June 3, 1969 H. F. GORHAM 3,447,481

LOCOMOTOR AND RAIL APPARATUS THEREFOR

Filed March 14, 1966

Sheet 1 of 3

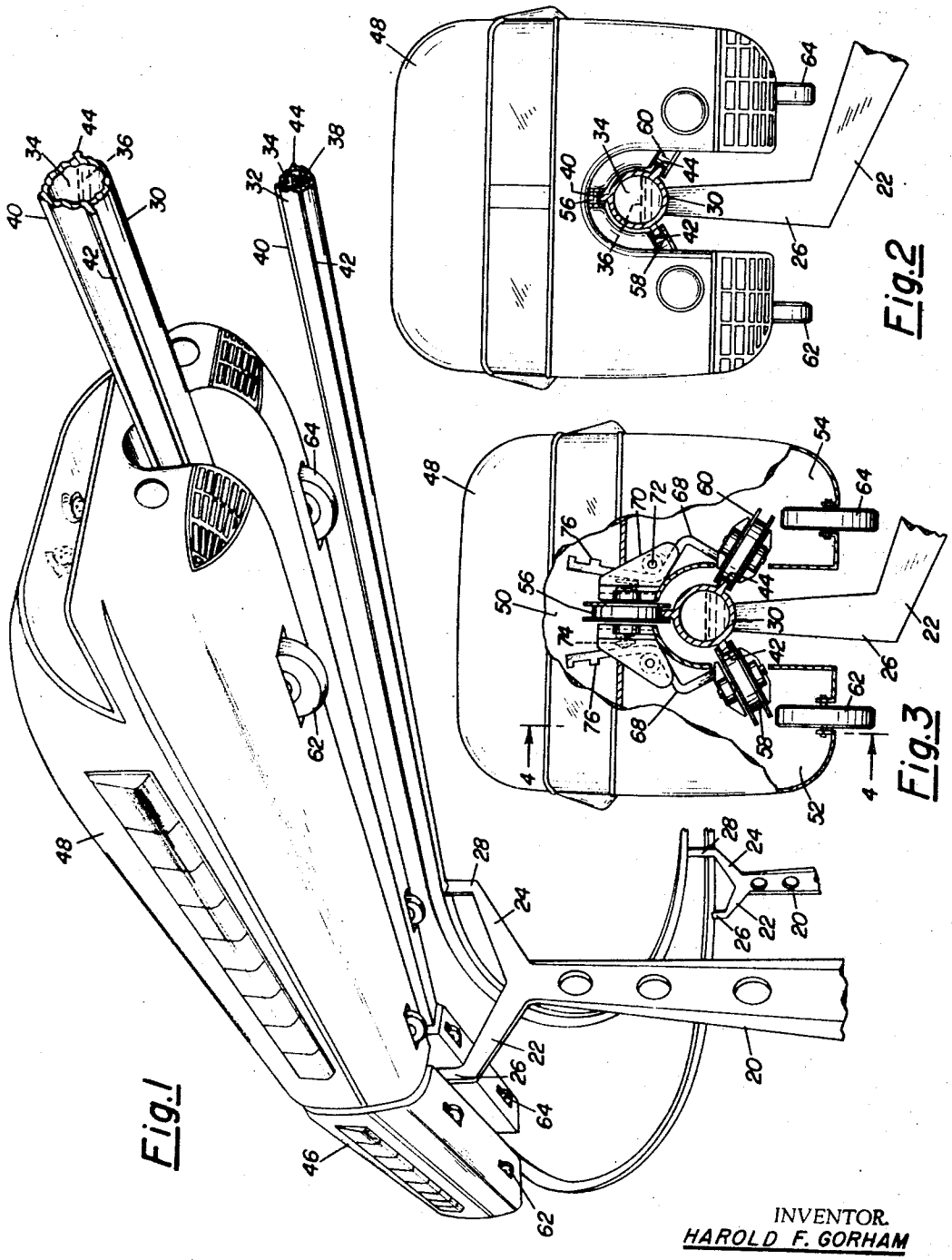


Fig. 1

Fig. 2

Fig. 3

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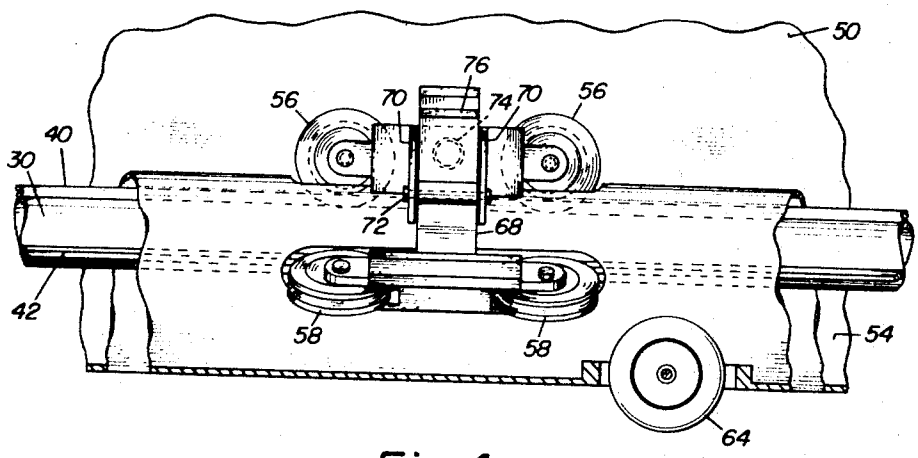


Fig. 4

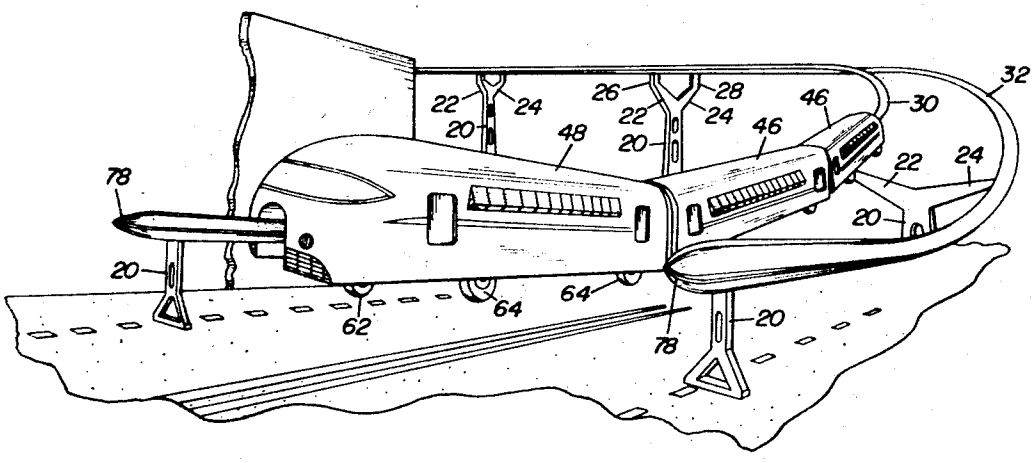


Fig. 5

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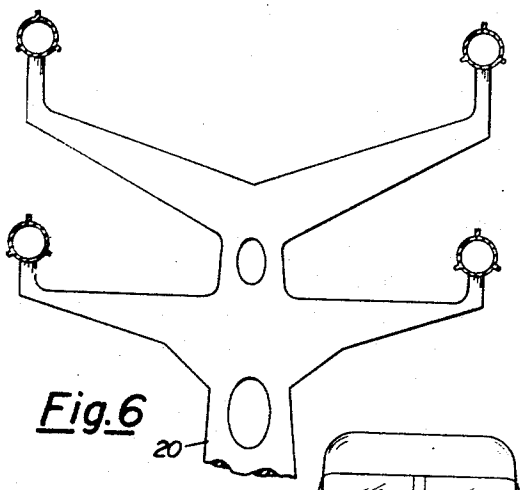


Fig.6

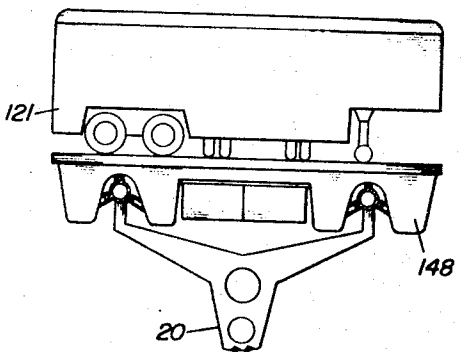


Fig.8

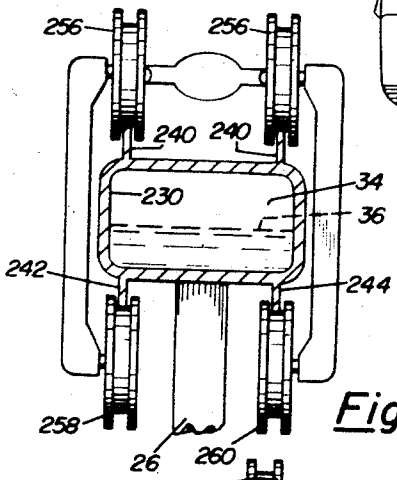


Fig.10

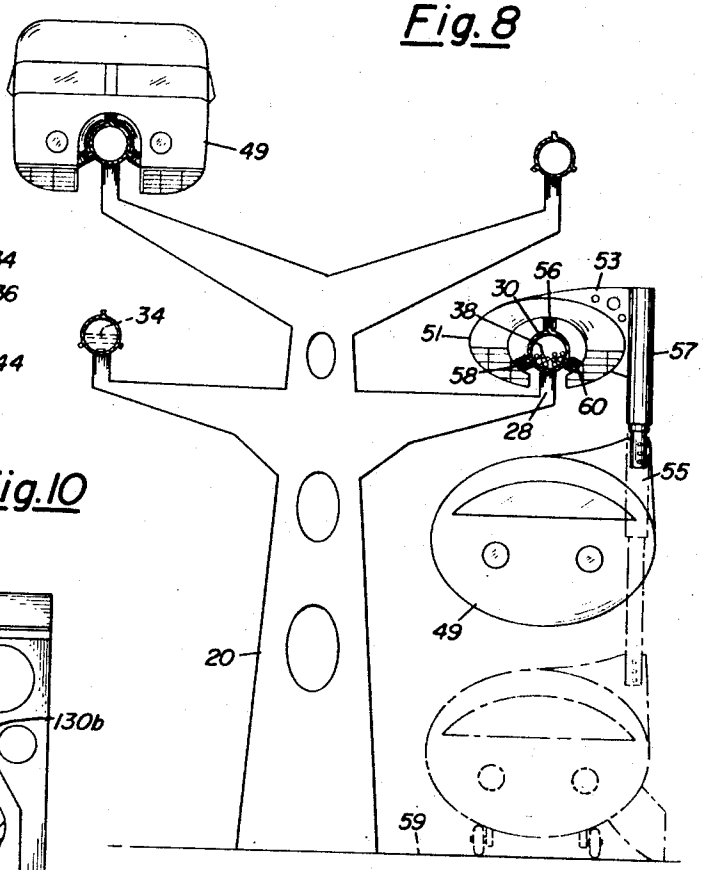


Fig.7

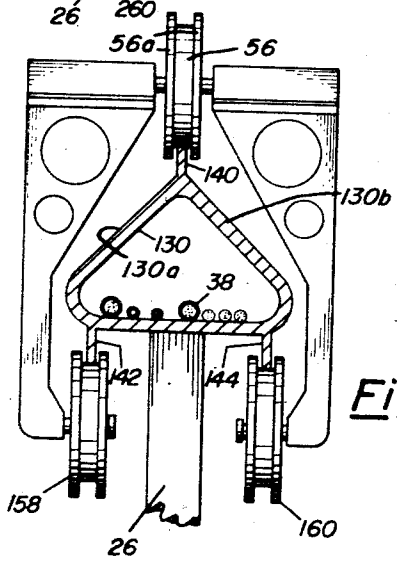


Fig.9

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LOCOMOTOR AND RAIL APPARATUS THEREFOR

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U.S. Cl. 104—120 6 Claims

ABSTRACT OF THE DISCLOSURE

A locomotor and rail therefor in which the locomotor includes a car having an upper compartment and two depending compartments. The compartments are for passengers, freight and equipment for driving the locomotor. The side compartments are spaced from one another for receiving the rail which carries the locomotor. The center of gravity of the locomotor is above the rail.

The present invention relates to locomotors and rails therefor, the latter being known generally as a monorail.

One aspect of the present invention contemplates rail means which form an upwardly facing track surface and a downwardly facing track surface for a locomotor. The locomotor is provided with a support or supports, which are disposed above the center of gravity of the locomotor for dependingly supporting the locomotor above the upwardly facing surface of the rail means. The locomotor is also provided with means below the downwardly facing surface of the rail means for limiting the upward movement of the locomotor. In one form of the invention, the locomotor is provided with an upper compartment for passengers and/or freight and is also provided with spaced lower compartments which are disposed on opposite sides of the rail means.

In another aspect of the invention, the rail means is hollow to form an elongated passage, for example, for fluid or conductors.

In still another aspect of the invention, a plurality of posts are provided; each of the posts having two laterally extending arms and each having an upwardly extending section. These sections are disposed above one another, and each of the upwardly extending sections carries a rail means. These rail means are also provided with upwardly facing track sections and downwardly facing track sections for supporting and guiding the locomotor, one above the other.

In still another aspect of the invention, the entire car or locomotor depends below the rail means and mechanism is provided for raising and lowering the locomotor from and to ground level.

Other features and the advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein preferred embodiments of the invention are illustrated.

In the drawings:

FIG. 1 is a perspective view showing a plurality of rail means, arranged substantially in parallel, horizontal relationship, one of the rail means being shown as dependingly supporting a locomotor, the view also showing two posts for supporting the rail means;

FIG. 2 is a front view of the locomotor and showing one arm of the post and also showing the track means in cross section;

FIG. 3 is a view showing part of the front of the locomotor broken away to show the mechanism for supporting and guiding the locomotor;

FIG. 4 is a fragmentary, sectional view taken along line 4—4 of FIG. 3;

FIG. 5 is a fragmentary view of a terminal showing the train of locomotors on one of the rail means;

FIG. 6 is a fragmentary view of the upper part of a post having two pairs of laternally extending arms carrying rail means, one pair of the laterally extending arms being disposed above the other;

FIG. 7 is a view showing the posts as shown in FIG. 6, and in addition, shows a locomotor on one of the rail means, the locomotor being the same as that shown in FIG. 1, and also showing another embodiment of the locomotor in which the entire locomotor is dependent from one of the rail means;

FIG. 8 is a view showing how an elongated element can be carried by a locomotor which rides upon two of the rail means;

FIG. 9 is a cross sectional view of the rail means of the type having two upwardly facing tracks; and

FIG. 10 is a fragmentary view of the rail means in which the body thereof is triangular in shape.

Referring generally to the drawings, a series of posts **20**, suitably supported on the ground, extends from terminal to terminal. These posts include laterally extending arms **22** and **24**, each having an upwardly extending section **26** and **28**, respectively. The upper end of the upwardly extending sections carries rail means **30** and **32**, respectively. The rail means are hollow to form elongated passages **34** for fluids such as gas or oil and for carrying other materials such as insulated wires. The fluid is shown as liquid **36** and the wires are shown at **38**.

Each of the rail means forms an upwardly facing forming a track **40** and at least one and preferably two, downwardly facing surfaces forming tracks **42** and **44**.

The rail means are adapted to support cars **46**, one of which is in the form of a locomotor **48**. In the embodiment shown in FIGS. 1 to 5, inclusive, each of the cars **46** has an inverted U-shape in transverse section and is provided with an upper compartment **50** for passengers and/or freight and two lower compartments **52** and **54**, which are disposed on opposite sides of the rail means. The machinery for driving the train of cars is disposed within the lower compartments **52** and **54**, which compartments may also serve as passenger and freight compartments.

The car **48** may be driven in either direction by any suitable means as, for example, by one or a plurality of jet engines such as that shown in the Brown Patent No. 3,006,288 or by an impeller engine which is also shown in the Brown patent. The entire car may be supported on air upon the upper track **40** such as that shown in the Cockerell Patent No. 3,174,440, or as shown in the drawing, upon wheels **56** which ride upon the upper track **44**. Derailing of the car is prevented by a series of rim type wheels **58** and **60**. The bottom of the car carries ground engaging wheels **62** and **64**. The front ground engaging wheels, will of course, be mounted for turning about vertically extending axles for guiding the car when it is removed from the rail means. Such latter construction could be similar to that now employed in automobiles. FIG. 5 shows the train being progressively lowered, the two rear cars being suspended from the rail means while the front car **48** is resting upon the ground wheels **62** and **64**.

The car is designed so that the surface thereof, immediately above the track **40**, is above the center of gravity of the car, i.e., all heavy machinery is disposed within the compartments **52** and **54**, so that although the upper compartment **50** is loaded to capacity with passengers and/or freight the center of gravity is below the track **40**. In this manner, the cars cannot be overturned, should the derailing mechanism fail. Too, in negotiating a curve, centrifugal force will tend to throw the lower part of the car away from the axis of the curve and the upper passenger compartment toward the axis of the curve. It will be understood that rail means, i.e., the tracks **40**, **42**, and **44**, will be positioned at angles relative to

that shown in FIGS. 2 and 3 to compensate for the tilting of the car as it negotiates a curve. For example, when the train is moving and negotiating a curve as shown in FIG. 1, the tracks **40**, **42** and **44** will be in positions which are disposed clockwise from that shown in FIGS. 2 and 3.

Referring more particularly to FIG. 3, the wheels **58** and **60** are suitably journaled on levers **68**, which are pivotally mounted on brackets **70** by pins **72**. The upper ends of the levers **68** are forced outwardly by coil springs **74**, but outward movement of the levers is limited by stops **76** whereby normally there is a clearance between surfaces **42** and **44** and the intermediate surfaces of the rimmed wheels **58** and **60**. The cars may be lifted from the tracks by moving the wheels **58** and **60** outwardly and this is done by pulling the upper ends of the levers **68** toward one another sufficiently whereby the rims of the wheels can clear the tracks **42** and **44**.

Referring now to the disclosure in FIG. 5, it will be seen that the end **78** of the rail means **30** and **32**, are tapered, the purpose being for the ready receiving of the wheels **56**, **58** and **60** when the car is backed off the rail means and on the rail means.

As seen in FIGS. 6 and 7, the posts may be provided with two pairs of arms for supporting four rail means, whereby trains may be manipulated one above the other. In each instance, the rail means may be hollow, as previously disclosed.

In the embodiment shown in FIG. 8, the locomotor **148** is of the type which spans and rides upon two rail means for the purpose of conveying elongated bodies, such as the truck shown at **121**.

Referring now to the embodiment shown in FIG. 9, it will be seen that the rail means **130** is triangularly shaped in cross section. The upper track **140** is carried at the apex of the hollow rail means **130** and the tracks **142** and **144** depend from the bottom of the hollow rail means. In FIG. 10, the hollow section of the rail means **230** is rectangular in section. In this embodiment, the car is carried by two wheels **256**, which ride respectively on two upper tracks **240**. The derail preventing wheels are shown at **258** and **260** and the tracks therefor, are shown at **242** and **244**.

Referring to FIGS. 3 and 9, and particularly to FIG. 9, it will be seen that the rail means **130** is in the form of a longitudinally extending tube having a centrally disposed upright section **140** which provides an upwardly facing surface forming a track. The wheel **56** is provided with opposite side flanges **56***a* which are spaced a greater distance from one another than the width of the track section **140**, and functions to limit side play of the wheel. Two sections **130***a* and **130***b* extend downwardly from opposite sides of the bottom of section **140**. Third and fourth sections **142** and **144** extend downwardly from the bottoms, respectively, of sections **130***a* and **130***b*, and the outer ends of these sections have downwardly facing surfaces forming tracks for wheels **158** and **160**, respectively. These wheels have flanges like those on wheel **56** to limit side play.

The upper track, being relatively narrow, can support only a narrow width of snow or ice which would be crushed readily when the wheel **56** moves over the same. Too, since the side sections **130***a* and **130***b* slope downwardly, water falling thereon will drain readily therefrom and consequently ice will not build to any detrimental height on those sections. It is also apparent that when snow falls on these declinging surfaces, it will slide off or will not be built to a detrimental height.

The same results are achieved by the rail structure shown in FIG. 3.

Referring now to the embodiment shown in FIG. 7, wherein the entire car **49** depends from the rail means **30** of the track previously described, the rail means carries an elongated body **51** which extends along the rail means and carries the wheels **56**, **58** and **60**. This body **51** encircles the rail means **30** except for the lower portion

thereof which receives the extension **28** on the posts **30**. A plurality of arms, one of which is shown at **53**, is affixed to the top of the body **51** and extends to one side thereof. Any suitable elevating and de-elevating means is interposed between the outer end of arm **53** and the outer ends **55** at the top of the car **49**. The elevating means is herein shown specifically as a multiple cylinder and multiple ram hydraulic hoist **57**. This hydraulic hoist is operated by the engineer in the car **49** for raising and lowering all of the cars **49**. The car **49** can be lowered from the position shown in full lines in FIG. 7 to the dotted line position which is at ground level, indicated at **59**, for the convenience of loading and unloading the car. It will, of course, be understood that the car will be elevated to the position shown in full lines during transit.

While the forms of embodiment herein shown and described constitute preferred forms, it is to be understood that other forms may be adopted falling within the scope of the claims that follow.

I claim:

1. A combination comprising:

(A) rail means having an upright section, said section having an upwardly facing surface forming a track, sections extending immediately downwardly from the opposite sides of the bottom of the upright section, sections extending downwardly and outwardly from the opposite sides of the lower ends of the second mentioned sections, each of the outer ends of the third and fourth mentioned sections having a downwardly facing surface forming a track;

(B) an inverted U-shaped car having an upper compartment and side compartments for passengers or freight, said side compartments being spaced from one another and said rail means being disposed in the space between the side compartments, said car including a wheel riding on the first mentioned track, and wheels engageable with the second mentioned tracks, said wheels each having side flanges spaced from one another at a distance greater than the width of the sections forming the tracks;

(C) means disposed in the space between the side compartments and above the center of gravity of the car and above the upwardly facing surface of the upper track, forming a support for dependingly supporting the car.

2. A combination as defined in claim **1**, characterized in that the rail means is a longitudinally extending tube.

3. A combination as defined in claim **1**, characterized to include:

(E) a lever, said means (D) being carried by the lever;

(F) means for pivotally supporting the lever on the second mentioned means.

4. A combination as defined in claim **1**, characterized in that the means (D) is a wheel; and further characterized to include:

(E) a lever carrying said wheel;

(F) means for pivotally supporting the lever on the second mentioned means.

5. A combination comprising:

(A) a plurality of aligned posts each having:

(1) a laterally extending arm;

(B) rail means carried on the outer ends of the arms, said rail means having:

(1) an upper, upwardly facing surface forming a track,

(2) a lower, downwardly facing surface forming a track;

(C) an elongated body;

(D) means carried by the body and riding on the upper surface of the rail means for supporting the body;

(E) means carried by the body below the downwardly facing surface and engageable with the latter surface for limiting upward movement of the body;

(F) a car;

(G) means fixed to the body and connected with and

extending outwardly of the outer ends of the arms for suspending the car below the arms and alongside of the posts, said last mentioned means including:

(1) means for raising and lowering the car relative to the body (C).

6. A combination as defined in claim **5**, characterized to include:

(H) a lever for carrying the means (E);

(I) means for pivotally supporting the lever on the body.

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