

No. 804,046.

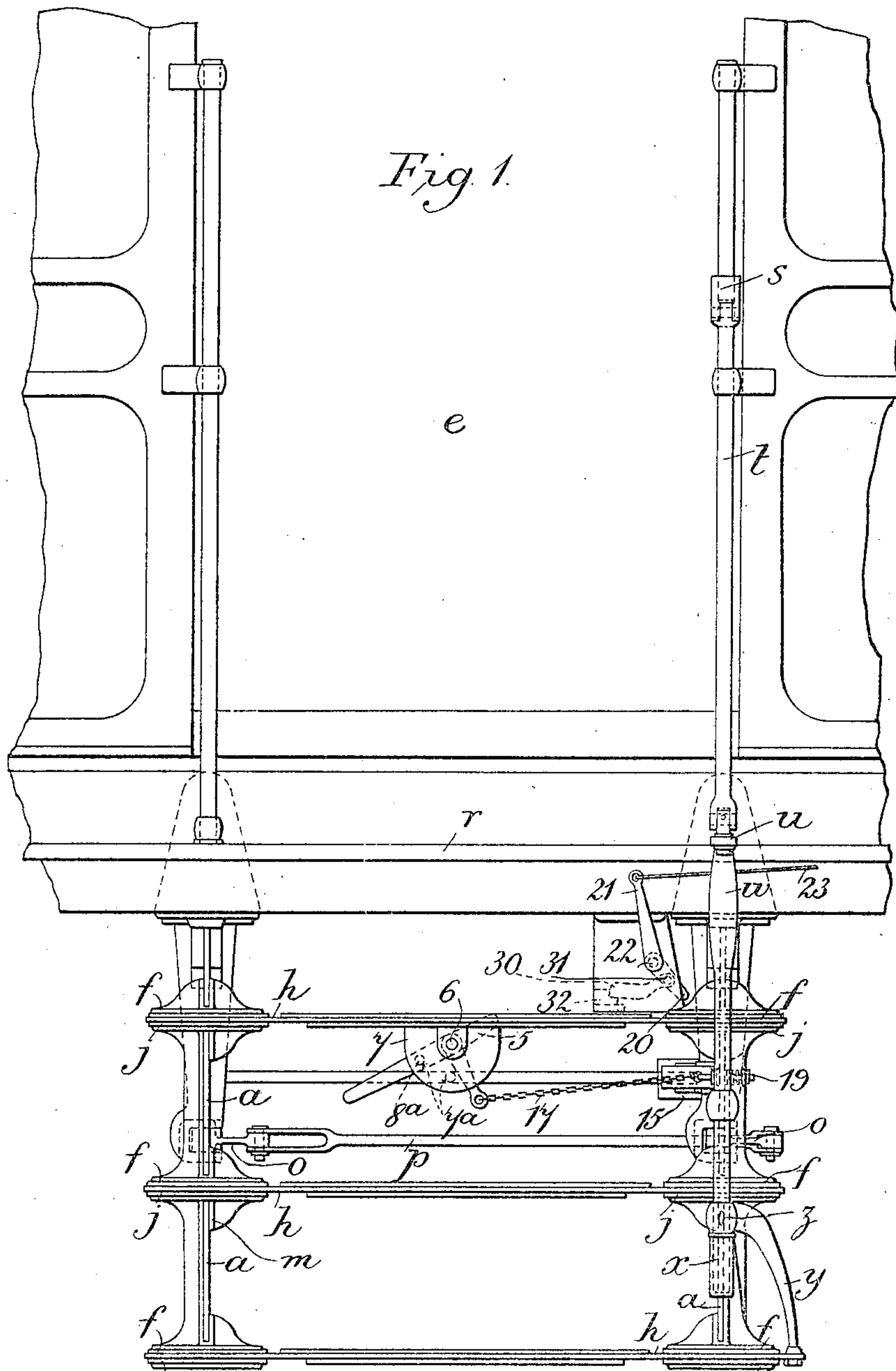
PATENTED NOV. 7, 1905.

J. G. ROBINSON.

STEPS OF RAILWAY AND TRAMWAY CARRIAGES, &c.

APPLICATION FILED JULY 22, 1905.

6 SHEETS—SHEET 1.



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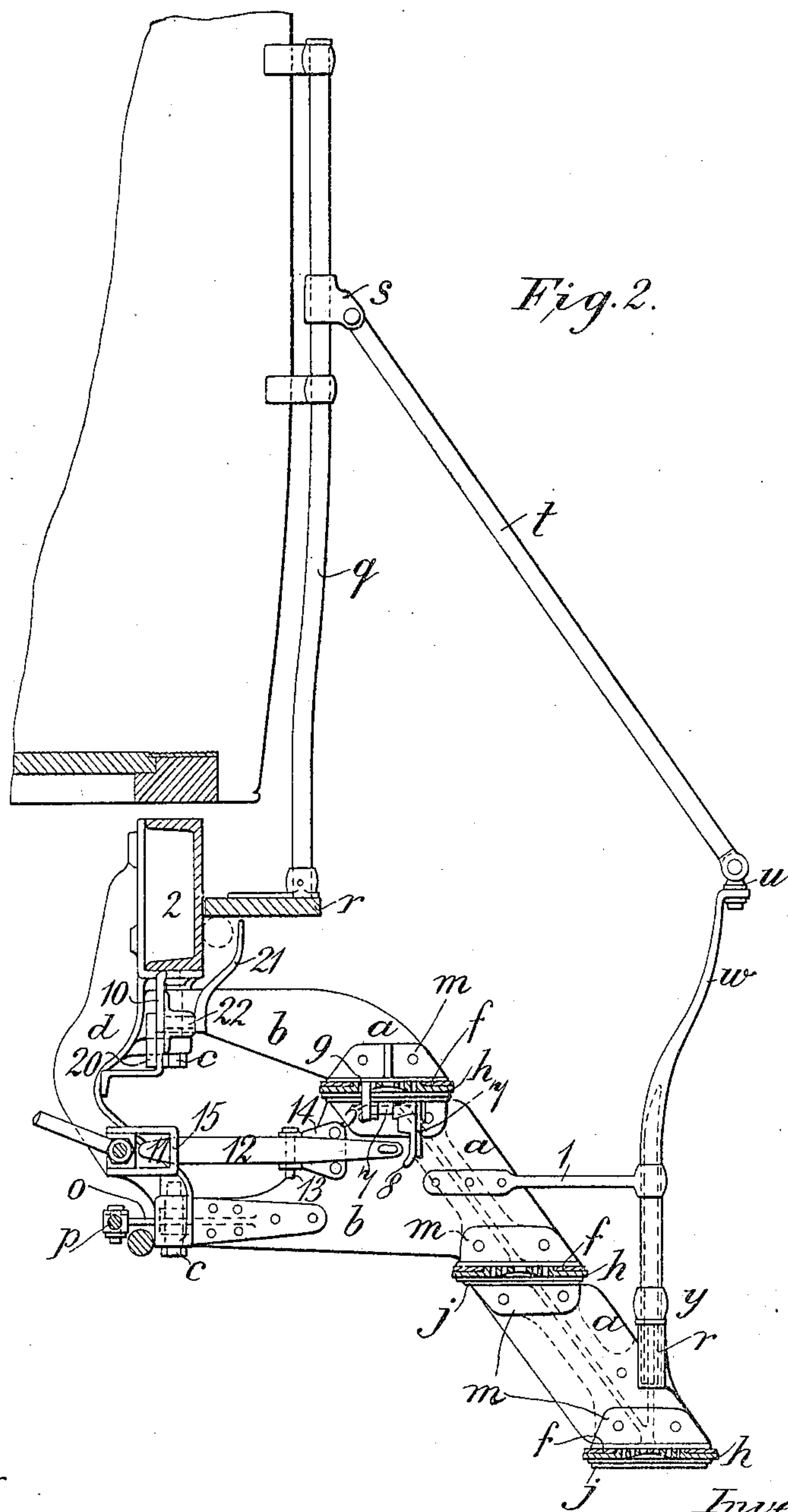
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6 SHEETS—SHEET 2.



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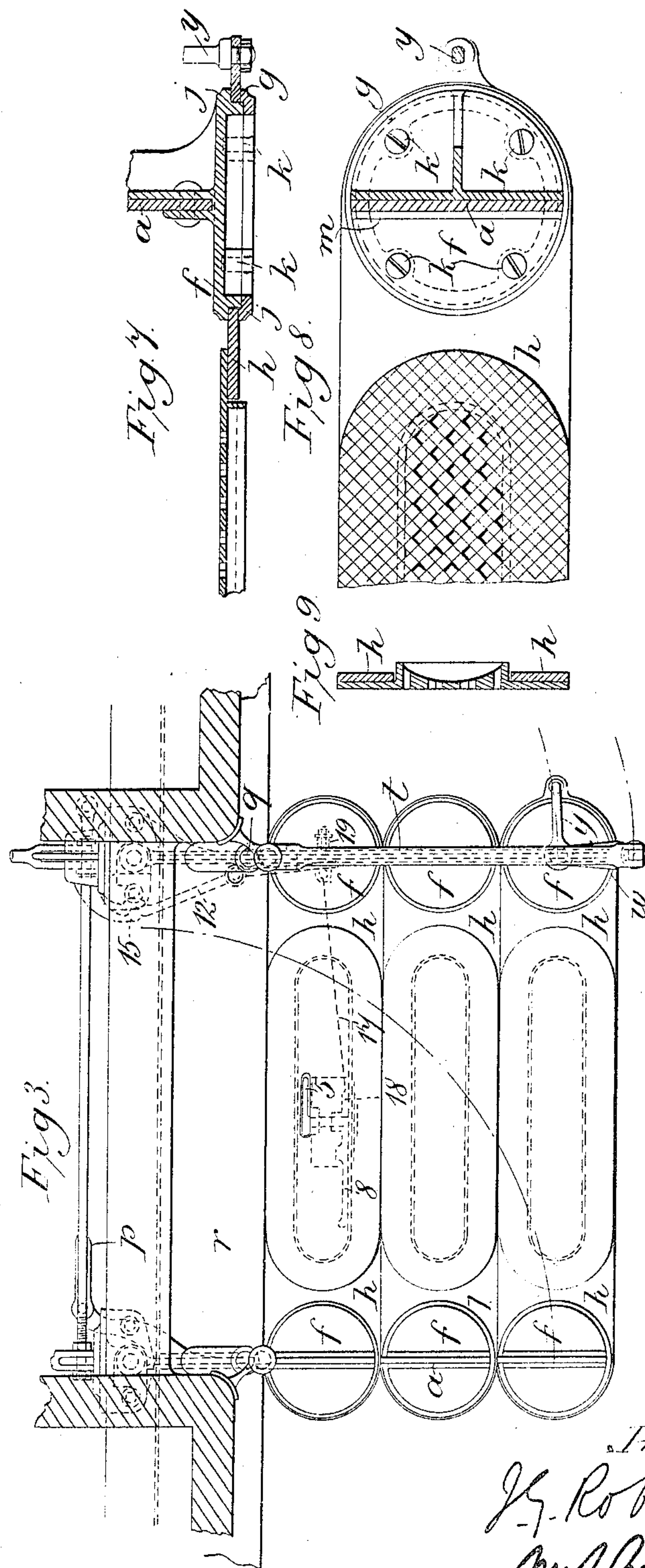
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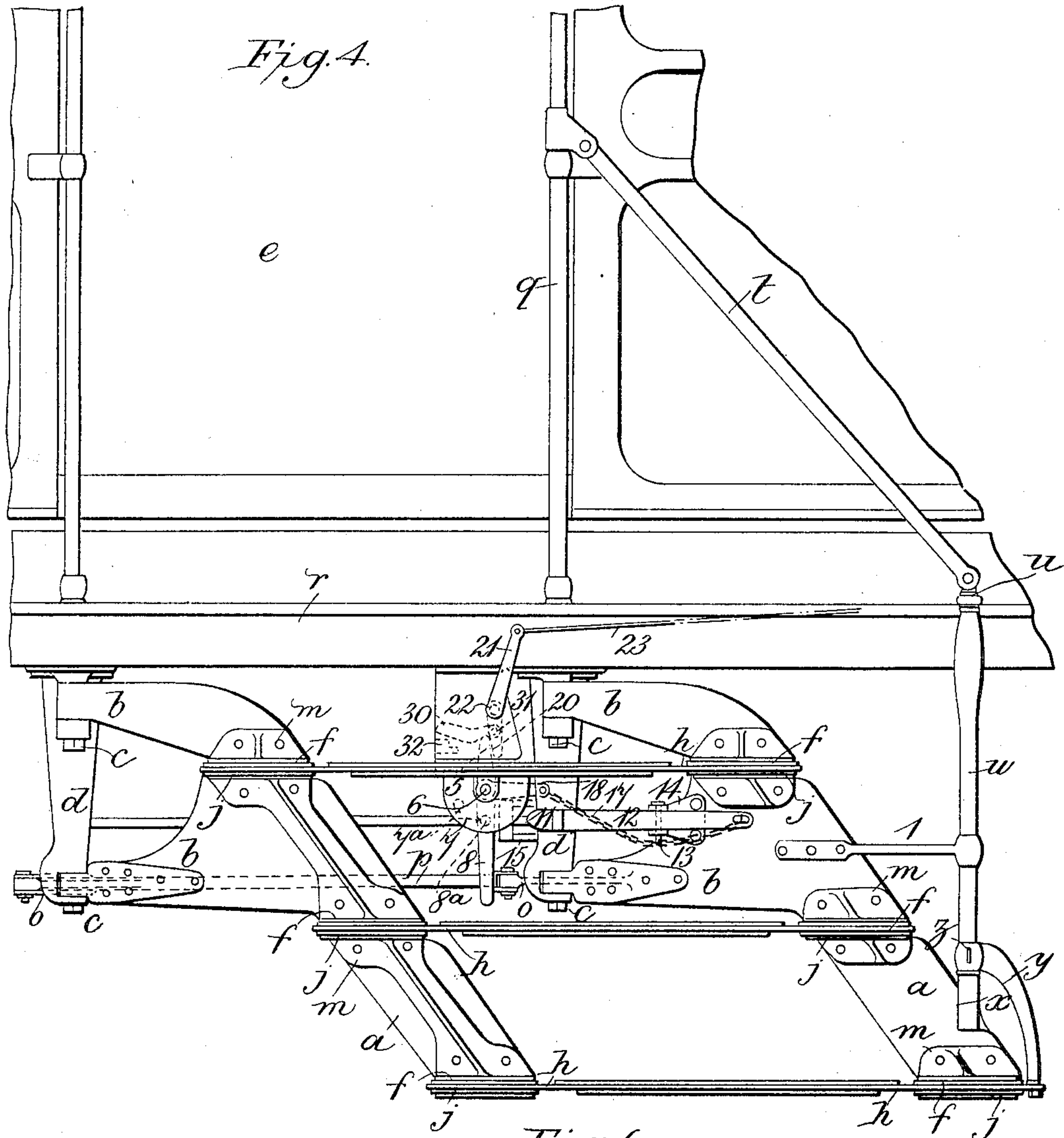
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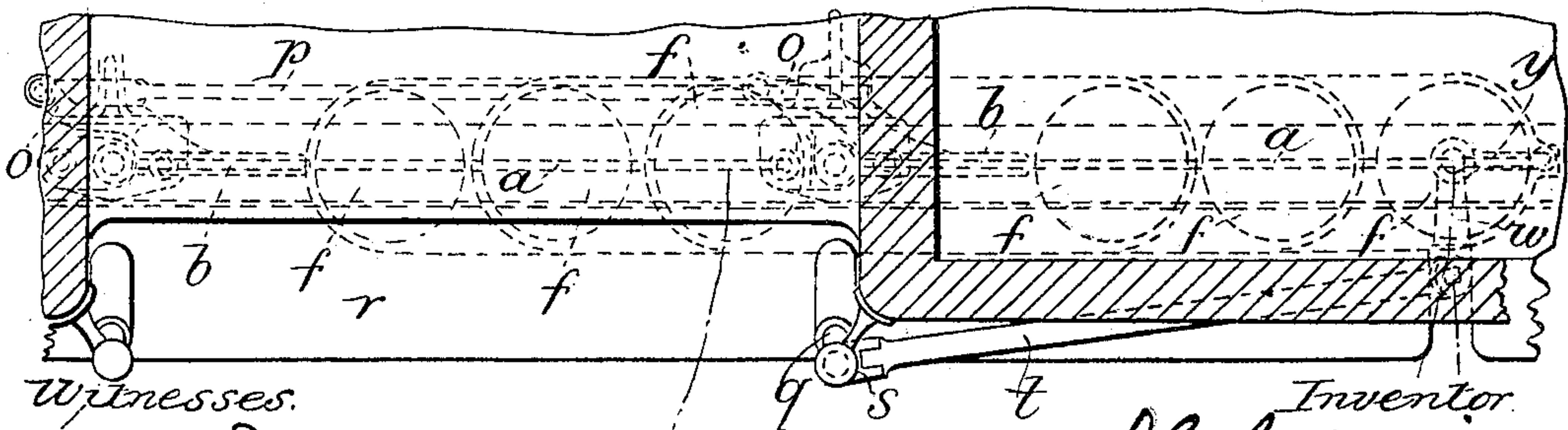
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6 SHEETS—SHEET 4.



*Fig. 6.*



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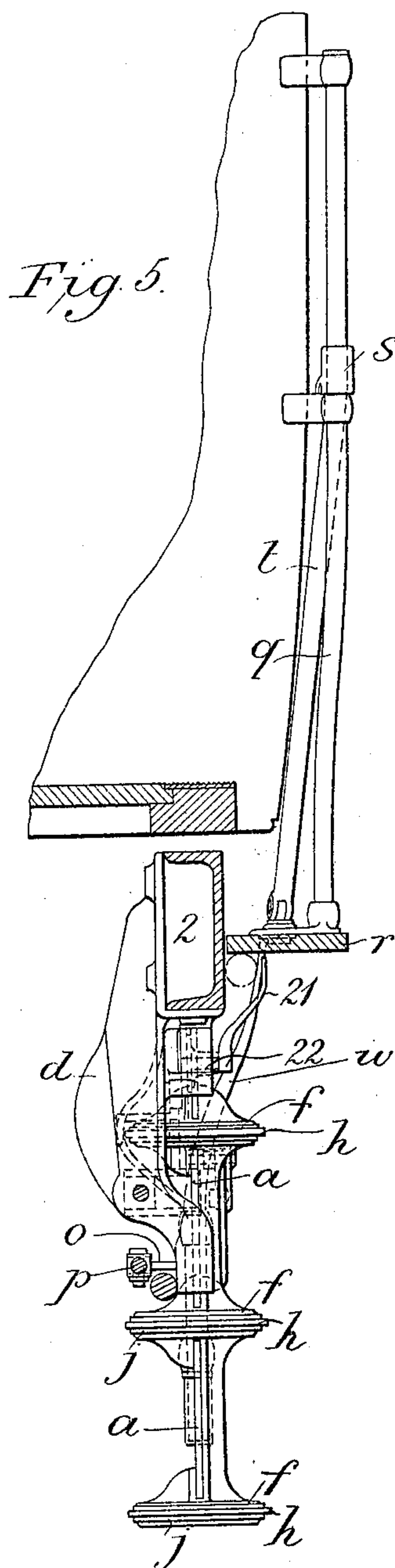
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6 SHEETS—SHEET 5.



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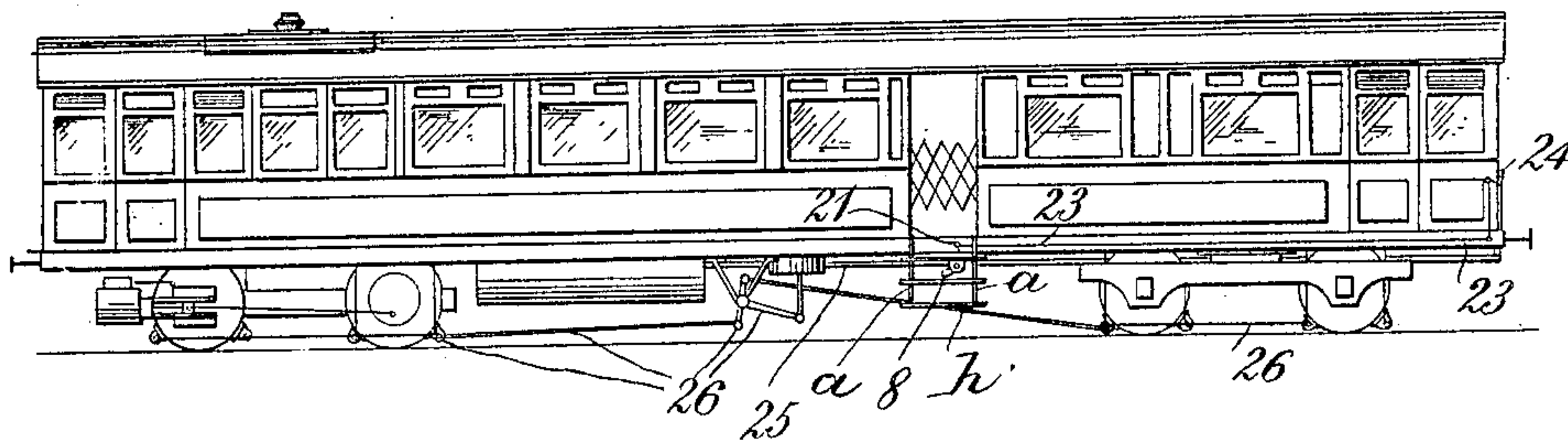
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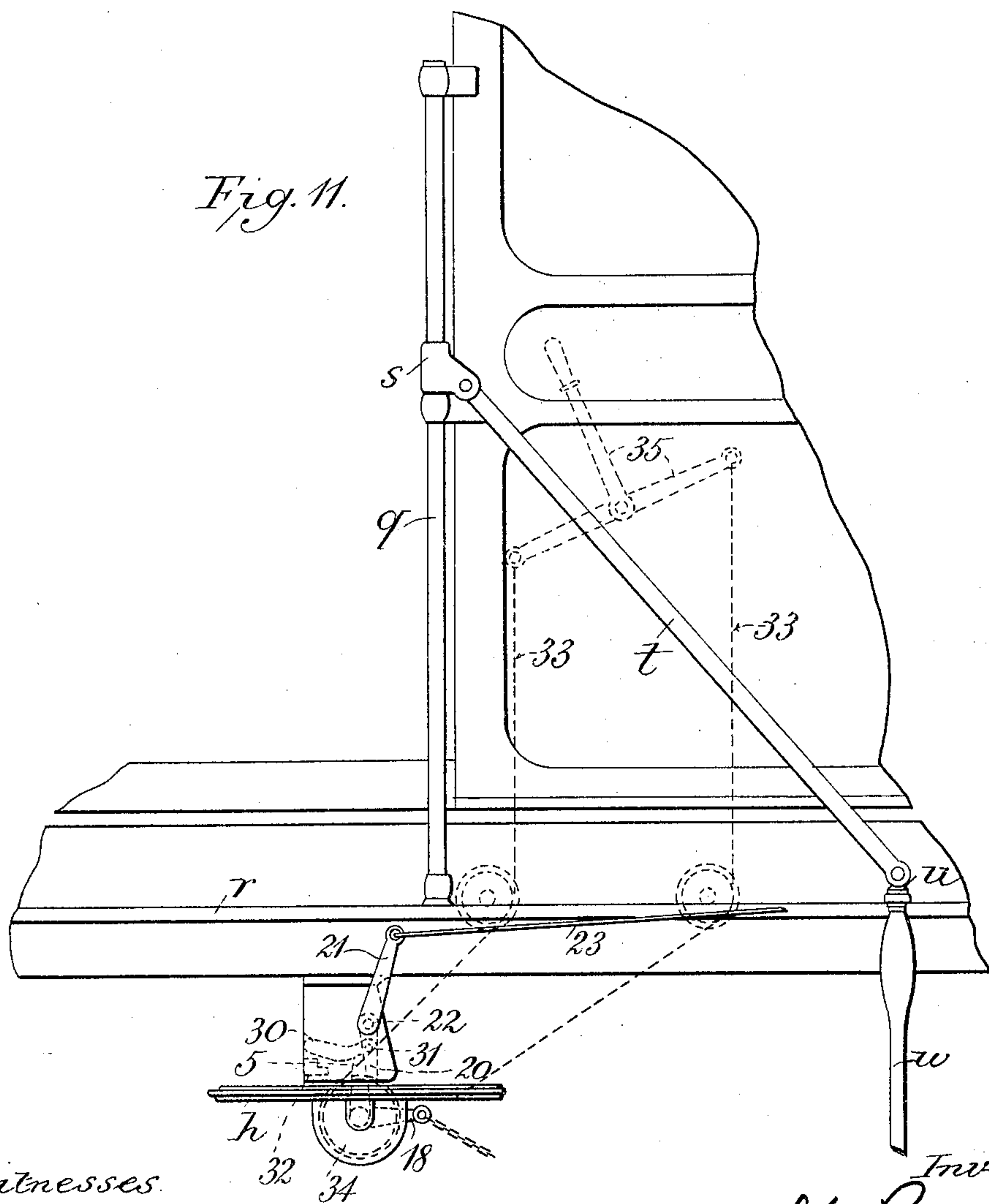
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6 SHEETS—SHEET 6.

*Fig. 10.*



*Fig. 11.*



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# UNITED STATES PATENT OFFICE.

JOHN GEORGE ROBINSON, OF FAIRFIELD, ENGLAND.

## STEPS OF RAILWAY AND TRAMWAY CARRIAGES, &c.

No. 804,046.

Specification of Letters Patent.

Patented Nov. 7, 1905.

Application filed July 22, 1905. Serial No. 270,840.

*To all whom it may concern:*

Be it known that I, JOHN GEORGE ROBINSON, a subject of the King of Great Britain and Ireland, residing at Fairfield, near Manchester, in the county of Lancaster, England, have invented Improvements in and in Connection with the Steps of Railway and Tramway Carriages and other Like Vehicles, of which the following is a specification.

According to this invention a railway or tramway motor car or carriage or other vehicle (hereinafter referred to as a "car") is furnished with steps which when in use extend from the car in a suitable position to enable passengers to conveniently enter and leave the car at level crossings and similar places that are without platforms and are adapted to be moved from said position into an out-of-the-way position, means being provided whereby it is insured that so long as the steps are in their in-use position the brakes of the car are held on and cannot be taken off until the steps are moved into their out-of-the-way position. The steps may be locked in their out-of-the-way position, so as to prevent them moving, and thereby possibly fouling, any obstacle when the car is in motion, and the locking device employed may be so arranged that the unlocking of the steps puts on the brakes and causes them to be maintained on until the steps are again locked in their out-of-the-way position, which operation releases the brakes so that they can be taken off.

The improved steps according to this invention comprise treads mounted at their ends to turn on suitable supports fixed to two sides or wings (hereinafter termed "wings") that turn on vertical or approximately vertical pivots secured to the car-underframe. The two wings are or may be connected together not only by the treads, but by a rod or rods, so as to insure uniform movement, the arrangement being such that when not in use the wings extend beneath the underframe in the direction of the length of the car, the treads being one above the other, while when in use the wings extend transversely away from the car, the treads being in proper position for use. There may be provided a hand-rail so pivotally connected to one of said wings and to the car-body that when the steps are in their out-of-the-way position it lies close to the adjacent side of the car.

Figures 1, 2, and 3 of the accompanying illustrative drawings show in front elevation, vertical transverse section, and in plan, re-

spectively, a portion of a steam-motor car furnished with steps according to this invention, the steps being in position for use. Figs. 4, 5, and 6 are similar views to Figs. 1, 2, and 3, respectively, showing the steps in their out-of-the-way position. Figs. 7, 8, and 9 are detail views, to a larger scale than that of the preceding figures, showing the right-hand end portion of the lowest step. Fig. 10 is a diagram showing a complete car with steps and brake mechanism. Fig. 11 is a detail view showing a modified construction.

In the construction illustrated in Figs. 1 to 9 the wings *a* of the steps are formed with lugs or ears *b*, that are mounted to turn on vertical pins *c*, carried by downwardly-extending brackets *d*, fixed to the vehicle-underframe one at each side of the car-doorway *e*. The wings *a* incline downwardly from the lugs or ears *b*. Each wing is provided with annular flanged supports or bosses *f*, which extend through corresponding holes *g*, formed in the adjacent ends of the treads *h*, so that the treads are between the flanges *j* of the supports or bosses *f* and rest on the lower flanges and are prevented from rising by the upper flanges while free to rotate about the supports or bosses. The steps in the example shown have three treads *h*, and for the purpose of placing the treads in position between the flanges of the annular supports *f* the lower flange *j* of each such support is made separate from the shank and upper flange thereof, the two portions being connected by screws *k*. The upper portion of each of the two lower step-supports is made in one with the lower flange of the support of the adjacent higher step. The wings *a* are each constructed in three pieces of sheet metal connected together by the annular supports *f* to flanges or webs *m*, to which the sheet-metal wing portions are riveted. The lower rearwardly-extending lug *b* has fixed to it a rearwardly-extending arm *o*, and a rod *p*, freely pivoted at each end to the outer end of said arms, connects the two wings, so insuring their uniform movement. A fixed hand-rail *q* extends vertically down each side of the door-frame to the footboard *r*, and pivoted to a knuckle-piece *s*, mounted to rotate and slide on the right-hand side fixed hand-rail *q*, is one end of a hand-rail *t*, whose other end is pivoted to another knuckle-piece *u*, that is itself pivoted to the upper end of a newel-post *w*, the lower end of which is carried by and can turn freely in a socket *x*, secured to the right-hand wing *a*. An arm



or bracket *y*, fixed to the end portion of the lowest step *h*, is also fixed, as by a cotter *z*, to the lower part of the newel-post *w*, so that the bent upper part of the post *w* is always  
 5 caused to extend outwardly whatever the position of the steps. The upper part of the newel-post *w* is outwardly bent in order to clear the underframe of the vehicle or lower part of the car-body when the steps are in the  
 10 out-of-the-way position. In order to steady the newel-post, it extends through and freely rotates in the end of a stay 1, fixed to the corresponding wing.

The wings *a* move through an angle of approximately ninety degrees when the steps are moved from the one extreme position to the other. In their in-use position (see Figs. 1, 2, and 3) the wings *a* extend transversely from the side of the car, with the treads *h* displaced laterally from beneath each other, so  
 20 as to be convenient for a person to walk up or down them, while when the steps are in the out-of-the-way position the wings *a* extend in the direction of the length of the car below the underframe, (usually beneath the sole-bar 2, as in the example illustrated,) the wings *a* being in one common vertical plane and the treads *h* one above the other, but displaced longitudinally. (See Figs. 4, 5, and 6.)

30 An arm 5, fixed on a short rock-shaft 6, that is mounted in brackets 7, fixed to the under side of the upper tread *h*, is adapted to be moved by a downwardly-extending hand-lever 8, fixed on the rock-shaft 6, the arm 5 in one position extending upwardly through  
 35 a slot 9 in the upper tread *h* and behind a bracket 10, that is fixed to the underframe 2, so as to lock the steps in their out-of-the-way position.

40 To prevent the hand-lever 8 from accidentally moving from the position to which it is moved when the steps are locked, Fig. 4, or unlocked, Fig. 1, the hand-lever is furnished with a spring-pressed ball 8<sup>a</sup>, adapted to enter one or the other of two depressions 7<sup>a</sup>,  
 45 that are formed in the bracket 7.

To securely hold the steps in their in-use position, the notched inner end 11 of a spring-pressed catch-lever 12, pivoted at 13 to a  
 50 bracket 14, carried by one of the wings *a*, is adapted to engage a suitably-shaped part 15, fixed to the adjacent downwardly-extending bracket *d* when the steps are in their in-use position. To release this catch, a chain 17 is  
 55 connected at one of its ends to the outer end of the catch-lever 12 and to an arm 18 on the before-mentioned hand-lever 8, so that by suitably moving the hand-lever 8 the catch-lever 12 is pulled by the chain 17 against the  
 60 action of its spring 19 out of engagement with the fixed part 15, so that the steps can then be moved into their out-of-the-way position by forcing them to the right, it may be by pressing the hand-lever 8 in the desired  
 65 direction.

It will be understood that with one hand the steps may be unlocked and moved from their out-of-the-way position into position for use, released from that position, moved back into their out-of-the-way position, and locked  
 70 there.

As the pivots *c* of the supporting-wings *a* are vertically arranged, the steps are not liable to collapse while in use.

For the purpose of putting on the brakes 75 when the steps are unlocked and moved into their position for use and for holding on the the brakes until the steps are again locked in their out-of-the-way position a lever 20 21 is pivoted at 22 to the fixed bracket 10, behind  
 80 which the locking-arm 5 extends when the steps are locked. The arm 20 of said lever is located in the path of the locking-arm 5, and the arm 21 is connected, as by a wire 23, to a valve (indicated digrammatically at 24, Fig. 85  
 10) in connection with the train-pipe 25 of the vacuum or air-brake apparatus 26 of the car, so that the locking-arm 5 cannot be moved clear of the fixed bracket 10 to release the steps without so moving the lever 20 21,  
 90 connected to the valve, as to put the brakes on, while to hold the brakes on a retaining-pawl 30 is freely pivoted at 31 to the brake-operating lever 20 21 in suchwise as to drop into engagement with a stop 32, fixed on the  
 95 bracket 10, when the lever is moved as beforeforesaid.

The retaining-pawl 30 when in engagement with the stop 32 is in such position that the locking-lever 5 when again moved behind the  
 100 fixed bracket 10 to lock the steps in their out-of-the-way position will lift it and so release the brake-operating lever 20 21 and enable the brakes to be taken off.

The steps may in some cases be locked in 105 their out-of-the-way position and unlocked therefrom from the inside of the car. Fig. 11 shows such an arrangement, in which the locking-lever 5 is adapted when the steps are in their out-of-the-way position to be actuated through  
 110 suitable connections, such as a chain 33, and a suitably-supported rotary chain-wheel 34, having a tapered square hole in its boss adapted to be engaged by the correspondingly-shaped inner end of the axle 6 when the steps  
 115 are in their out-of-the-way position from a hand-lever 35, located within the car and to which the two ends of the chain 33 are connected, so that the steps may be thereby locked and unlocked, and may be then moved, as by  
 120 pulling the pivoted hand-rail *t* of the steps in the desired direction.

What I claim is—

1. In a railway, tramway, or the like vehicle, brake mechanism, steps mounted so as to  
 125 be movable from an in-use position to an out-of-the-way position and means whereby the operation of the brakes is insured when said steps are in their in-use position, substantially as set forth.  
 130



2. In a railway, tramway, or the like vehicle, brake mechanism, steps mounted so as to be movable from an in-use position to an out-of-the-way position, means adapted to lock  
5 said steps in their out-of-the-way position and means whereby, when said locking means are actuated to unlock said steps, the operation of said brakes is insured until said locking means are actuated to again lock said steps, substantially  
10 as set forth.

3. In a railway, tramway, or the like vehicle, a brake train-pipe, a controlling-valve on such pipe, steps mounted so as to be movable from an in-use position to an out-of-the-way  
15 position and means whereby said valve is operated to insure application of the brakes when said steps are in their in-use position, substantially as set forth.

4. In a railway, tramway, or the like vehicle, a brake train-pipe, a controlling-valve on such pipe, steps mounted so as to be movable from an in-use position to an out-of-the-way  
20 position, means adapted to lock said steps in their out-of-the-way position and means whereby, when said locking means are actuated to unlock said steps, said valve is operated to insure application of the brakes until  
25 said locking means are actuated to again lock said steps, substantially as set forth.

5. In a railway, tramway, or the like vehicle, brake mechanism, steps mounted so as to be movable from an in-use position to an out-of-the-way position, a locking-arm pivoted to  
30 said steps, a part fixed to said vehicle behind which said locking-arm is adapted to be placed when said steps are in their out-of-the-way position, a lever pivoted to said vehicle in the path of said locking-arm and means connecting  
35 said lever to said brake mechanism, substantially as set forth.

6. In a railway, tramway, or the like vehicle, a brake train-pipe, a controlling-valve on such pipe, steps mounted so as to be movable from an in-use position to an out-of-the-way  
45 position, a locking-arm pivoted to said steps, a part fixed to said vehicle behind which said locking-arm is adapted to be placed when said steps are in their out-of-the-way position, a lever pivoted to said vehicle in the path of said  
50 locking-arm and means connecting said lever to said brake-controlling valve, substantially as set forth.

7. In a railway, tramway, or the like vehicle, brake mechanism, steps mounted so as to be movable from an in-use position to an out-of-the-way position, a locking-arm pivoted to  
55 said steps, a part fixed to said vehicle behind which said locking-arm is adapted to be placed when said steps are in their out-of-the-way position, a lever pivoted to said vehicle in the path of said locking-arm and adapted to be  
60 moved by said locking-arm when such arm is actuated to release the steps, a pawl pivoted to said vehicle also in the path of said locking-arm and adapted to hold said lever in the

position to which it is moved by said locking-arm until said locking-arm is actuated to again lock said steps and means connecting  
70 said lever to said brake mechanism, substantially as set forth.

8. In a railway, tramway, or the like vehicle, a brake train-pipe, a controlling-valve on such pipe, steps mounted so as to be movable from an in-use position to an out-of-the-way  
75 position, a locking-arm pivoted to said steps, a part fixed to said vehicle behind which said locking-arm is adapted to be placed when said steps are in their out-of-the-way position, a lever pivoted to said vehicle in the path of said  
80 locking-arm and adapted to be moved by said locking-arm when such arm is actuated to release the steps, a pawl pivoted to said vehicle also in the path of said locking-arm and adapted to hold said lever in the position to which  
85 it is moved by said locking-arm until said locking-arm is actuated to again lock said steps, and means connecting said lever to said brake-controlling valve substantially as set forth.

9. In steps for railway, tramway or the like vehicles, treads, sides or wings on which  
90 the ends of said treads are mounted to turn, and approximately vertically-arranged fixed pivots on which said sides or wings are mounted to turn, substantially as set forth.

10. In steps for railway, tramway or the like vehicles, treads, sides or wings on which  
95 the ends of said treads are mounted to turn, approximately vertically-arranged fixed pivots on which said sides or wings are mounted to turn, and means adapted to connect said  
100 sides or wings so as to insure their uniform movement, substantially as set forth.

11. In steps for railway, tramway or the like vehicles, treads, sides or wings on which  
105 the ends of said treads are mounted to turn, and approximately vertically-arranged fixed pivots on which said sides or wings are mounted to turn from a position in which they extend beneath the vehicle in the direction of  
110 the length of the vehicle into a position in which they extend transversely away from the vehicle, substantially as set forth.

12. In steps for railway, tramway or the like vehicles, treads, sides or wings on which  
115 the ends of said treads are mounted to turn, approximately vertically-arranged fixed pivots on which said sides or wings are mounted to turn, from a position in which they extend beneath the vehicle in the direction of the  
120 length of the vehicle into a position in which they extend transversely away from the vehicle and means adapted to connect said sides or wings so as to insure their uniform movement, substantially as set forth.

13. In steps for railway, tramway or the like vehicles, treads, sides or wings on which  
125 the ends of said treads are mounted to turn, a hand-rail pivotally connected to one of said sides or wings and to the vehicle, and approximately vertically-arranged fixed pivots  
130



on which said sides or wings are mounted to turn, substantially as set forth.

14. In steps for railway, tramway or the like vehicles, treads, downwardly-extending brackets fixed to the vehicle, vertical pins on said brackets, sides or wings on which the ends of said treads are mounted to turn, and rearwardly-extending lugs on said sides or wings mounted on said pins, substantially as set forth.

15. In steps for railway, tramway or like vehicles, treads, a circular hole near each end of each tread, flanged supports or bosses extending through said holes the treads being between the flanges thereof, sides or wings carrying said supports and approximately vertically-arranged fixed pivots on which said sides or wings are mounted to turn.

16. In steps for railway, tramway or the like vehicles, treads, sides or wings on which the ends of said treads are mounted to turn, approximately vertically-arranged fixed pivots on which said sides or wings are mounted to turn, a vertically-arranged hand-rail fixed to the vehicle, a knuckle-piece mounted to rotate and slide on said fixed hand-rail, a newel-post fixed to one of said sides or wings, another knuckle-piece pivoted to said newel-post and a hand-rail pivoted at its ends to said knuckle-pieces, substantially as set forth.

17. In steps for railway, tramway or the like vehicles, treads, sides or wings on which the ends of said treads are mounted to turn, approximately vertically-arranged fixed pivots on which said sides or wings are mounted to turn, a vertically-arranged hand-rail fixed to the vehicle, a knuckle-piece mounted to rotate and slide on said fixed hand-rail, a socket fixed to one of said sides or wings, a newel-post mounted to turn in said socket, an arm fixed to one of said treads and to said newel-post, another knuckle-piece pivoted to said newel-post and a hand-rail pivoted at its ends to said knuckle-pieces, substantially as set forth.

18. In steps for railway, tramway or the

like vehicles, treads, sides or wings on which the ends of said treads are mounted to turn, approximately vertically-arranged fixed pivots on which said sides or wings are mounted to turn, and means adapted to hold said steps in position for use, substantially as described.

19. In steps for railway, tramway or the like vehicles, treads, sides or wings on which the ends of said treads are mounted to turn, approximately vertically-arranged fixed pivots on which said sides or wings are mounted to turn, a spring-pressed catch-lever pivoted to one of said sides or wings, a fixed part adapted to engage said catch-lever when the steps are in use, and hand-operated means adapted to move said catch-lever against the action of its spring, substantially as set forth.

20. In a railway, tramway, or the like vehicle, brake mechanism, steps mounted so as to be movable from an in-use position to an out-of-the-way position, means, capable of being actuated from within the vehicle, adapted to lock said steps in their out-of-the-way position and means whereby, when said locking means are actuated to unlock said steps, the operation of said brakes is insured until said locking means are actuated to again lock said steps, substantially as set forth.

21. In a railway, tramway, or the like vehicle, a brake train-pipe, a controlling-valve on such pipe, steps mounted so as to be movable from an in-use position to an out-of-the-way position, means, capable of being actuated from within the vehicle, adapted to lock said steps in their out-of-the-way position and means whereby, when said locking means are actuated to unlock said steps, said valve is operated to insure application of the brakes until said locking means are actuated to again lock said steps, substantially as set forth.

Signed at London, England, this 6th day of July, 1905.

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