

June 9, 1931.

P. J. KOSTER ET AL

1,809,448

MONORAIL SYSTEM

Filed Feb. 23, 1929

2 Sheets-Sheet 1

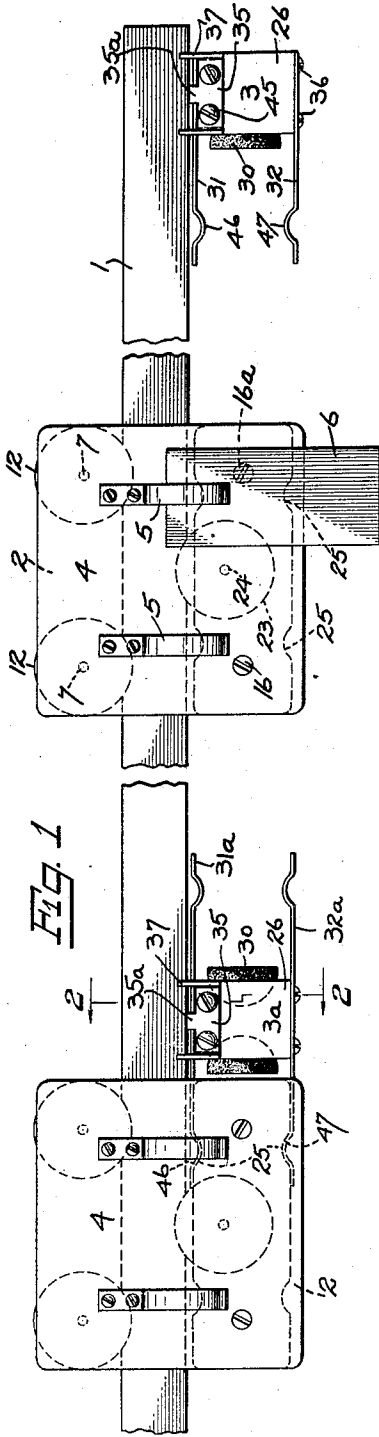


FIG. 3

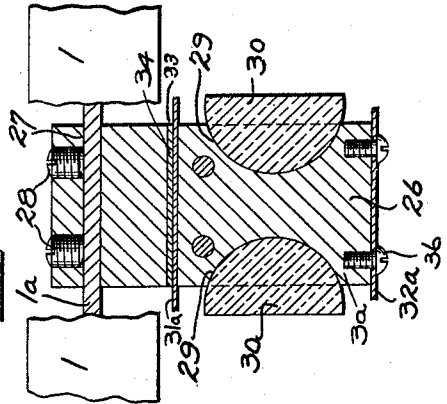
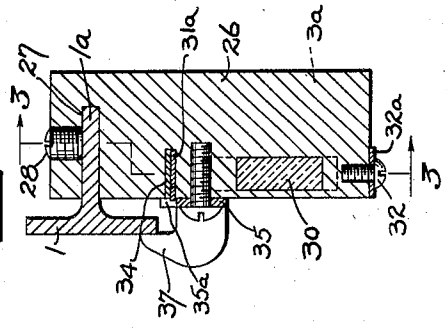


FIG. 2



INVENTOR
Peter J. Koster
Albert A. Koors
General Baldwin
BY
ATTORNEY

June 9, 1931.

P. J. KOSTER ET AL

1,809,448

MONORAIL SYSTEM

Filed Feb. 23, 1929

2 Sheets-Sheet 2

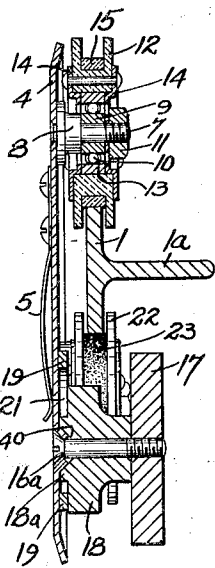
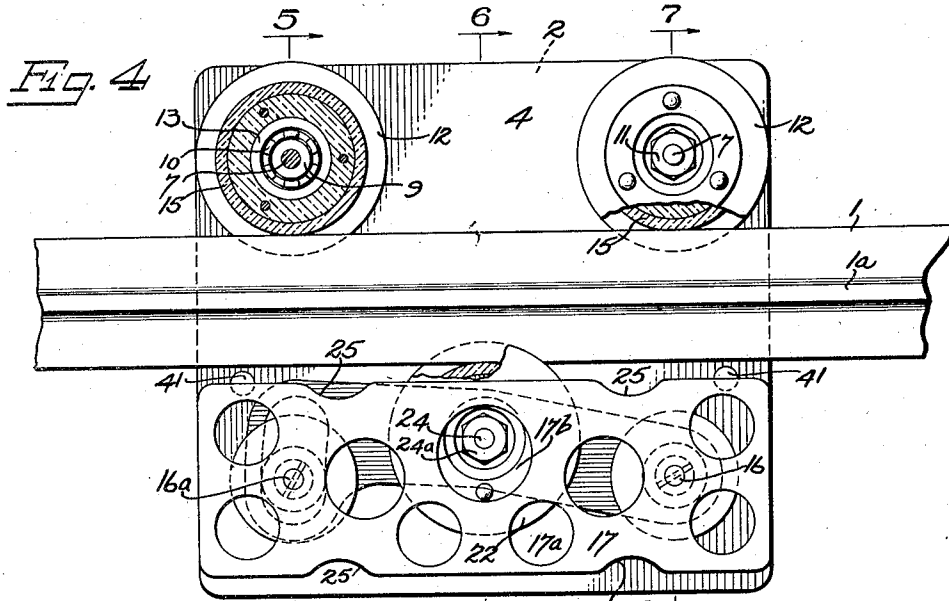


Fig. 5

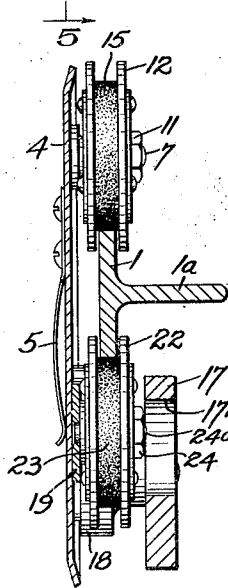


Fig. 6

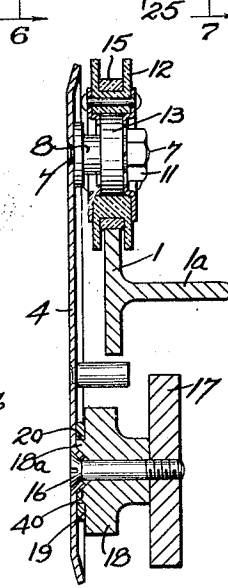


Fig. 7

INVENTORS
Peter J. Koster
Albert A. Koors.
BY *Gerald A. Radewick*
ATTORNEY

UNITED STATES PATENT OFFICE

PETER J. KOSTER AND ALBERT A. KOORS, OF PLEASANT RIDGE, MICHIGAN

MONORAIL SYSTEM

Application filed February 23, 1929. Serial No. 341,393.

This invention relates to improvements in monorail systems, and is primarily intended for such purposes as the distribution of tickets along a telephone switchboard.

5 The invention aims, among other things, to provide a monorail system: having cars that will travel a considerable distance along a monorail when pushed by the hand, and that travel practically noiselessly; wherein means are provided for preventing the cars from accidentally leaving their rails when they receive a sudden push; wherein means are provided for quickly and easily removing the cars from their monorails; and wherein means are provided for making adjustments to compensate for wear of the tires which ride on the margins of the monorails.

Other objects of the invention are: to provide a monorail system having adjustable stops thereon so that the cars may be stopped at any desired point therealong and held so that they will not rebound; to provide safety clamps on the stops for preventing them from falling off the monorail if their holding screws become loose; and to provide members on the cars which cooperate with the stops and also balance the cars and hold them in a substantially upright position at all times.

30 Having thus briefly and broadly outlined some of the major objects and advantages of the invention, we will now proceed to describe an embodiment thereof with the aid of the accompanying drawings, in which:

35 Figure 1 illustrates a front elevation of portions of a monorail with cars and stops thereon.

Figure 2 is an enlarged section on the line 2—2 of Figure 1.

40 Figure 3 is a section on the line 3—3 of Figure 2.

Figure 4 shows an enlarged rear elevation of a car on its monorail, and

45 Figures 5, 6 and 7 are sections on the lines 5—5, 6—6 and 7—7 of Figure 4.

Referring to the drawings, 1 designates a monorail of T-section along which cars 2 are adapted to travel, and having stops 3 and 3a arranged on its lateral web 1a which is rearwardly disposed.

We will now proceed to describe the construction of one of the cars. A vertical plate 4 extends above and below the monorail and in front of the latter. On the plate 4 spring clips 5, or other suitable holding means, are provided for carrying a ticket as indicated at 6 in Figure 1. Extending rearwardly from the plate 4 towards the top of the latter are two pins 7, preferably located that a line through their centers is substantially parallel with the upper margin of the plate. On the pins 7 adjacent the plate 4 bosses 8 are arranged against which the inner races 9 of ball bearings 10 are held as by nuts 11 in threaded engagement with the outer extremities of the said pins. Flanged wheels 12, both of which travel along the upper margin of the monorail 1, are arranged around the peripheries of the outer races 13 of the ball bearings 10, and are held on the latter by means of washers 14 so that they and the said outer races rotate together. The wheels 12 are usually made of fibre or other non-metallic substance in order to render the cars substantially noiseless as they travel along the rail 1. The outer portions of the washers 14 are secured to the sides of the wheels 12 and their inner annular portions are so flexed as to grip the sides of the outer races 13. Around the peripheries of the wheels between the flanges are rubber tires 15.

Through the lower portion of the plate 4 holes 40 are provided, one towards either side, so that a line through their centres is substantially parallel with a line through the centres of the pins 7. Screws 16 and 16a project through the holes 40 and are in threaded engagement with a balancing member 17 which extends substantially the full length of the plate 4 and is spaced from the latter by washers 18 placed around the said screws. This member 17 should be of sufficient width to relieve the sides of the tires 15 from excessive wear, and for that reason is, in the present instance, made fully wide enough and is then lightened up by means of holes 17a there-through.

Between the washers 18 and the plate 4 are the ends of a support 19 having apertures 20 and 21 therethrough through which the

screws 16 and 16a pass. The aperture 20 is substantially circular and receives a boss 18a on one side of one of the washers 18, and the other aperture 21 is elongated so that when the boss 18a of the other washer 18 is arranged therein limited movement is permitted that end of the support 19 about the screw 16. Mounted on the support 19 substantially centrally between the screws 16 and 16a is a flanged wheel 22 having a rubber tire 23 thereon between its flanges. The wheel 22 is preferably made of fibre or other non-metallic substance similarly to the wheels 12. This wheel 22 is preferably mounted on a pin 24 projecting from the support 19 in a manner similar to that employed for mounting the wheels 12 on their pins 7. In this way provision is made for moving the wheel 22 nearer to or further from the lower margin of the monorail 1 so that adjustment may be made for wear of the tires 15 and 23. Again sufficient clearance is thus obtained, when the wheel 22 is dropped to its lowest position, for moving the bottom of the car forward clear of the lower margin of the monorail so that it may be lifted clear of the latter and removed therefrom.

The balancing member 17 should be of such weight and so positioned relative to the plate 4 that it balances the car and holds it substantially vertical at all times. Through this member an aperture 17b is provided behind the pin 24 so that a nut 24a on the latter is easily accessible, and a short distance from its ends the upper and lower sides of this member have recesses 25 formed therein for a purpose hereinafter referred to.

Extending rearwardly from the plate 4 towards its sides are two safety pins 41, which, if the car tips unduly due either to the tires 15 and 23 having worn or to the upper and lower wheels 12 and 22 having been set too far apart, engage the lower margin of the rail 1 and prevent the car 2 from falling off.

The stops 3 and 3a, which are one or two-sided, consist of blocks 26 having slots 27 therein which receive a portion of the lateral web 1a of the monorail, and are held against movement thereon as by set screws 28. In the one-sided stops 3a recess 29 is formed in one side of the block 26 to receive a resilient bumper 30, and laterally projecting arms 31 and 32 are secured to the said block. The upper arm 31 rests partly in a slot 33 cut across the front of the block 26 and projects laterally in one direction therefrom. This arm should be slightly wider than the depth of the slot 33 so that it extends slightly in front of the latter. Against one side of the portion of the arm which rests in the slot a longitudinally curved liner 34 is placed which assists in holding the arm in position. On the front of the block a safety clamp 35 is secured having an upwardly projecting lug 35a thereon which bears against the front margin of the

arm 31 and holds the latter in place. The forwardly and upwardly extending wings 37 integral with the safety clamp prevent the latter from swinging rearwardly around the monorail sufficiently for the block 26 to become disengaged from the lateral web 1a in the event of the screws 28 becoming loose. Moreover, in order to place the stop in position on the rail the screws 45, by which the clamp 35 is fastened to the face of the block 26, must be loosened sufficiently to permit the block to be swung forwardly so that the lateral web 1a may be engaged by the slot 27. The lower arm 32 has one of its ends secured to the underside of the block 26 as by screws 36 and projects beyond the said block under the upper arm 31. Towards their outer extremities the upper and lower arms 31 and 32 have opposed inwardly flexed portions 46 and 47 respectively.

The construction of the two-sided stops 3a is similar to that of the one-sided ones, except that bumpers 30 are provided on both sides, and the arms 31a and 32a are supported substantially centrally of their length by the block and project in both directions therefrom.

The monorail may be supported in any desired manner, not shown, and, owing to the construction of the cars they will travel a considerable distance along the rail when pushed. On reaching a stop 3, or 3a, one end of the balancing member 17 strikes a bumper 30, and the upper and lower margins of the said member pass along the inner sides of the arms 31 and 32, or 31a and 32a, until the recesses 25 are engaged by the flexed portions 46 and 47 of the said arms, which latter are, of course, made of resilient material. In this manner the cars are positively held against any rebound when they reach their destination.

From the foregoing it is believed that the construction and operation of the various cooperating parts utilized in our monorail system will be readily understood; and while the preferred forms of construction have been described and shown, they are of course subject to such alterations and modifications as fall within the scope of the appended claims.

What we claim as our invention and desire to secure by Letters Patent is:

1. A monorail system comprising a rail, a car adapted to travel along it, wheels on said car adapted to ride on the upper and lower margins of said rail, and a member adapted to maintain said car in an upright position.
2. A monorail system comprising a rail, a car adapted to travel along it, wheels on said car which ride on the upper and lower margins of said rail, means for adjusting the vertical distance between said wheels, and a member on said car adapted to maintain it in an upright position.
3. A monorail system comprising a rail, a

vertical plate, double flanged wheels mounted on one side of said plate the treads of which are adapted to bear against the upper and lower margins of said rail, and a balancing member on said plate.

4. A monorail system comprising a rail, a car, double flanged wheels on said car adapted to travel along the upper and lower margins of said rail, tires on said wheels, and safety pins on said car to prevent said wheels accidentally leaving the rail when said tires wear.

5. A monorail system comprising a rail, a car, double flanged wheels on said car adapted to travel along the upper and lower margins of said rail, means for adjusting the vertical distance between the wheels, and safety pins on said car to prevent said wheels from accidentally leaving said rails if there is too great a distance between the upper and lower wheels.

6. A monorail system comprising a rail, a vertical plate, flanged wheels mounted on one side of said plate which bear against the upper and lower margins of said rail, means for adjusting the vertical distance between the wheels, safety pins projecting from said plate adapted to engage the underside of said rail before the wheels on the upper margin of said rail lift sufficiently for their flanges to clear the upper rail margin thereby preventing accidental disengagement of said wheels from said rail, and means on said plate for maintaining it in an upright position.

7. A monorail system comprising a rail, a vertical plate, pins extending laterally on one side of said plate, wheels revoluble on said pins which ride on the upper margin of the rail, a support pivotally mounted on said plate, a wheel revolubly carried by said support which is adapted to turn against the lower margin of said rail, means for holding said support against pivotal movement, and a balancing member on said plate to maintain it in upright position.

8. A monorail system comprising a rail, a vertical plate, pins extending laterally on one side of said plate, wheels revoluble on said pins which ride on the upper margin of said rail, a support having a hole through one end and an elongated slot through the other, screws projecting from said plate passing through said hole and slot, means for holding said support against pivotal movement about the screw which extends through the hole, and a wheel revolubly mounted intermediately of said support which bears against the lower margin of said rail.

9. A monorail system comprising a rail, a vertical plate pins extending laterally on one side of said plate, non-metallic wheels rotatable on said pins, resilient tires on said wheels which bear on the upper margin of said rail, screws projecting from the side of said plate, a balancing member engaged by

said screws, a support the ends of which are mounted on said screws between said plate and said balancing member, said support having a slot therethrough through which one of said screws passes so that it permits limited pivotal movement about the other screw, another pin projecting from said support, a non-metallic wheel revoluble on said other pin, and a resilient tire on said latter wheel which bears against the lower margin of said rail.

10. A monorail system comprising a rail, a vertical plate, pins extending laterally from said plate, ball bearings the inner races of which are held stationary on said pins, wheels, annular flanges secured to the sides of said wheels the inner annular portions of which grip the outer races of said ball bearings, said wheels being adapted to travel along the upper margin of said rail, another wheel mounted on said plate adapted to travel along the lower margin of said rail, and means for maintaining said plate in an upright position.

11. A monorail system comprising a T-shaped rail, a car, wheels on said car riding on the upper and lower margins of said rail, a stop, means for securing said stop anywhere along the lateral web of said rail, and a member on said car adapted to strike said stop.

12. A monorail system comprising a rail, a car adapted to travel along it, a stop attachable anywhere along said rail, a member on said car adapted to strike said stop, and means on said stop for holding said car against rebound.

13. A monorail system comprising a rail, a car adapted to travel along it, a stop attachable anywhere along said rail, a member on said car adapted to strike said stop, and a safety means on said stop to prevent it accidentally falling from said rail.

14. A monorail system comprising a T-shaped rail, a car, wheels on said car which ride along the upper and lower margins of said rail, a stop having a horizontal slot therethrough to receive the lateral web of the rail, means for securing said stop against movement along the lateral web, and a member on said car adapted to strike said stop.

15. A monorail system comprising a T-shaped rail, a car, wheels on said car adapted to travel along said rail, a stop having a horizontal slot therethrough to receive the lateral web of the rail, means for securing the stop against movement along the lateral web, a member on said car adapted to strike said stop, and laterally extending arms on said stop to engage said member as said car nears the stop.

16. A monorail system comprising a T-shaped rail, a car, wheels on said car adapted to travel along said rail, a stop attachable anywhere along the lateral web of the rail, fastening means for holding said stop against movement along the lateral web, a

cavity formed in one side of the stop, a resilient bumper projecting from said cavity, arms projecting from said stop having portions adjacent their outer extremities flexed towards one another, a member on said car adapted to strike said stop and having recesses therein adapted to be engaged by the flexed portions of said arms so that the car is held by the latter against rebound.

17. A monorail system comprising a T-shaped rail, a car, wheels on said car adapted to travel on the margins of said rail, a stop on the lateral web of said rail, means for attaching said stop anywhere along said lateral web, a member on said car adapted to strike said stop, and a safety clamp on said stop extending upwardly in front of the rail face remote from said lateral web adapted to engage said face if the stop attaching means becomes loose and prevent the stop from falling from said rail.

18. A monorail system comprising a T-shaped rail, a car, wheels on the car adapted to ride on the upper and lower rail margins, a stop having a horizontal slot to engage the lateral web of the rail, fastening means for holding said stop against movement along said lateral web, said stop having a second slot therein to support an arm the extremity of which projects towards the car, a safety clamp having forwardly projecting portions in front of the face of the rail remote from its lateral web adapted to engage the said rail face if the stop fastening means becomes loose and prevent the stop from falling off the rail, and lugs on said clamp which bear against one edge of said arm and hold it in its slot, a second arm on said stop projecting towards the car, and a member on said car adapted to be received between said arms as said car nears said stop.

19. A ticket distributing mechanism comprising a rail, a ticket supporting plate, rail engaging means on said plate adapted to travel freely along said rail, and a balancing member carried by said plate to hold the latter in an upright position.

20. A ticket distributing mechanism comprising a rail, a ticket supporting plate, rail engaging means on said plate adapted to travel freely along the upper and lower margins of the rail, and a balancing member carried by the plate to maintain the latter in an upright position.

21. A ticket distributing mechanism comprising a rail, a ticket supporting plate, a ticket engaging means on said plate, rail engaging members on said plate adapted to travel freely along the rail, and a balancing member carried by the plate for maintaining it in an upright position.

22. A ticket distributing mechanism comprising a rail, a ticket supporting plate, a ticket engaging means on one side of the latter, rail engaging means on the other side of

said plate adapted to travel freely along the rail, and means carried by said plate for preventing accidental disengagement of the rail engaging means from the rail.

23. A ticket distributing mechanism comprising a rail, a ticket supporting plate, wheels rotatably mounted at one side of said plate adapted to travel along said rail, resilient tires on said wheels, and a balancing member carried by the plate to maintain it in an upright position.

24. A ticket distributing mechanism comprising a rail, a ticket supporting plate, non-metallic wheels rotatably mounted on one side of the plate adapted to travel along the rail, and a balancing member carried by the plate to maintain the latter in an upright position.

25. A ticket distributing mechanism comprising a rail, a ticket supporting plate, non-metallic wheels on said plate, resilient tires on said wheels, said wheels being adapted to travel along the upper and lower margins of the rail, and a ticket engaging means on said plate.

26. A ticket distributing mechanism comprising a rail, a ticket supporting plate, wheels rotatably mounted at one side of the plate, said wheels being adapted to travel along said rail, a stop attachable anywhere along said rail, a member secured to said plate adapted to strike said stop, and means holding said member and stop together when the former strikes the latter.

27. A ticket distributing mechanism comprising a rail, a ticket supporting plate, wheels rotatably mounted at one side of said plate adapted to travel along the upper and lower margins of the rail, a balancing member carried by the plate for maintaining it in an upright position, and means for varying the distance between the wheels to bring them into engagement with the rail margins as their peripheries wear.

28. A monorail system comprising a rail, a ticket supporting plate, wheels revolvably mounted on said plate adapted to travel along the upper and lower margins of the rail, and means carried by the plate for preventing accidental disengagement of the wheels from the rail.

29. A monorail system comprising a rail, a ticket supporting plate, rubber tired wheels carried by said plate adapted to travel along the upper and lower margins of the rail, a ticket engaging means on said plate, and means for varying the distance between the wheels so that adjustment may be made for tire wear.

30. A monorail system comprising a rail, a car having a ticket supporting plate thereon, rail engaging means on said car adapted to travel along the rail, a stop attachable anywhere along said rail, said car being adapted

70

75

80

85

90

95

100

105

110

115

120

125

130

to strike said stop, and means holding said car and stop together when the former strikes the latter.

ly of their length so that the said flexed portions may engage corresponding recesses formed in portions of said car.

PETER J. KOSTER.
ALBERT A. KOORS.

- 5 31. A ticket distributing mechanism comprising a rail, a ticket supporting plate, a ticket engaging means on said plate, non-metallic wheels rotatably mounted on said plate adapted to travel along said rail, and a member carried by said plate to maintain the latter in an upright position.
- 10 32. A ticket distributing mechanism comprising a rail, a ticket supporting plate, wheels carried by said plate adapted to travel along said rail, a member secured to said plate, a stop attachable anywhere along said rail, a resilient bumper projecting from said stop, and cooperating means on said member and stop for holding the former against the latter when the plate strikes the bumper.
- 20 33. A monorail car comprising a plate, means on one side of said plate for holding a ticket thereon, and wheels rotatably mounted relative to said plate and disposed on the other side thereof, said wheels being adapted to travel along the upper and lower margins of a monorail.
- 25 34. A monorail car comprising a vertical plate, wheels rotatably mounted on one side of said plate, said wheels being adapted to travel along the upper and lower margins of a monorail, and means for varying the vertical distance between the wheels that travel along the upper and lower monorail margins.
- 30 35. A monorail car comprising a vertical plate, wheels on one side of said plate adapted to travel along the upper and lower margins of a monorail, means on said plate for supporting an article to be carried by said car, and a balancing member on said plate to hold it in its vertical position when travelling along the monorail.
- 35 36. A vertical plate, wheels mounted thereon adjacent its upper and lower margins, said wheels being adapted to travel along the upper and lower margins of a monorail, means on said plate for holding an article to be carried, a balancing member on said plate, and means for varying the vertical distance between the upper and lower wheels.
- 40 37. A stop having a slot therein adapted to receive the lateral web of a T-shaped monorail, means for holding said stop immovable on said monorail, and arms projecting from said stop in alignment with said monorail adapted to engage a car as the latter approaches along said monorail and hold said car against rebound.
- 45 38. A stop adapted to be secured to a monorail, and resilient arms on said stop extending one above the other in alignment with the monorail adapted to engage a car as it approaches along the monorail, said arms being flexed towards one another intermediate-
- 50 55 60 65

70

75

80

85

90

95

100

105

110

115

120

125

130