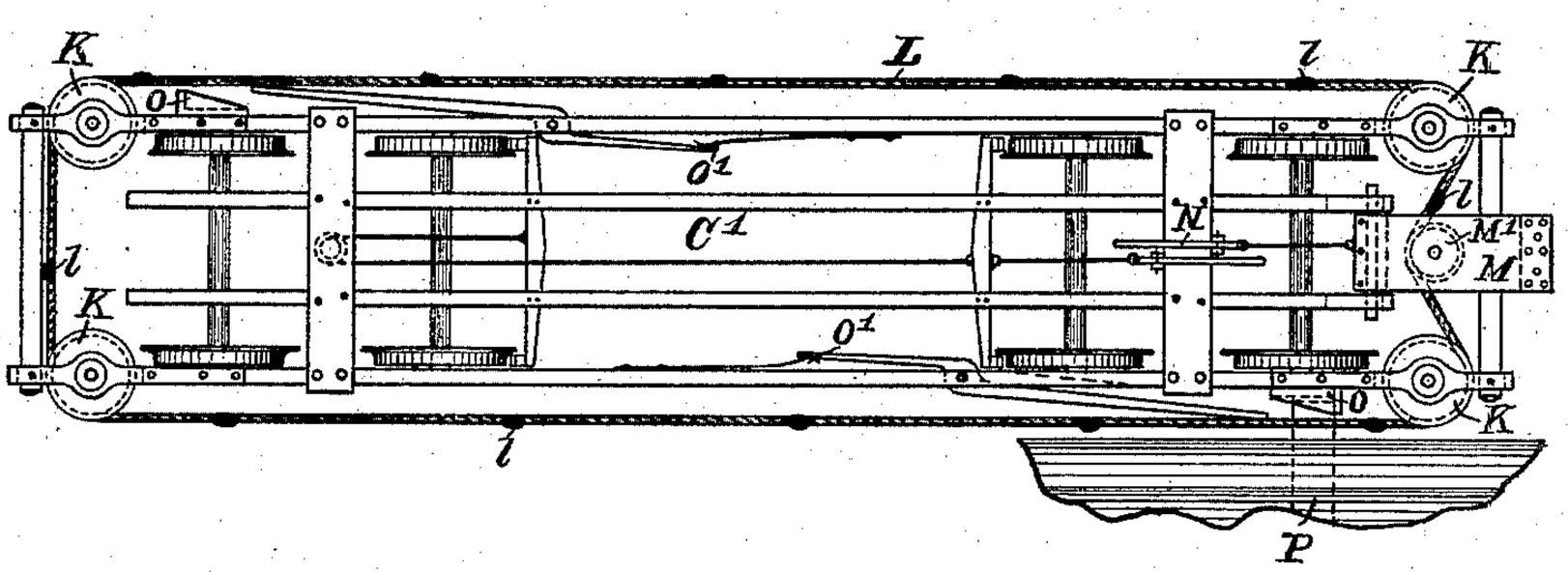
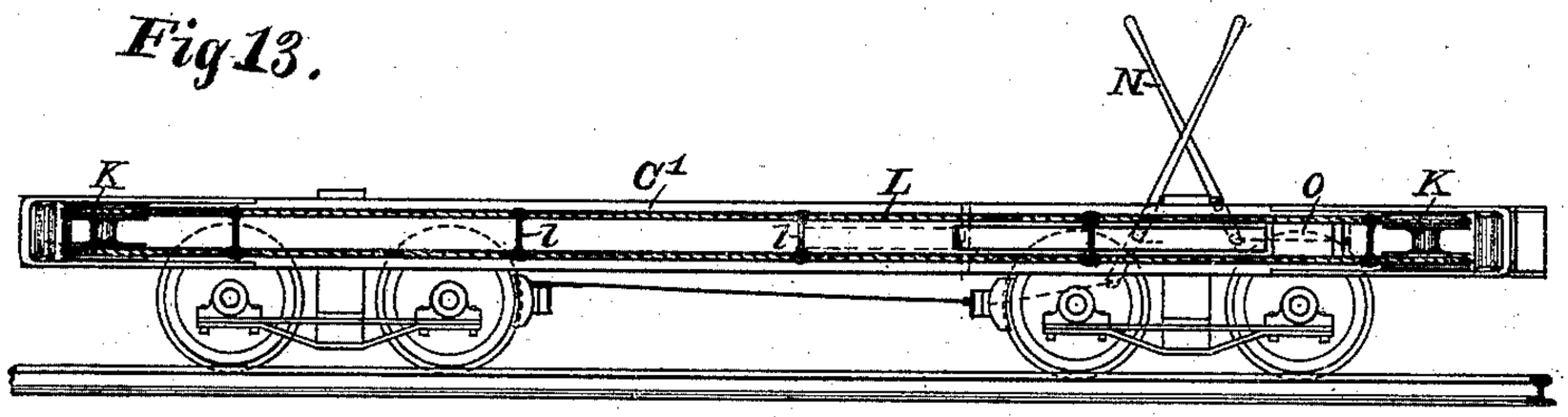


Fig 13.



WITNESSES.

Frank. Mfiller.

Albert H. Bates

INVENTOR.

Charles M. Hollingsworth

By his attorney

E. L. Thurston

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

CHARLES M. HOLLINGSWORTH, OF CLEVELAND, OHIO.

PASSENGER-RAILWAY SYSTEM.

SPECIFICATION forming part of Letters Patent No. 474,657, dated May 10, 1892.

Application filed July 20, 1891. Serial No. 400,157. (No model.)

To all whom it may concern:

Be it known that I, CHARLES M. HOLLINGSWORTH, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Passenger-Railway Systems, of which the following is a specification.

My invention relates to railway systems in which passengers are transferred to and from moving trains by means of revolving circular platforms properly placed with relation to the train-tracks; and it consists in the combination of parts hereinafter described, and definitely pointed out in the claims.

In the drawings, Figure 1 is a plan view of what I now consider to be one of the best constructions for a terminal of the system. Fig. 2 is a vertical sectional view of the same. Fig. 3 is a plan view of a form of the system which includes at one end a modified form of a terminal station—viz., a floating station to and from which passengers may pass only by way of the cars. Fig. 4 is a vertical section on the line 4 4 of Fig. 3. Fig. 4ª is a detached view of the mechanism for revolving said platform. Fig. 5 is a plan view of one complete system which has no way-station shown. Fig. 6 is a plan view of a system having one variety of tracks upon which the transfer-platform runs. Fig. 6ª is a profile of the said transfer-platform tracks. Fig. 7 is a plan view of another arrangement of transfer-platform tracks. Fig. 8 is a plan view of a system having still another arrangement of said tracks. Fig. 9 is a view transversely of the main tracks, showing a signaling apparatus. Fig. 10 is a plan view of the means for moving the signal-arm in one direction. Fig. 11 is a side view of a track-section, showing the mechanism by which each train may cause the signaling arm or pointer to be returned to the zero-point. Fig. 12 is a plan view, and Fig. 13 a side elevation, of one form of movable transfer-platform adapted to be used in transferring passengers between way-stations and the moving trains. Fig. 14 is a top view of the barb which is attached to the car.

I will now proceed to describe the system as illustrated in the drawings, referring to the parts by reference letters and figures.

A A′ represent the main tracks upon which the through trains run, and which for convenience I will call the "up" and "down" tracks, respectively. These tracks are connected at their ends by curved tracks A^2 A^3, thereby forming one continuous track, around which trains may run indefinitely.

B represents the continuously-moving train, which may be propelled by any kind of motor. As shown, however, the train is propelled by an electric motor mounted on one car and receiving the current from a center rail A^4.

C C′ represent revolving circular platforms, which are placed between the tracks A A′, one at each end of the line, and in such relation to the connecting-curves A^2 A^3 that a train traveling around said curve will move so close to said platform that a person may readily step from one to the other.

I have based the construction and intended mode of operation of the circular platform as a means for passing to and from a moving train, primarily, on the fact that the angular motion at the center of a revolving circular platform is *nil* and increases as the radial distance from the center to the circumference increases. A body supported on such a platform gradually acquires tangential motion in moving toward the circumference and gradually loses tangential motion in moving toward the center of rotation. Thus one may, if suitable means are provided, get onto a revolving circular platform near the center of rotation without material disturbance to one's balance, and then by moving away from the center gradually and imperceptibly acquire the greater movement of the outer edge of the platform.

As shown in Figs. 1 and 2, the platform C is in the form of a ring, which surrounds a central stationary platform D. Both platforms are elevated, and a person may reach the stationary platform by passing under the moving platform to stairs which lead to the stationary platform. The platform C has on its under side and near its outer and inner edges, respectively, the circular beams c^7 c^8, which serve as tracks and rest upon the friction-rollers f f', which are mounted on the columns F F′, arranged in circles about the

axis of rotation. The platform is revolved by the driven cable Z, which lies in a peripheral groove, or by any other appropriate mechanism.

Intermediate of the stationary platform D and the revolving platform C is an intermittently-movable ring-shaped platform E. On both the outer and inner edges of the platform E is mounted a series of rollers or wheels $e\,e'$, which rest, respectively, on the flange c on the platform C and the flange d on the platform D. By these means the platform E is supported with its upper surface at the level of the proximate edges of the platforms C and D.

A series of horizontal wheels $e^2\,e^2$, each having a flange e^3, which rests upon flanges c' on the platform C and d^2 on the frame of the platform D, is loosely journaled to a stiff ring e^4. This ring is sustained by its connection with the wheels, and the only function of the ring, as shown in the drawings, is to keep the wheels $e^2\,e^2$ properly spaced at the same distance from each other. Each wheel is connected by means of a pitman e^5 with the under side of the platform E. The faces of the wheels $e^2\,e^2$ bear on one side against the edge of the flange c' of the platform C and on the other side against the edge of the fixed flange d^2. The friction between the wheels $e^2\,e^2$ and the fixed flange d^2 on one side and the revolving flange c' on the other side cause said wheels to revolve. By reason of the connection above explained between the platform C and the wheels $e^2\,e^2$ said wheels move the platform E intermittently forward in the same direction that the platform C moves. When the pivots which connect the pitmen e^5 with the wheels e^2 is nearest the platform C, as shown in the drawings, the platform E will move fastest and at substantially the same angular velocity as that at which the platform C moves. When the said pivots are nearest the fixed platform D, the platform E is stationary—that is to say, as said points of connection between the wheels e^2 and pitmen e^5 are moving outward the platform E moves with increasing velocity until said points of connection are nearest to the platform C, and after that the platform E moves with decreasing velocity until it becomes substantially stationary for the instant when said points of connection are nearest the fixed platform. The platform E is therefore an intermittently-movable platform. When stationary, or nearly so, passengers may pass between it and the fixed platform D. When moving at and near its maximum speed, passengers may pass between it and the platform C. In both cases the passenger passes from one platform to a platform which is relatively fixed, or substantially so.

The draft of the cable Z upon the platform C will provide sufficient friction between the wheels $e^2\,e^2$ and the platforms C and D to insure the revolution of said wheels; but I do not intend to limit the invention herein described and claimed to a platform C when driven by a cable or any other specific mechanism nor to the combination of the continuously-moving platform C with an intermittently-movable platform which is moved by any specific mechanism. When the train B is traveling upon the curved track A^2 at the same angular rate that the platform C moves, the outer edge of the platform and the train will remain in fixed relative positions and passengers may without danger pass from one to the other.

If the motor-man in charge of the train be skillful, he can generally cause the train to move at the same angular rate as the platform; but I believe that the best practice requires some means for connecting the train with the platform, so that during the time the train is on the curve A^2 or A^3 said train and platform shall certainly move at the same angular rate and be thereby relatively fixed. I have therefore provided such means, which consist of the following parts—viz., a bar b, attached to the forward or motor car and provided with a longitudinal horizontal slot b', and a spring-actuated radially-movable bar c^6, attached to the revolving platform C. The bar c^6 has a roller on its outer end, which permits it to move with comparatively little friction upon the bar b, against which it is pushed by the spring c^5. It will rarely happen that the car will move alongside of said platform with such accuracy that the bar c^6 will immediately enter the slot b' in the bar b; but by the aid of certain visible signals, to be hereinafter explained, it may come so near it that the friction-roller c^4 will strike against the face of the bar b. Bar b may be curved or beveled at its ends to push back the bar c^6 when it misses b'. If the roller is in front of the slot b', the car will be speeded forward until the bar c^6 can be forced into said slot. If behind the slot, the car is slowed down until the said bar can be forced into the slot. In order that the car may come alongside of the platform at approximately the desired point, I provide a moving signal traveling down the track, whereby the motor-man may regulate his speed and position. A shaft G is suitably mounted in a bearing beneath the track. At one end of the shaft is secured a cog-wheel, which is revolved through its engagement with the revolving platform. The other end of the shaft is connected suitably with a sprocket-wheel or sheave g, over which runs a chain or cable g'. At a suitable distance down the track is secured a sprocket-wheel or sheave g^3, over which said chain runs. The length of the chain should be equal to the circumference of the platform C or some multiple thereof, and a point on the chain should move at the same rate as a point on the edge of the platform. One or more visible signals g^2 are attached to this chain in such a position that the motor-man may at some distance down the track bring his train into some predetermined relation to the proper signal, which, if this relation is maintained, will

cause the train to move up to the platform at approximately the place to cause the engagement of the two bars c^6 and b, as above explained. At the same time the train and the outer edge of the platform will before such engagement occurs be moving at substantially the same rate, so that no jar will be produced either on the train or platform and the two will remain relatively immovable until the train in passing from the curved to the straight track begins to separate from the platform. As this separation takes place the bar c^6 is automatically withdrawn from the slot in the bar b.

It is evident that unless the trains are of a length equal to the circumference of the platform C only a part of the edge of the platform, equal to the length of the train, is available as a means for entering and leaving the moving trains, and it is therefore necessary to be able before the train arrives to know just what part of the platform will be available for the purpose, so that passengers who wish to board the train will know where to congregate to be ready. This result is secured through having the trains so controlled that they will always come alongside of a predetermined part of the revolving platform. This is made easy in part by the signaling apparatus above explained and in part by another signaling apparatus which informs the motor-man as far down the track as desired whether or not he is coming up right to make the proper connection with the platform. This signaling apparatus consists of a dial or series of dials and associated pointers placed alongside of the track at suitable intervals and the means for operating them. The dial 1 (see Figs. 9, 10, and 11) faces the approaching train. The pointer is pinned to a central shaft, which is revolved step by step by means of a pawl 2, a lever 3, carrying an armature, and a pawl 4, and a ratchet 5, and an electro-magnet 6. The electrical circuit in which the electro-magnet is placed is closed by a boss 7 on the platform C, which presses against a metallic spring 8 at each revolution of the platform or fraction thereof, thereby pressing it against a metallic plate 9, said spring and plate being connected with the conducting-wires of the circuit. Each time the circuit is completed the electro-magnet draws the armature on the lever 3, and the pawl 2, acting on the ratchet, causes the pointer to move forward one space. In approaching the terminal platform on proper time, as determined by signals already passed, the motor-man will see the pointer of the signal which is nearest the terminal, as at X, move when he is, say, fifty feet from it, more or less, which movement of the pointer will have a definite and known relation to the movement of the traveling signals g^2. He will then know that he is at about such a distance from the platform that by running at normal speed he will come up to the signal g^2 and afterward to the platform at about the right position. The signals g^2 on the cable g', above described, will, as before explained, aid the motor-man to come to exactly the right point.

The dial-and-pointer signals above described also serve to properly distribute the trains for the following reason—viz., each train in passing one of the signals resets it to zero. Therefore when the motor-man on a train comes to a dial on which the pointer has moved forward any number of spaces he may know that the platform C has made just that many revolutions since the preceding train passed and thus if the terminal platform is made to revolve at an approximately uniform rate its revolutions, recorded by a signal placed at any point on the line, may serve as units of time to indicate whether or not a train passing the signals is making its proper time relative to the train next ahead of it. If it is desired that the trains should move at a higher speed over one part of the line than another, it is only necessary that the motor-man be definitely so instructed, so that each one on coming to this part may so increase his speed that he will arrive at and pass the signals ahead at the proper interval of time after the passage of the preceding train. For this part of the line the space-intervals between trains would be increased in proportion to the increase of speed, while the time-intervals between trains would remain the same as for other parts. It is also evident that the speed of the trains may be so varied in a definite and regular manner that they will move more slowly in passing any or all of the transfer-stations, both terminal and way stations, than on the intermediate portions of the line, the traveling signals g^2 enabling the motor-man to bring himself definitely to the proper reduced speed in approaching a terminal platform.

The means whereby each train in passing a signal resets it to zero consists of a lever 10, placed alongside of the track at a point where it will be depressed by the passing train. This lever operates a lever 12, which extends to the signal, where it is connected with a vertically-movable rod 11. This rod as it is moved up withdraws the retaining-pawl 4 and the moving-pawl 2, whereupon the pointer-shaft is revolved by a spring 13 to bring the pointer to zero.

This system of transferring passengers at way-stations may take several different forms, some of which are illustrated in the drawings. In Fig. 8 two supplemental tracks H H are provided, which lie parallel to the main tracks and extend the entire length of the line between terminals. On these tracks a transfer train or car C′ may be run. Passengers pass from the stationary platforms J to the transfer-car, which stops for the purpose. The transfer-car moves forward, and the through train comes alongside while both are in motion and continues to move alongside of the transfer-car until the passengers go from one to the other. The transfer-car then slows

down and stops at the next stationary platform J. When this mode of operation is followed, the transfer-car will preferably be propelled by an independent motor and managed by its motor-man. A passenger in no hurry can stay on the transfer-train as long as desired, but one wishing to make a quick trip goes from the transfer-train to the through train at the first opportunity and from the through train to a transfer-train just before reaching the station where he wishes to get off.

In Fig. 7 is shown another arrangement of tracks adapted to accommodate a transfer-car which moves back and forth between two adjacent way-stations. In this figure H^2 H^3 represent supplemental tracks by the side of the main tracks, which supplemental tracks are connected at the ends, as shown. I represents the stationary platform from which the "up" passengers pass to the transfer-platform and to which the "down" passengers pass from said platform, and I′ represents the stationary platform from which the "down" passengers pass to the transfer-platform and to which the "up" passengers pass therefrom. The transfer-platform may have its independent motor, or it may be constructed in the form shown in Figs. 12 and 13. This platform is mounted on suitable trucks, and it receives its motion wholly from the continuously-moving train. Mounted at the corners of the platform are the sheaves K K K K, around which runs an endless friction-belt L. At one end of the car is a longitudinally-movable frame M, in which is mounted a sheave M′, which is adapted to bear against said belt L. The frame is connected with a lever N or its equivalent, whereby a greater or less tension may be applied to the belt L. The "belt," so called, consists in the form shown of two cables, which are connected at intervals by the bridge-pieces *l l*. On each through train is a draw-head P, which strikes against one of the bridge-pieces *l*, thereby moving it forward. By a proper application of tension upon the belt L this forward movement is caused to start the platform without any considerable jar and to cause the platform to gradually acquire the velocity of the train. As the belt L moves forward faster than the platform moves, the draw-head projecting from the through train will soon move against a lug O, which projects from the side of the platform and is there retained by the spring O′, also secured to said platform, whereupon the platform and train move forward in a fixed relation to each other until the platform, following the track H on which it runs, moves away from the train. The lug O is withdrawn from its engagement with the draw-head and the platform moves over onto the track H′, when by the application of suitable brakes it is stopped alongside of the fixed platform I′. Passengers pass, as desired, in either direction between the movable platform C′ and the fixed platform I′, and the through train coming from the opposite direction engages with the movable platform, as before, and carries it back to the fixed platform I. While the train and transfer-platform move side by side passengers may pass from one to the other, as desired.

In the construction shown in Figs. 6 and 6ª the transfer-platform is carried in the direction indicated by the arrow by the moving train. After traveling with the train a considerable distance the two separate by reason of the curve in the track on which the transfer-platform runs. This track is also set on an incline, as shown by the profile view in Fig. 6ª. The grade causes the platform to stop and then roll down through the action of gravity back to the fixed platform, when the passengers get on or off, as desired.

In Figs. 3 and 4 another modification in a part of the system is shown. The revolving circular platform at one end of the line may be so constructed that there is no way of getting to and from it except by the train. Where the platform at one end is of this construction, that at the other end must have some means of getting to and from its central part without traveling on the platform itself. The construction shown in Figs. 1 and 2 may be employed at said end of the line. The platform shown at the left of Fig. 3 may be put to any desired use—as, for example, it may be used as a refreshment-pavilion or as an observatory. When sufficiently elevated, persons sitting at one point on it can as it revolves obtain a view in any direction. This platform may be in the form of a floating vessel, as shown. When so constructed, it is held in its proper relation to the tracks by a fixed ring of trestle-work Q, which surrounds it. It may be revolved by means of a motor R, which it supports. The motor drives one or more radiating shafts *r*, to the ends of which are keyed or otherwise secured the pinions *r′*. When the platform floats on the water, it is necessary to make some provision for the variation in the height of the water or in the depth to which the float sinks due to the differences in the load which it may carry.

I render the platform operative under the varying conditions by means of a ring-shaped platform C^2, mounted on trucks on the trestle Q. This ring C^2 is connected with the floating platform by vertical tongues and grooves, as at Q′. The shafts to which the pinions *r′* are secured are mounted on the ring C^2 and are connected with the shafts *r* by the mechanism shown in Fig. 4ª—viz., a shaft r^2, which enters a socket in the end of the shaft *r*, the relative revolution of said shafts being prevented by splines. A link r^3 is connected by universal joints at one end with the pinion-shaft and at the other with the trestle r^2. These pinions *r′* engage with a rack mounted on the vessel-ring Q.

The specific construction of the revolving

platform and its operating mechanism which is shown in Figs. 3 and 4 is shown for the purpose of illustrating a modification of the system wherein, as above explained, no means except the trains are provided for getting onto or from one of the revolving circular platforms. I do not in this application make any claims for the specific invention found in this form of platform, but have filed a separate application for the same, which is serially numbered 400,159.

On the platform C is a guard-rail S, located at a little distance from the edge thereof and having gates *s'*, which may be operated by an attendant. It is intended that such of the gates shall be open as are at the part of the platform alongside of which the train will move. Therefore passengers may pass through the open gates at the parts of the platform from which they may board the moving train, but not at the other parts thereof.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a railway system, a stationary circular platform and means for getting to and from the same, a revolving ring-shaped platform surrounding said stationary platform, and an intermittently-moving ring-shaped platform intermediate of said stationary and revolving platforms, with a fixed curved track outside of and extending partly around said revolving platform, and tracks A A', continuous with said curved track, substantially as and for the purpose specified.

2. In a railway system, as the means for making transfers to and from moving trains at the terminals of the line, a circular stationary platform, means for getting to and from the same, a revolving ring-shaped platform surrounding said stationary platform, and an intermittently-movable ring-shaped platform intermediate of said stationary platform and revolving platform, combined with a curved track outside of said revolving platform, a train moving thereon, and means connecting said train and revolving platform together, thereby holding them in fixed relation to each other during the time the train is on said curve, substantially as and for the purpose specified.

3. In a railway system, as the means for safely getting onto and from moving trains at the terminals of the line, a revolving circular platform, a curved track outside said platform connecting the up and down tracks, and a train moving on said curved track, combined with a spring-actuated bar and a socket adapted to receive its end, one of said parts being carried by the train and the other by the platform, substantially as and for the purpose specified.

4. The combination of a revolving circular platform, a curved track outside of said platform, and a track A, continuous with said curved track, with a movable signal and mechanism connecting said platform and signal, whereby the latter is moved and at a rate in definite relation to the rate of movement of said platform, substantially as and for the purpose specified.

5. The combination of a revolving platform, a fixed curved track outside of said platform, and a track A, from which trains may pass onto said curved track, with a signal movable alongside of said track toward said platform and mechanism connecting said platform and signal, whereby the latter is at the same velocity as that of the periphery of the platform, substantially as and for the purpose specified.

6. In a railway system, the combination of a revolving circular platform, a curved track outside said platform, and a track A, from which the trains may pass to said curved track, with an endless belt having visible signals secured thereto lying alongside of the track A, two pulleys over which the belt runs, one located near the platform, the other at a distance therefrom and alongside of the track A, and means for driving said belt at approximately the same velocity as the periphery of the platform, substantially as and for the purpose specified.

7. In a railway system, the combination of a revolving circular platform, a curved track outside of said platform, and a track A, from which trains may pass onto said curved track, with an endless belt equal in length to a multiple of the circumference of the platform, two pulleys over which said belt runs, one located near the platform, the other at a distance therefrom and alongside of the track A, a visible signal attached to said belt, and means for driving said belt at approximately the same velocity as the periphery of said platform, substantially as and for the purpose specified.

8. In a railway system, the combination of a revolving circular platform, a curved track outside said platform, and a track A, from which trains may pass onto said curved track, with a visible dial-and-pointer signaling device placed alongside the track A, an electro-magnet adapted to operate the same step by step, and means whereby the revolving platform completes the electrical circuit in which said electro-magnet is placed at suitable intervals, substantially as and for the purpose specified.

9. In a railway system, the combination of a revolving circular platform, a curved track outside said platform, and a track A, from which trains may pass to said curved track, with a series of dial-and-pointer signals alongside of the track A at suitable distances apart, an electro-magnet in connection with each signal and adapted to move the same step by step, an electrical circuit including all of said electro-magnets, and means whereby said circuit is closed at suitable intervals by said platform, substantially as and for the purpose specified.

10. The combination of a revolving circular platform, a curved track outside of said plat-

form, and a track A, continuous with said curved track, with a series of dial-and-pointer signals placed at intervals alongside of said track A, an electro-magnet connected with each signal and adapted to move the same step by step, an electric circuit including all of said electro-magnets, means whereby the circuit is closed at suitable intervals by said platform, and means whereby each signal is independently reset to zero, substantially as and for the purpose specified.

11. In a railway system, the combination of a revolving circular platform, a curved track outside said platform, a track A, from which trains may pass to said curved track, and trains traveling on said tracks, with a series of dial-and-pointer signals, an electro-magnet connected with each signal and adapted to move the same step by step, an electric circuit including all of said electro-magnets, means whereby the circuit is closed at suitable intervals by said platform, and means whereby each signal is independently reset to zero by each passing train, substantially as and for the purpose specified.

CHARLES M. HOLLINGSWORTH.

Witnesses:
E. L. THURSTON,
FRANK. MILLER.