

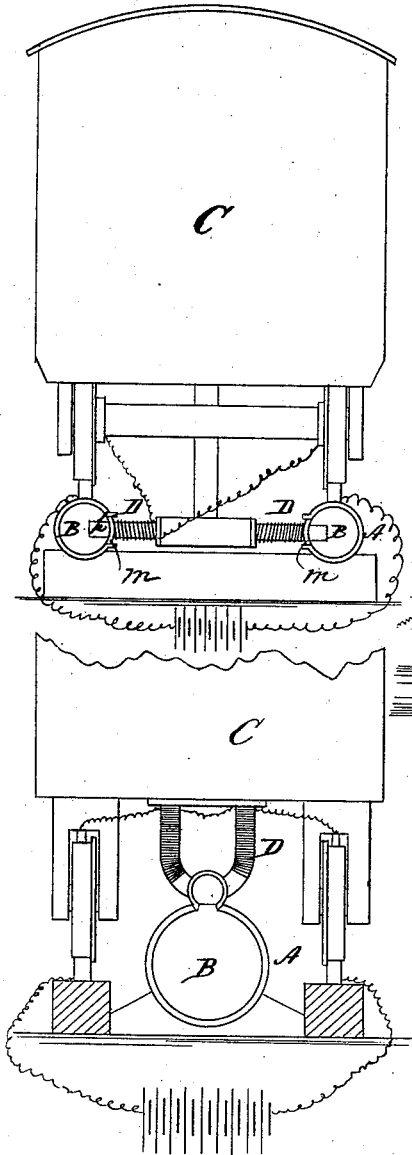
T. A. & A. A. CONNOLLY.

PNEUMATIC RAILWAY AND CONVEYER.

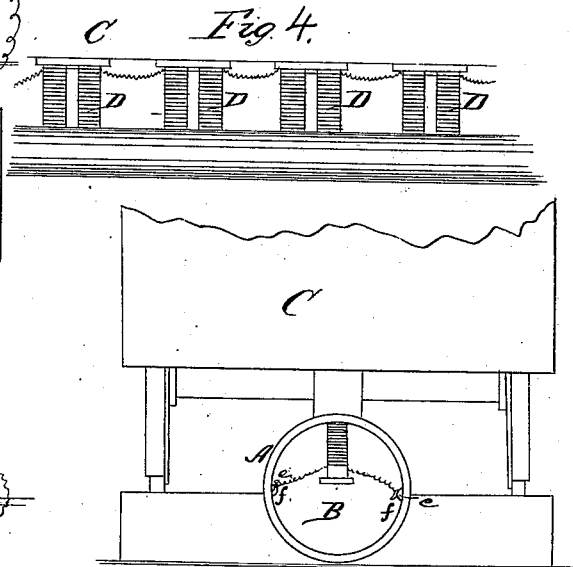
No. 381,907.

Patented May 1, 1888.

*Fig. 1.*



*Fig. 2.*



*Fig. 3.*

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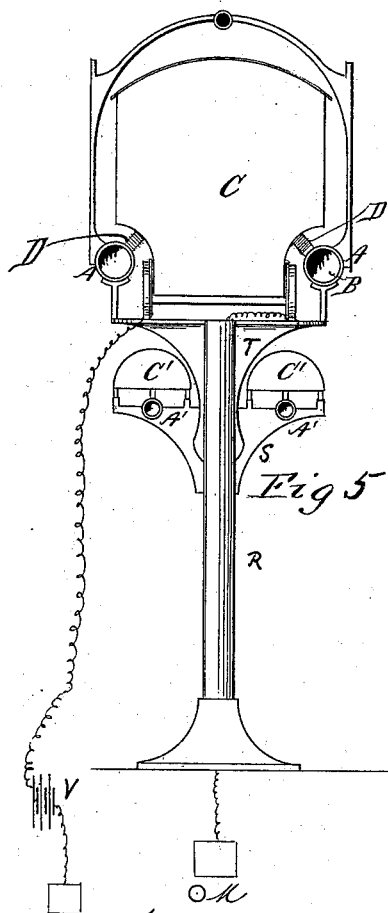


Fig 5

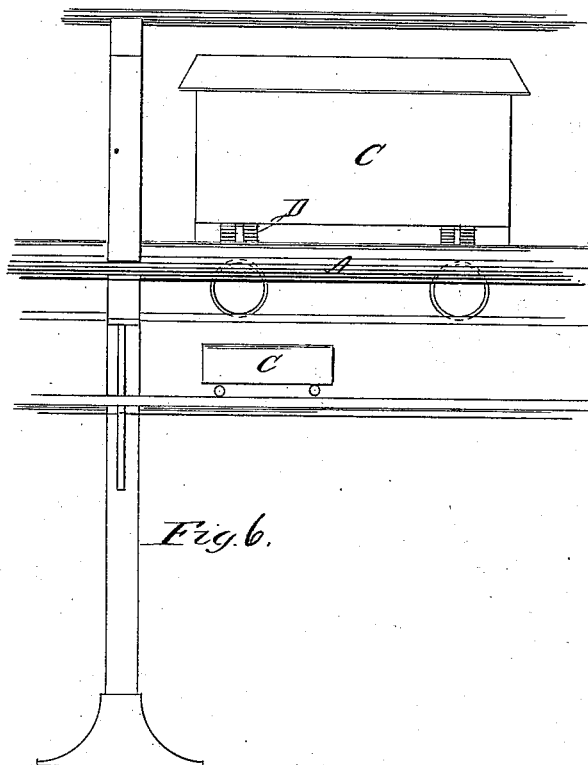


Fig 6

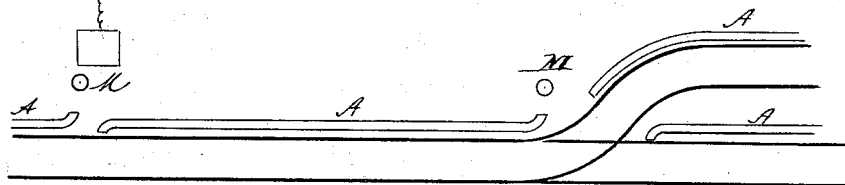


Fig 7

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# UNITED STATES PATENT OFFICE.

THOMAS A. CONNOLLY AND ANTHONY A. CONNOLLY, OF WASHINGTON,  
DISTRICT OF COLUMBIA.

## PNEUMATIC RAILWAY AND CONVEYER.

SPECIFICATION forming part of Letters Patent No. 381,907, dated May 1, 1888.

Application filed June 25, 1881. Serial No. 36,497. (No model.)

*To all whom it may concern:*

Be it known that we, THOMAS A. CONNOLLY and ANTHONY A. CONNOLLY, of Washington, in the District of Columbia, have invented certain new and useful Improvements in Pneumatic or Atmospheric Railways and Conveyers; and we do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification, in which—

Figure 1 is an end view of a railway structure to which our invention is applied. Fig. 2 is an end view of a railway with our invention under a modified plan. Fig. 3 is an end view of a railway under a different modification of our invention. Fig. 4 is a side view of a pneumatic tube and a series of coupling-magnets arranged above or beside the same. Fig. 5 is an end view of an elevated-railway structure embodying our invention. Fig. 6 is a side view of the same. Fig. 7 is a plan view or diagram of a line of railway constructed according to our "block-system" plan.

Our invention has relation to atmospheric or pneumatic railways or transit systems, whereby a car, train, or carrier is propelled through the medium of a pneumatic tube, its piston, and necessary appliances, while said car, train, or carrier is arranged and adapted to travel outside said tube.

Our invention has for its object the perfection of means for establishing, maintaining, and controlling connection between the car, train, or carrier and the pneumatic piston by magnetic attraction, the same being obtained by means of electro-magnets carried either on the car or piston and energized from stationary generators, whereby a tube, entirely airtight and unprovided with valves, may be employed, and all the disadvantages and defects incident to other systems of atmospheric transit avoided.

Referring to the accompanying drawings, A designates a pneumatic tube in which travels the piston B, propelled in the usual or any suitable manner—as by creating a vacuum in

front or a plenum behind. This tube may be made of wood, terra-cotta, glass, or other non-magnetic material—that is, preferably of any material save iron or steel, although under proper conditions iron or steel may be used, such conditions being that the structure and arrangement of the tube shall isolate it from interfering with or obstructing magnetic attraction.

The piston, for the purposes of our invention, is made either wholly or in part of iron or steel, so as to possess high magnetic attractive properties or be capable of being rendered magnetically attractive or responsive.

C designates the car or carrier, upon which is mounted an electro magnet or magnets, D, so constructed that they may be highly charged or energized. The poles, or either thereof, when the car or carrier is in position, oppose and are in close proximity to or touch the surface of the tube, so as to exert its attractive influence through the same and upon the piston, which thereby becomes an armature to said magnet. The attraction between the armature and the magnet thus constitutes a coupling of a strength corresponding to the intensity of the attractive relations and the distance intervening between the piston and the magnet.

Although the attractive force or influence of a magnet is inversely as the square of the distance of its armature, we have found by experiment that comparatively little attractive force is necessary to maintain a coupling between the traveling piston and the body moved thereby; hence a tube of sufficient thickness of wall for practical purposes may be employed and the coupling preserved therethrough.

The battery or generator for energizing the magnet may be stationed at any point on the line of travel and led to the car by suitable conductors—such, for instance, as the rails—the current making circuit through the wheels, as shown in Fig. 2.

Instead of locating the magnet on the car or carrier it may be attached to or made a part of the piston, and the current generated by a battery or generator on the line of travel and led to the magnet by suitable conducting mediums.

Fig. 3 shows the magnet carried by the pis-

ton, the circuit being made through conducting-rails *e* on the inside of the tube, connection with the magnet being preserved through brushes *f*.

5 In Fig. 1 is shown a non-metallic or non-magnetic piston provided with an armature-piece, *k*, adapted for iron tubes, a non-magnetic strip, *m*, being inserted in the tube, through which attraction is exerted.

10 The plans and modifications under which our invention may be carried into effect are so numerous that a detailed description of all of them is unnecessary. By way of illustration, however, we have shown several different modes of application, to which, however, we do not limit ourselves. Thus in Figs. 1, 5, and 6 we have shown that instead of a single atmospheric tube several tubes of small diameter may be employed, the same constituting together the  
20 propelling apparatus for a single car, train, or carrier. The employment of several atmospheric tubes where heretofore a single tube has been used we regard as an important feature incidental to the uses to which our invention  
25 may be employed.

In Fig. 7 we illustrate, by a diagram, a plan whereby, in a railway or transit system based on our invention, any number of cars, trains, or carriers may be simultaneously conveyed  
30 on a single line of track. For this purpose the tubes *A* are arranged so as to constitute a block system. Each length or block of tube is independent and provided with its own piston and the necessary apparatus, as indicated at *M*, for creating the vacuum or plenum,  
35 so that there may be as many cars, trains, or carriers running independently on the one line of track as there are blocks.

In Figs. 5 and 6 we have shown our invention applied to an elevated railway, of which  
40 *R* are the supporting standards, *S* the superposed frame-work, and *T* the brackets or beams upon which are laid the rails and tubes. In these figures the tubes for the main car or carrier  
45 *C* are located one on either side of the lat-

ter, but any other arrangement may be adopted. A stationary electric generator, *V*, supplies the current to one, or, if desired, to both the rails, whence it passes through the wheels of the car, the electro-magnet *D*, and thence to earth, or  
50 return by way of the metallic frame or trestle.

*C'* *C'* designate small carriers running on separate rails suitably disposed and supported by the frame or trestle work and propelled through the medium of separate tubes *A'*.  
55 Such small carriers may be used for the conveyance of freight, luggage, or the mails, while the main cars are used for the convenience of passengers.

While we have referred to our invention as  
60 a railway system, the employment of rails in the sense in which they are usually understood is not essential, as the tubes themselves may constitute the supports for the carriers. So, too, the employment of atmospheric pressure  
65 is only suggestive, since other mediums may be adopted.

What we claim as our invention is—

The combination, in a railway or transit system or plant, of a pneumatic tube containing a  
70 piston, a car or carrier arranged to travel outside said tube, an electro-magnetic coupling or connection between said car or carrier and said piston, the same consisting of an electro-magnet and armature located the one within the  
75 tube and the other upon the car or carrier, a stationary electric generator outside the car, and an electric current conductor or conductors leading the current through sliding or moving contacts to said magnet, substantially as  
80 and for the purpose described.

In testimony that we claim the foregoing as our own we have hereto affixed our signatures in presence of two witnesses.

THOS. A. CONNOLLY.  
ANTHONY A. CONNOLLY.

Witnesses:

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G. W. P. SWARTZELL.