

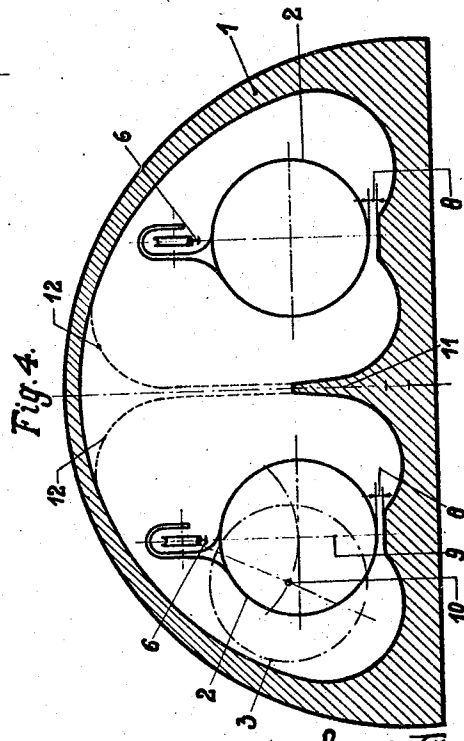
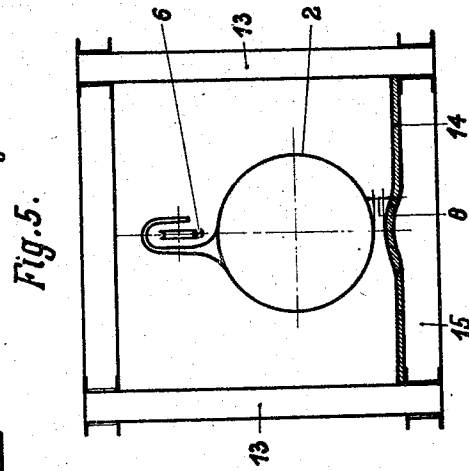
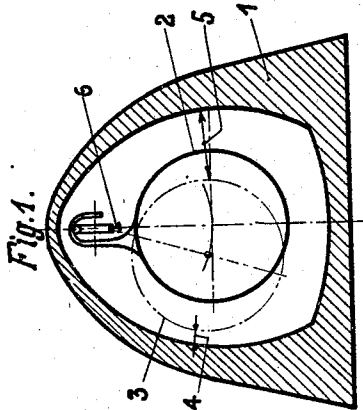
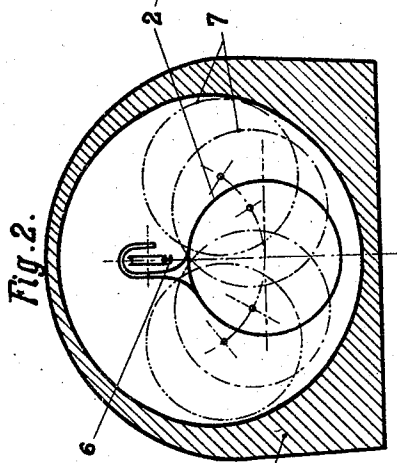
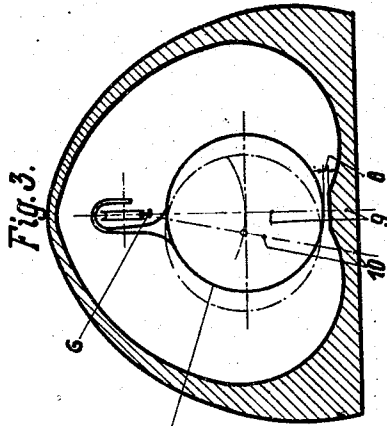
Nov. 16, 1926.

F. KRUCKENBERG

1,607,260

MEANS FOR AVOIDANCE OF SIDE OSCILLATIONS OF MONORAIL CARS

Filed Jan. 24, 1925



Inventor:
Fritz Kruckenberg,
By Byron Townsend & Crickenstein,
Attys.

UNITED STATES PATENT OFFICE.

FRANZ KRUCKENBERG, OF HEIDELBERG, GERMANY.

MEANS FOR AVOIDANCE OF SIDE OSCILLATIONS OF MONORAIL CARS.

Application filed January 24, 1925, Serial No. 4,577, and in Germany May 15, 1924.

In propelling high speed cars in tunnels, particularly with monorailways, when the clearance between the car and the wall of the tunnel diminishes a reduction of pressure is experienced on account of the velocity of the air. The pressure varies with the square of the speed. Consequently the car experiences a sucking effect from the tunnel wall. If the car is not equidistant from either wall of the tunnel for any reason, such as on oscillation due to a change of direction of the track or unsymmetrical load or is running in a double track tunnel, the danger exists, that the car may be drawn against one of the tunnel walls.

Fig. 1 shows the tunnel section 1, with the car 2 of a suspension railway. Should the car for any reason have reached the position 3, the air pressure at 4 is much less than at 5 and the side swinging of the car will be consequently increased, until it is possible, that the car will strike the tunnel wall and be destroyed.

In order to avoid such an accident we must make the tunnel section sufficiently great and give the supporting rail 6 a suitable position as in Fig. 2. The small, easily produced oscillations can however be increased by the sucking action of the nearer wall of the tunnel and cause oscillations about the middle position, which would be unendurable for the passengers.

The solution of these difficulties as shown in Fig. 3 consists in forming the tunnel section in such a way, and placing the rail in such a position, that the clearance between the car and the floor of the tunnel at 8 in the vertical section 9 is much smaller, than the clearance at the sides. At the lower part of the car there exists therefore a sucking force, which in a small deviation 10 of the car from the center line 9 does not act in the line of support 6, and so increases the gravitational moment by the returning moment produced by a suitable diminishing of the section at 8, so that the sucking of the tunnel wall is neutralized or exceeded.

In Fig. 4 the same case is shown for a double track tunnel. Here the clearances between the cars and the right and left hand wall of the tunnel are very different. In order to neutralize in this case the suction of the walls, the air-stream section for each car can be diminished by a center wall 11,

which may be prolonged along the whole length of the track and which is indicated by the dotted lines 12.

Naturally the means for producing the sucking action on the lower part of the car can be employed in the open air, e. g. on bridges to prevent side swingings and to neutralize the moments caused by sidewinds. In Fig. 5 for this purpose have been provided along the horizontal girder 15 of the bridge 13 a floor or platform 14, so that it is nearest to the floor of the car at 8 and prevents the air stream from moving downwards. In the case of the car's hanging below a bridge, this floor or platform 14 can be replaced by the ground itself or by a construction on the ground or an extension of the bridge. If the bridge is covered in against atmospheric influences the conditions are the same, as shown in Figs. 3 and 4, further description of which is unnecessary.

The above description can also apply in the case of monorailways with gyroscopic stabilization, the effect of gravity must be replaced in the description by the gyroscopic effect and the upward and downward directions be inverted; also for other high speed railways wherever severe side oscillations are possible.

What I claim is:

1. A high speed railway system having means for preventing oscillations of the cars comprising a ridge-like elevation extending into proximity to the path of travel of the bottom of the car whereby at high speed suction is produced on the car and oscillations are restrained.

2. A high speed railway system as claimed in claim 1 comprising a tunnel or tube-like construction, in which the clearance between the car and the wall of the tunnel is relatively small.

3. A high speed railway double track tunnel system, having means for preventing oscillations of the cars comprising a ridge-like elevation extending into proximity to the path of travel of the bottom of the car whereby at high speed suction is produced on the car and oscillations are restrained, and having a wall extending upwardly between the tracks.

In testimony whereof I affix my signature.

FRANZ KRUCKENBERG.