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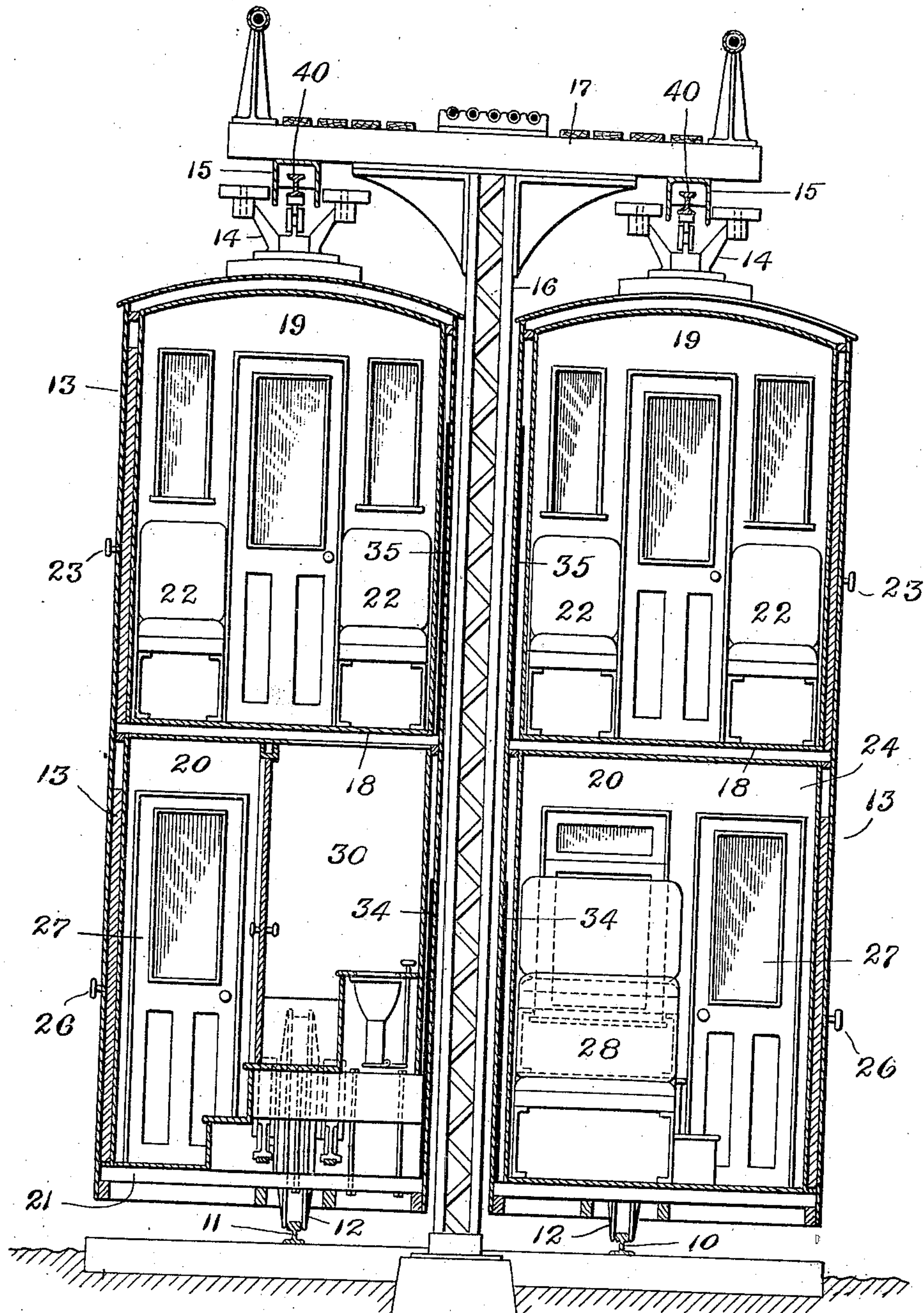
E. M. BOYNTON.  
RAILWAY SYSTEM.

APPLICATION FILED JUNE 13, 1910.

Patented Nov. 22, 1910.

3 SHEETS—SHEET 1.

Fig. 1



Witnesses:  
*M. G. Crozier*  
*W. P. Abell*

Inventor,  
Eben Moody Boynton,  
by *Night & Day May*  
*Atty.*

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3 SHEETS—SHEET 2

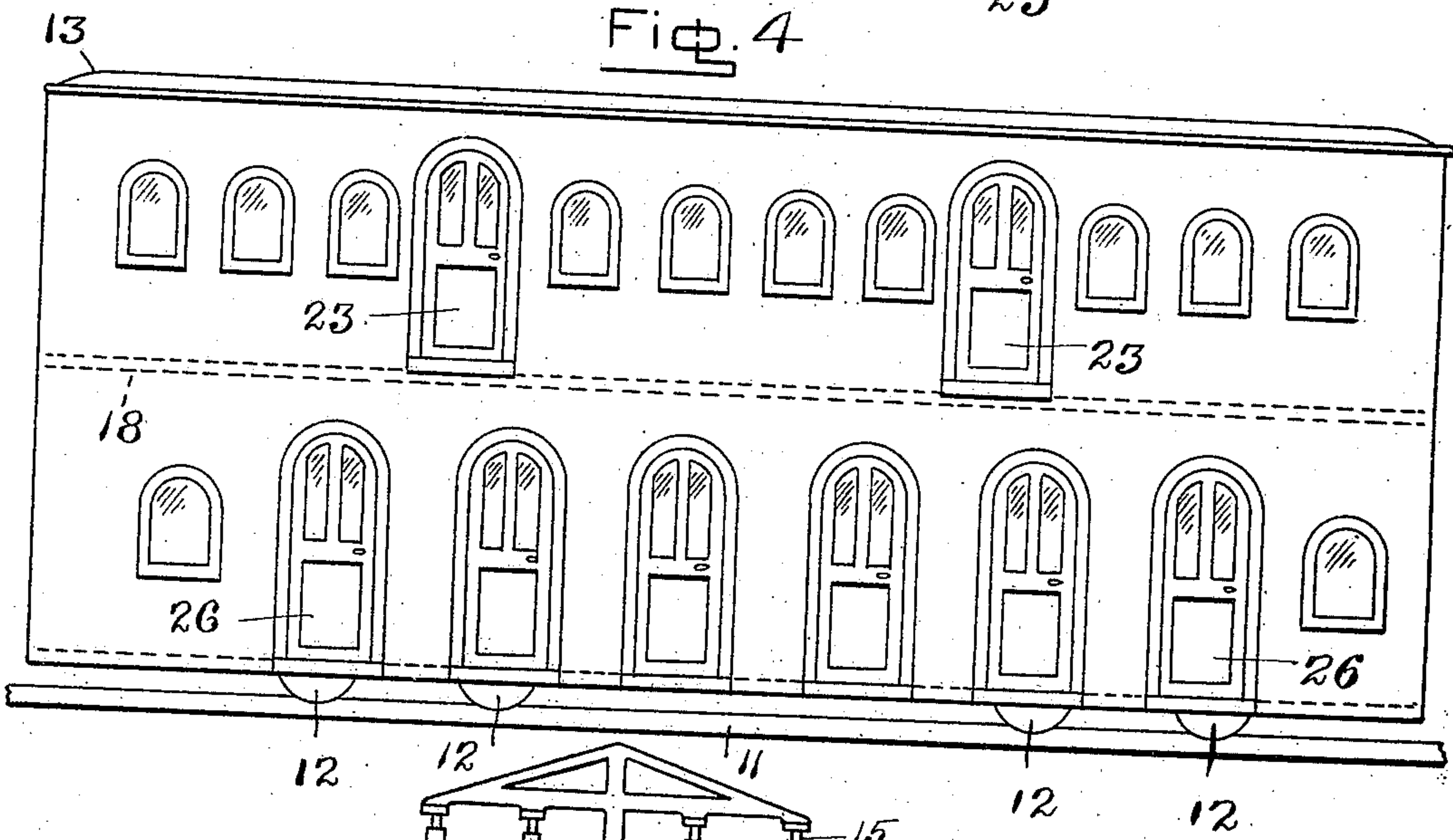
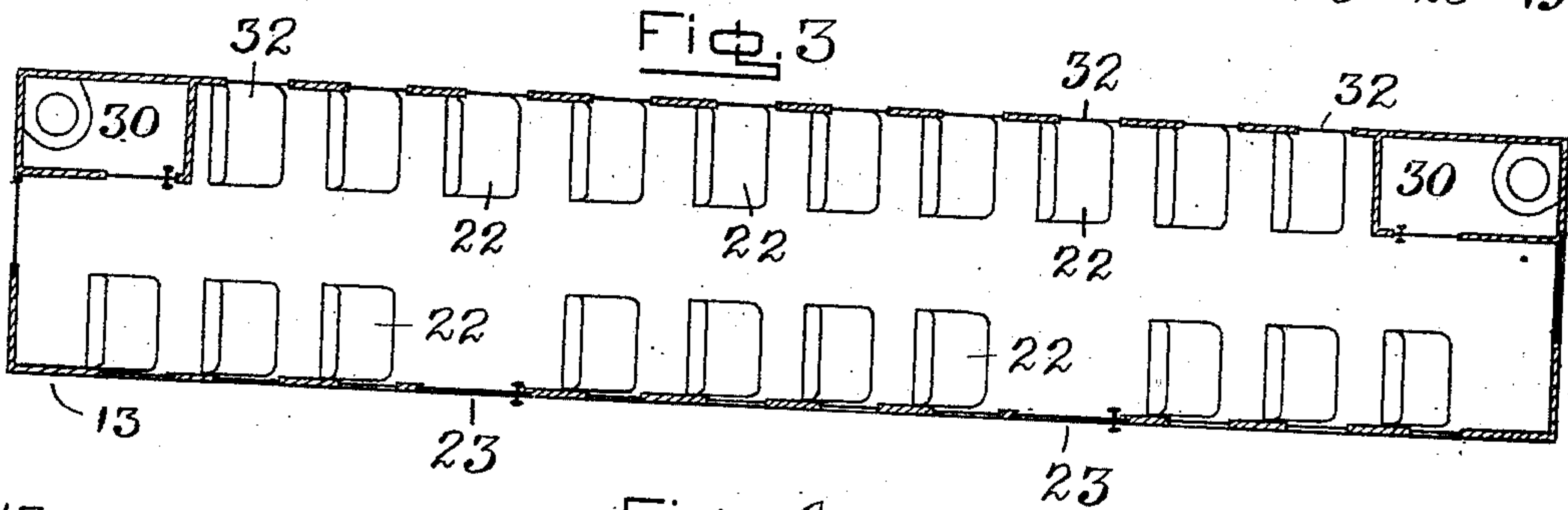
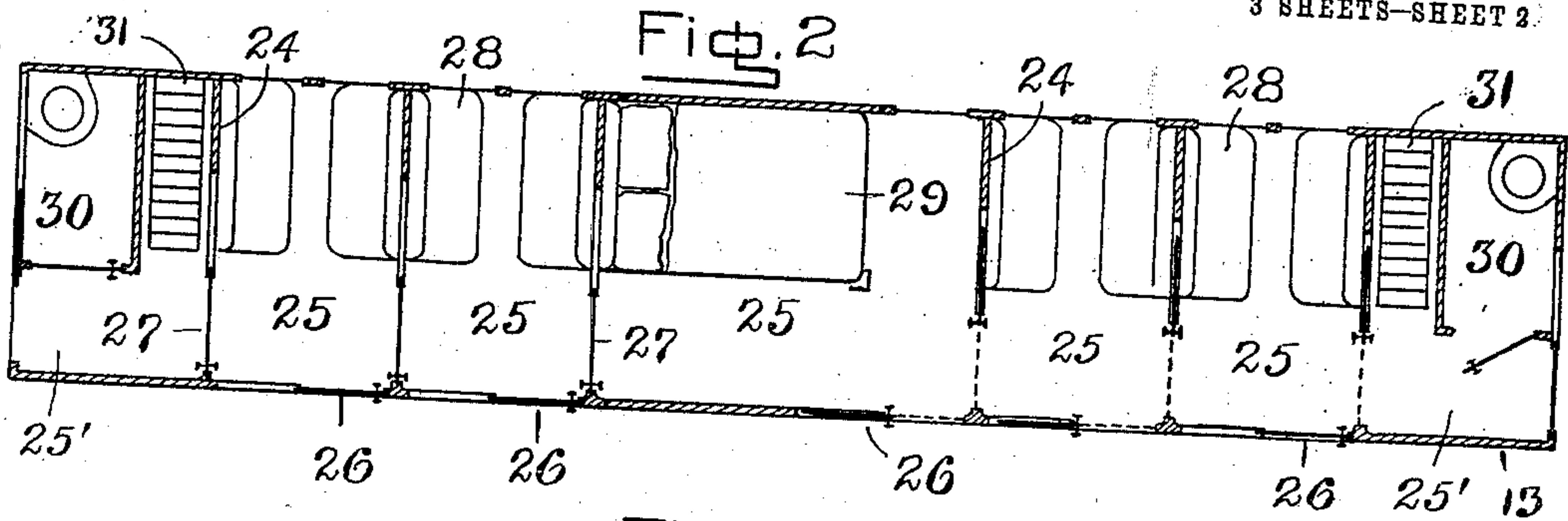


Fig. 6.

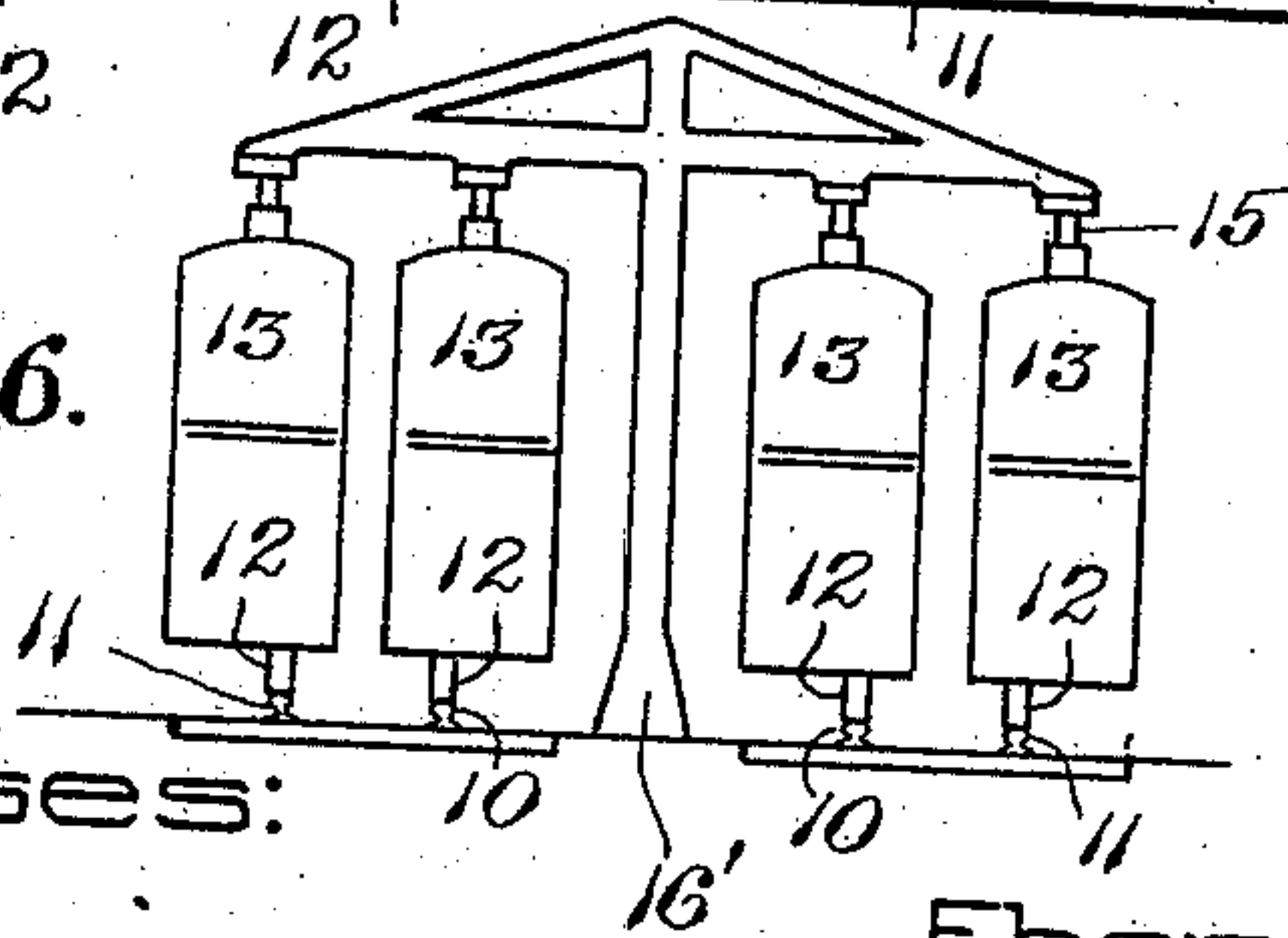
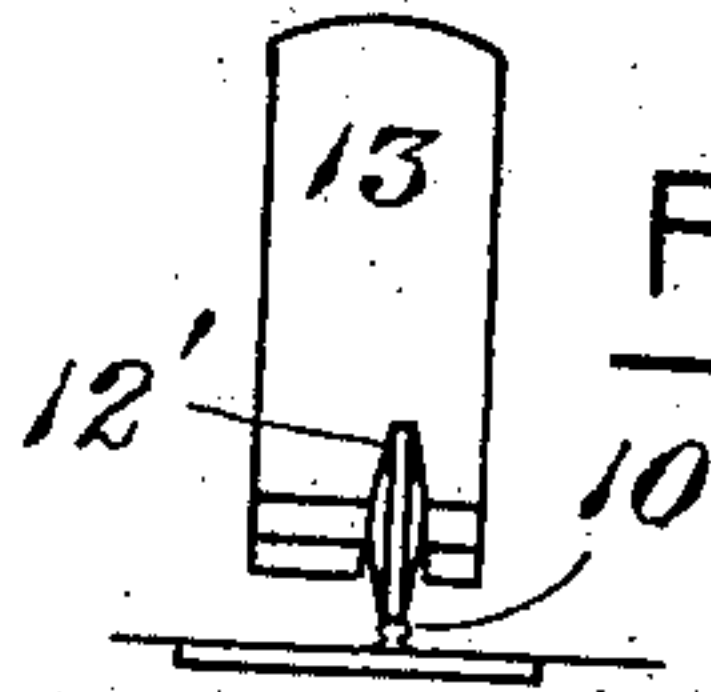


Fig. 7.



Witnesses:  
M. G. Crozier  
W. P. Abell

Inventor,  
Eben Moody Boynton,  
by *Wm. Brown Lundy & May*  
Attys

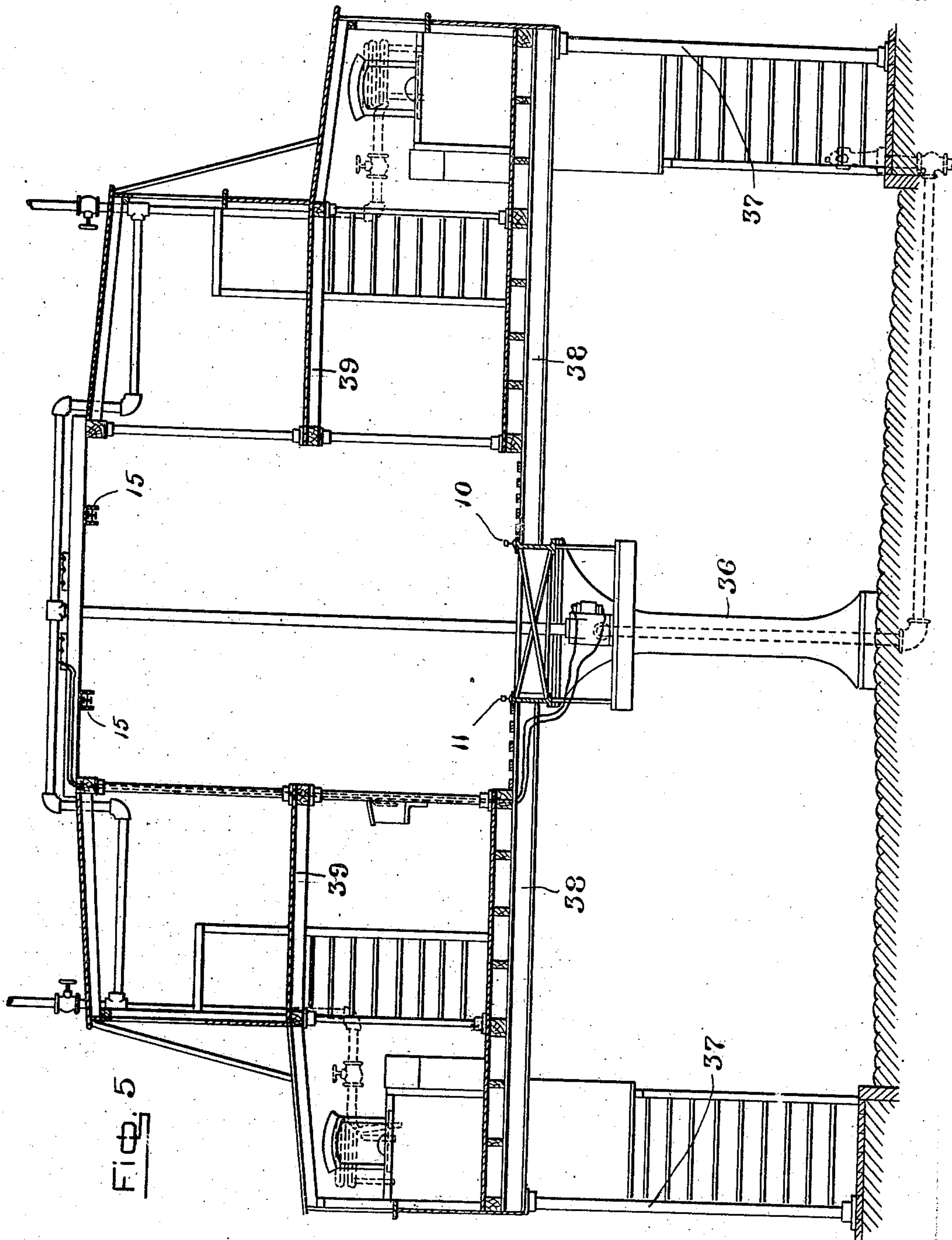


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3 SHEETS—SHEET 3.



Witnesses:  
*M. G. Crozier*  
*W. P. Abell*

Inventor,  
Eben Moody Boynton,  
*by Knight Brown Zimly May*  
Atty.



# UNITED STATES PATENT OFFICE.

EBEN MOODY BOYNTON, OF WEST NEWBURY, MASSACHUSETTS.

RAILWAY SYSTEM.

976,628.

Specification of Letters Patent.

Patented Nov. 22, 1910.

Application filed June 13, 1910. Serial No. 566,484.

*To all whom it may concern:*

Be it known that I, EBEN MOODY BOYNTON, of West Newbury, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Railway Systems, of which the following is a specification.

The present invention relates to railway systems of the monorail type.

One of the objects of the invention is to utilize the present existing railroads of the two-rail type so that a road now equipped with bridges, tunnels, stations, etc., for a system of the two-rail type may accommodate twice the number of trains of the monorail type without requiring any increase in width or height of the present tunnels, bridges, stations, or other equipment.

In carrying out the present invention, the cars therefor are constructed with an upper and a lower floor and are made somewhat narrower than the cars of the present two-rail type. The traction wheels for the monorail cars of the present invention are not arranged midway between the sides of the cars but are arranged upon the inner side of the longitudinal median line of the cars, with the result that the cars overhang the wheels on the outer side more than on the inner side of the line of the wheels. The purpose of arranging the wheels in this manner is to utilize the two rails of the present standard gage two-rail track of which the rails are approximately 4 feet 8½ inches apart, and at the same time to provide sufficient width in the bodies of the cars for the accommodation of passengers. For the purpose of comparison it may be stated that the width of the cars inside the longitudinal median line of the wheels is approximately 2 feet, thus leaving a space between two passing trains of approximately 11 inches. It is proposed to extend the width of the cars outside of the longitudinal median lines of the wheels approximately three feet, thus providing a total width of five feet for the body of the car. The aggregate width of two passing trains of the dimensions aforesaid is therefore approximately ten feet and eleven inches, which is but slightly more than the width of a single car of the present standard gage. It is apparent, therefore, that two trains constructed according to the present invention may pass through a tunnel constructed for a single train of the present

type for standard gage, and, likewise, four trains constructed according to the present invention may pass through a tunnel constructed for two trains of the present standard gage.

The increased height of the body of a car according to the present invention is offset by dropping the lower floor of the car below the axles of the traction wheels and by reducing the distance between the floors and ceilings to a distance no greater than that which is actually necessary for persons of average height.

It is proposed to equip one of the floors of each car with private compartments or staterooms such as those desired by passengers traveling long distances, and to equip the other floor of each car with seats only, such as those at present installed in day coaches. In this way the local passengers may be kept apart from the long distance passengers and the latter may have absolute privacy, if desired. The public compartment for the local passengers may be arranged in the same manner as the present day coaches for local use, that is, with a longitudinal aisle in the center and seats on both sides.

The arrangement of the private compartments is not like that of the public compartments. The private compartments are divided by transverse partitions into separate staterooms. Each stateroom includes two seats facing each other which may be converted into a bed. The seats are all arranged upon the inner side of the car, and doors in the outer wall of the car are provided for access to the several staterooms. Doors are provided in the transverse partitions, said doors being arranged between the longitudinal median line of the car and the outer wall thereof, with the result that when all of the doors in said partitions are open there is a continuous unobstructed passage throughout the entire length of the car. By reason of this equipment passengers may be enabled to pass back and forth through the staterooms or they may be confined to their respective staterooms. The arrangement of all of the seats or beds upon the inner or narrower side of the car offsets to a great degree the unequal disposition of the body of the car with relation to the wheels, and the car is, therefore, not seriously out of balance.

Referring to the accompanying drawings,



Figure 1 represents a cross section of two trains and a road of the monorail type constructed in accordance with this invention. Fig. 2 represents a horizontal section through the lower compartment of a car, showing the floor plan thereof. Fig. 3 represents a similar section through the upper compartment, showing the floor plan thereof. Fig. 4 represents an elevation of the outer side of a car. Fig. 5 represents a vertical cross section of an elevated station equipped for the passage of the cars illustrated. Fig. 6 represents an adaptation of four rails to the present invention. Fig. 7 represents an end elevation of a car equipped with a gyroscopic driving wheel such as that illustrated in Patent 533,861 granted me February 12, 1895.

The same reference characters indicate the same parts wherever they occur.

The drawings are intended merely to illustrate the essential elements of the present invention, and no attempt has been made to carry out all the details of construction.

Referring to Fig. 1: 10 and 11 indicate traction rails which may be presumed to be spaced according to the present standard gage of four feet eight and one-half inches, this gage being used as a basis of comparison in order to show how standard roads now in use may be converted to the system of the present invention with comparatively slight expense. 12 indicates the traction wheels of cars 13, said cars being equipped with overhead guiding devices 14 for coacting with a rail 15 which maintains the cars in an upright position.

According to the arrangement illustrated, the distance between the longitudinal central line of the wheels and the inner wall of the car is approximately two feet, while the distance between said line of the wheels and the outer wall of the car is approximately three feet. A space of approximately eleven inches is left between passing trains, which space may be occupied by upright members 16 for supporting cross-ties 17 upon which the guide rails 15 and other parts of the equipment may be mounted.

The space within each car is divided by an intermediate deck or floor 18, thus separating the space into an upper compartment 19 and lower compartment 20. The floor 21 of the lower compartment is preferably arranged below the axles of the wheels 12 and comparatively close to the rails 11, thus giving the necessary depth for the cars and dispensing with steps for entering the lower compartment.

The upper compartment is equipped with seats 22 arranged as usual at both sides of the car, thus providing a central longitudinal aisle. Access to the upper compartment may be had through doors 23 in the outer wall of the car.

The lower compartment 20 is divided by transverse partitions 24 into staterooms 25. Access to the staterooms may be had through the doors 26 in the outer wall of the car, and passage from one stateroom 70 to another may be had through doors 27 forming parts of the partitions 24. The doors 26 and 27 are preferably of the rolling type, so that they may recede into the partitions. The doors 27 are all arranged 75 in alinement on the outer side of the longitudinal center of the car, so that when they are all open there is an unobstructed passage from end to end of the car. The staterooms are equipped with seats 28 facing each other, 80 which seats are adapted to be converted into beds or berths. One or more of the staterooms may, if desired, be equipped with an extra large bed such as that indicated at 29. The compartments at the ends of the lower 85 floor may be subdivided to provide toilet rooms 30 and to provide spaces for ladders or steps 31 leading to the upper floor 18. It is to be noted that there are no doors in the inner wall of the car. The inner wall is, 90 however, provided with windows 32 for the lower compartment, and windows 33 in the upper compartment. For the protection of the passengers the inner wall of each car is provided with sheets of armor plate extend- 95 ing throughout the length of the car, the protective plate for the lower compartment being indicated at 34, and that for the upper compartment at 35.

Fig. 6 illustrates a station appropriate for 100 a system employing cars of the type described, this type of station being especially adapted for a railroad passing through the streets of a thickly populated community. The traction rails are supported upon an ele- 105 vated structure including central supporting pillars 36, outer pillars 37, and floors 38 and 39. The floors 38 are arranged to be approximately in the level of the lower floors of the cars, so that passengers may enter 110 and leave the cars without steps. The floors 39 are likewise arranged with relation to the upper floors 18 of the cars. The cars are provided with end doors in addition to the side doors indicated, thus providing passage 115 from car to car when the cars are coupled together to form trains. The cars may be provided with vestibules in addition to the end compartments 25', but the provision of such vestibules would obviously decrease 120 the capacity of the car. The overhead guide rails 15 are formed to partly inclose electric conductors 40 by which the motive power is furnished when electricity is employed for the motive force. The cars are adapted to 125 be propelled either by individual motors or to be drawn by an engine, whether the engine be of the steam, electric, internal combustion or any other type.

Fig. 6 illustrates the manner in which two 130



tracks of the standard two-rail type may be utilized to accommodate four trains of the single-rail type. According to this arrangement, the supporting pillars 16' for the superstructure are arranged between two pairs of rails 10 and 11. For a four-rail system this arrangement of pillars 16' is preferred, for the reason that there is more space between the rails 10, 10 than between a rail 11 and the adjacent rail 10.

The representation of Fig. 7 includes a driving wheel 12' which is intended to represent a driving wheel of the type illustrated in Patent 533,861 granted me February 12, 1895. This type of driving wheel incloses an electric motor which may rotate continuously, whether the wheel is driven or remains stationary, and it is proposed to equip the cars with wheels of this type so as to utilize the gyroscopic action of the motor to maintain the cars in an upright position and thus dispense with overhead rails for the purpose. The structure and operation of a wheel of this type is fully given in the said patent, and it is therefore not necessary to include the same in this application. It is sufficient to state that the motor may rotate continuously and that the wheel is provided with friction clutch mechanism by which the motive power may be transmitted to the wheel. The wheels are of relatively great diameter, for example, six feet, more or less; and a car equipped with four wheels of this type in which the motors rotate continuously would be amply supported in an upright position by the gyroscopic action of the motors, whether the cars are stationary or in motion.

Having thus explained the nature of my said invention and described a way of constructing and using the same, although without attempting to set forth all of the forms in which it may be made or all of the modes of its use, what I claim is:

1. A railway system comprising a single rail, a car having wheels arranged to run upon said rail, said wheels being between the longitudinal vertical median plane and one side of the car, a series of seats on the same side of said plane as the wheels, a longitudinal passageway extending from said seats to the wall on the opposite side of said plane, and means for maintaining said car in a substantially upright position.

2. In a railway system, the adaptation of a two-rail track of standard gage for two tracks of the single-rail type, by the combination of upright pillars midway between said rails, a superstructure including overhead guide rails mounted on said pillars, cars provided with traction wheels, said cars overhanging the traction wheels more upon the outer side than upon the inner, seats on both sides of the cars, and an aisle between

3. In a railway system the combination of two parallel traction rails, upright pillars midway between said rails, overhead guide rails supported by said pillars, cars provided with traction wheels and guide rail wheels, each car being adapted to run upon one of said traction rails and to be held upright by one of said guide rails, said cars overhanging said traction wheels more upon the side farther from said pillars than upon the side nearer said pillars, and seats in said cars arranged to partially equalize the unequal disposition of weight due to the unequal overhanging of the cars.

4. In a railway system, the combination with two rails of a two-rail track of standard gage, of cars of the single-rail type, each car having two stories and having traction wheels arranged nearer the inner than the outer side, one story being provided with seats on both sides, said seats being separated by a longitudinal aisle, and doors in the end walls and outer wall thereof, and the other story being sub-divided by transverse partitions into separate compartments, a door in the outer wall of each compartment, a door in each of said transverse partitions between the longitudinal median line of the car at the outer wall, and seats in said compartments between the inner wall and the doors of said partitions.

5. A railway system comprising a single rail, a truck arranged thereon, a car carried by said truck with its longitudinal vertical median plane offset from the like plane of said rail, means within the car tending to equalize the weight upon the two sides of the said plane of the rail, and means for maintaining said car in a substantially vertical position.

6. A railway system comprising a single rail, a truck arranged thereon, a car carried by said truck with its longitudinal vertical median plane offset from the like plane of said rail, said car being divided into an upper and a lower story, one of said stories having a row of seats on each side and an aisle between the rows of seats, the other of said stories having seats arranged to partially equalize the weight upon the two sides of the said plane of the rail, and means for maintaining said car in a substantially vertical position.

7. A railway system comprising a single rail, a truck arranged thereon, a car mounted upon said truck with its longitudinal vertical median plane at one side of the like plane of said rail, said car being divided into an upper and a lower story, one of said stories having two series of seats one on either side of said plane and a central aisle, and the other of said stories having a single series of seats arranged on the same side of said plane as the wheels, and a longitudinal



wall on the opposite side of said plane, and means for maintaining said car in a substantially vertical position.

8. A railway system comprising a single rail, a car having wheels arranged to run upon said rail, said wheels being between the longitudinal vertical median plane and one side of the car, a series of transverse partitions dividing the car into compartments, doors in said partitions upon the opposite side of said plane with reference to the wheels, seats in said compartments on the same side of said plane as the wheels, and means for maintaining said car in a substantially upright position.

9. A railway system comprising a single rail, a car having wheels arranged to run upon said rail, said wheels being arranged

between the longitudinal vertical median plane and one side of the car, and a reinforcing protective plate on the side wall of the car nearer which said wheels are arranged, and means for maintaining said car in a substantially upright position.

10. In a railway system, the combination of two-story cars each provided with traction wheels arranged between the longitudinal median line and one side of the car, the lower floor of the car being below the axle of the traction wheels.

In testimony whereof I have affixed my signature, in presence of two witnesses.

EBEN MOODY BOYNTON.

Witnesses:

W. P. ABELL,

HENRY O. CUSHMAN.