E. BACHELET.

LEVITATING TRANSMITTING APPARATUS.

APPLICATION FILED APR. 21, 1910. RENEWED JUNE 12, 1911.

1,020,943. **Patented Mar. 19, 1912.**

Fig. 1.

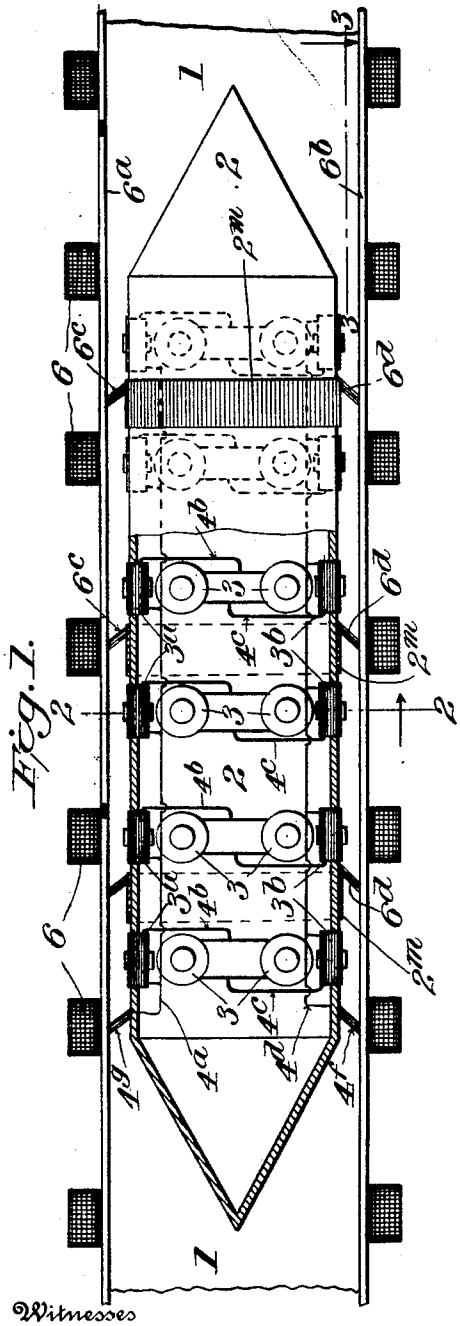


Fig. 3.

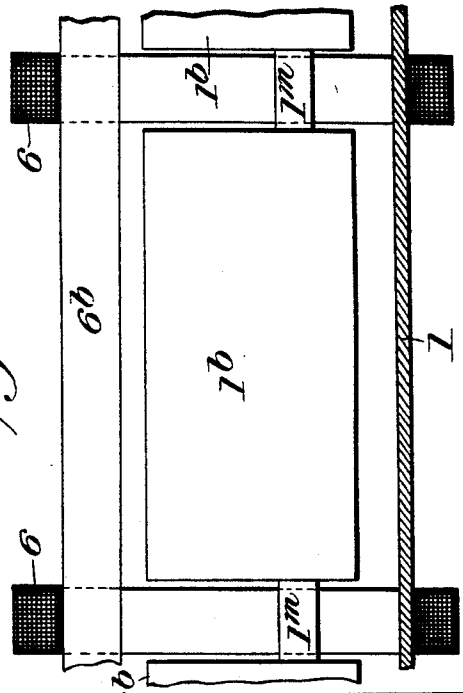
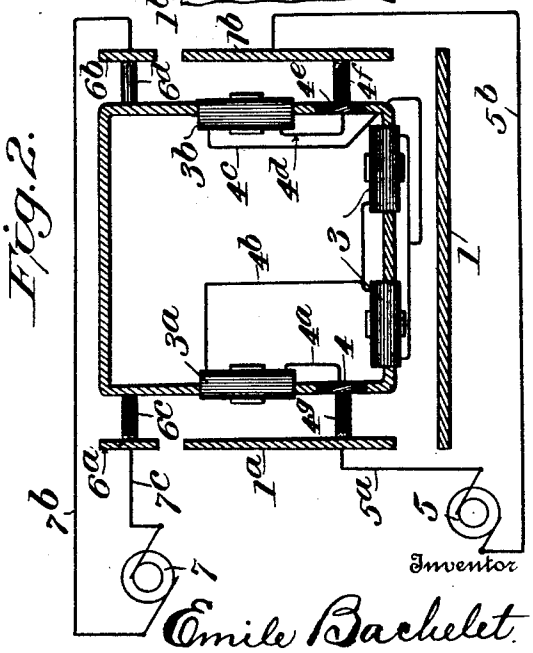


Fig. 2.



Witnesses

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LEVITATING TRANSMITTING APPARATUS.

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Application filed April 21, 1910, Serial No. 556,712. Renewed June 12, 1911. Serial No. 632,772.

To all whom it may concern:

Be it known that I, EMILE BACHELET, of Mount Vernon, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Levitating Transmitting Apparatus; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

This invention is an improvement in levitating transmitting apparatus of the general type disclosed in my application for patent filed April 2, 1910, Serial No. 553,134. In such apparatus the carrier is levitated in a magnetic-field, so as to be practically floated in the air, and may be impelled through such field by suitable means, preferably by electro-magnetic attraction. In said application the magnetic field is established by means of electro-magnets arranged along the path or guide-way to be traversed by the carrier, and are successively energized so as to produce a shifting magnetic field in which the carrier is levitated and caused to move with such field.

It is the object of the present invention to levitate the carrier by means of electro-magnets, mounted thereon and movable therewith, and to provide means whereby such magnets may be continually energized by periodic currents so as to levitate the carrier during its transit from one point along the guide way to another; the guide-way being so constructed that by reason of the repulsion between the magnets and the walls or guide-way which the carrier is to traverse, (or the repulsion between the eddy currents produced in the guide way and the magnetic field producing such currents) the carrier will be floated or suspended in such guide-way and may be caused to traverse the same by any suitable means. I at present prefer to cause the levitated carrier to traverse the guide-way by an arrangement of solenoids, and use the carrier, or parts thereof, as a core or cores of such solenoids; so that the carrier will be sucked or impelled along the guide-way by the successive action of the solenoids mounted therealong.

I will now describe a conventional form of apparatus embodying the invention and illustrated in the accompanying drawings, which will enable any one skilled in the art to thoroughly comprehend the invention and embody same in a practical apparatus,—although of course the construction shown in the drawings is merely illustrative, and the invention is not restricted to the particular apparatus shown therein; but the invention and features thereof for which protection is desired are summarized in the claims.

In said drawings—Figure 1 is a plan view partly broken away of part of a guide-way and of a self levitating carrier in such guide way. Fig. 2 is an enlarged transverse section on line 2—2, Fig. 1. Fig. 3 is an enlarged detail section on line 3—3, Fig. 1.

The guide-way of the carrier is preferably trough-shaped and may be constructed of or lined with non-magnetic conductive material such for instance as pure aluminum, and such parts should be of sufficient thickness to prevent or greatly retard the flow of magnetic lines of force therethrough, as hereinafter described, so that the magnets on the carrier will be forcibly repelled therefrom.

As shown in the drawings the guide-way has a bottom plate 1 and side plates 1^a and 1^b of non-magnetic material; these plates might all be connected, but for purposes of cheapness are made separate. The bottom plate 1 may be practically continuous along the length of the way; but the side plates 1^a and 1^b may be made in sections as hereinafter described.

Within the guide-way formed by the plates 1, 1^a, 1^b, as described, I place a carrier 2 which is of slightly less width than the space between the sides 1^a, 1^b, and may be made of any suitable material, preferably a light non-magnetic metal. In cross section the carrier approximately conforms to the cross section of the guide-way. In the drawings the ways are shown as U-shaped, or approximately rectangular in cross section, and the carrier is similarly shaped; but obviously the guide-way and carrier could be of any other desired form in transverse section, as polygonal, or curved; the essential requisite being that the guide-way shall be sufficiently trough-like to form a guide for the carrier and direct it as it traverses therealong, and therefore I do not wish to be restricted to any particular shape or form of the guide-way, provided the essentials are retained.

The carrier 2 is provided on its sides and

bottom with powerful but light magnets 3, 3^a, 3^b. These magnets are preferably electro-magnets and may be arranged in series along the length of the carrier as shown. I do not however wish to be restricted to any particular number or arrangement of the magnets provided enough are placed on the carrier to levitate it as hereinafter explained. The cores or poles of the magnets are preferably arranged (in each series) to alternate, that is the first magnet in the series may have its N. pole outermost, and the next magnet have its S. pole outermost; and so on. As shown a pair of magnets 3 are arranged in the bottom of the carrier and above the bottom plate 1 of the guide-way; and magnets 3^a are arranged on the side of the carrier adjacent to the side plate 1^a of the guide way; and magnets 3^b are arranged in the side of the carrier adjacent the side plate 1^b of the guide-way. A powerful magnetic field is generated by the poles of such magnets when energized by a periodic current such as an alternating current, or an interrupted direct current, or interrupted alternating current, and they will be repelled from the non-magnetic portions of the walls and bottom of the guide-way, with the result that the carrier will be levitated above the bottom plate 1, and out of contact with the sides 1^a, 1^b, of the guide-way as indicated in Fig. 2. The carrier will be levitated and remain levitated in the magnetic field so long as the magnets continue to be periodically energized; and if the magnetic field is made sufficiently strong the carrier may be utilized to transport matter or material.

The carrier magnets may be energized periodically by current supplied from any suitable source; in some cases it may be feasible to have the carrier contain its own source of electricity for energizing the magnets thereof; but as shown in the drawings the magnets are energized from an exterior current generator; such as an alternating current dynamo located at any suitable point. The magnets may be and preferably are, connected by suitable wiring in series or in multiple so that they will be energized simultaneously. I do not restrict myself to any particular mode of connecting the magnets, but at present prefer to connect each pair of magnets 3^a in multiple, and put them in series with the adjacent magnets 3, 3^b; and as shown the first magnet 3^a of each series is connected by a wire 4^a with a conductor 4 attached to the side of the carrier, but insulated therefrom, and the current passes from the magnet 3^a through wire 4^b to the magnets 3; and thence through wire 4^c to the magnet 3^b; and thence through wire 4^d to a conductor 4^e at the opposite side of the carrier. The conductor 4 is provided with a brush 4^g which is adapted to contact with the plates 1^a, or a suitable conductor adjacent said plates, and to which current is supplied from the generator 5, by a wire 5^a. The conductor 4^e is provided with a brush 4^f which is adapted to contact with the plates 1^b, or a suitable conductor adjacent said plates, from which current is returned to the generator 5 through wire 5^b.

The carrier 2 when levitated may be propelled along the guide-way by any suitable means; for example if the guide-way was closed, or placed within a tube as explained in my prior application, the carrier could be impelled through such closed guide-way by means of suction in front of, or air pressure behind the carrier; or the carrier might carry its own motor as described in my aforesaid application; or it may be impelled along the way by action of solenoids arranged along the way; and in the drawing a number of solenoids 6 are shown as arranged at suitable intervals along the guide-way and are adapted to be energized for a suitable distance in advance of the carrier, as described in my aforesaid application; the solenoids being electrically connected with sectional conductors 6^a and a continuous conductor 6^b arranged along the guide-way. When the circuit is closed between the conductors 6^a and 6^b the solenoids connected with conductors 6^a will be energized. The circuit is closed between the conductors 6^a, 6^b by means of brushes 6^c, 6^d attached to the carrier 2; which brushes may be electrically connected through the carrier in any suitable manner; and if the carrier is made of conductive material it could be used as the electrical connection between the brushes 6^c, 6^d. The conductor 6^b is connected by a wire 7^c to a suitable source of electric current, such as a direct current dynamo 7; the other pole of such dynamo is connected by a wire 7^b with the conductor 6^a. The conductors 6^a, 6^b, may be arranged as described in my aforesaid application, or in other suitable manner, so that a number of solenoids 6 will be energized sufficiently in advance of the carrier to cause the latter to progress along the way; the carrier or parts thereof forming a core for such solenoids and being drawn successively thereinto. The carrier, if of non-magnetic material, may be provided with sheet metal bands 2^m, which act as cores for the solenoids, and assist the solenoids in impelling the carrier along the way as described in my application aforesaid.

As the plates 1, 1^a, 1^b are made of non-magnetic material, for the purpose described, they would have some effect in lessening or retarding the attractive effect of the solenoids on the core or carrier and therefore I propose to make the side plates 1^a, 1^b in sections which extend from one solenoid to the next as indicated in Fig. 3 of the drawings.

If these sections 1^b, 1^a are to be utilized as conductors, as above described, they may be connected through the solenoids by conducting strips 1^m as indicated in Fig. 3 of the drawings.

Preferably I extend the bottom plate 1^a continuously along the way. I have found that the levitating effect is increased by having the non-magnetic portions 1, 1^a, 1^b of the way of considerable thickness, but of course the extent and thickness of such portions will depend upon the size and weight of the carrier to be levitated.

By placing the levitating magnets on the carrier,—and making it, as it were, levitate itself,—the construction is of course greatly simplified and cheapened as only sufficient levitating magnets are required to levitate the carrier and such magnets move with the carrier, and may be continually energized by periodic currents; and thus I create a continuous periodic magnetic field and shift such field bodily with the carrier along the way. This is obviously a much cheaper construction than that described in my aforesaid application, in which it is necessary to provide sufficient magnets all along the way to levitate the carrier at any point therein.

I do not as above stated consider the invention restricted to any particular form or construction of carrier or way; the essential feature of the invention being providing a way and a carrier adapted to traverse such way; and means on the carrier whereby it will be levitated or floated in the way; and means whereby such levitated carrier may be impelled along the way. Of course such levitated carrier may be caused to traverse the way at high velocity and suitable means are provided for arresting the carrier at the end of the way or where desired, such means however form no part of the present invention and need not be described herein.

What I claim is:

1. Transmitting apparatus, comprising a guide-way of non-magnetic conducting material, a carrier provided with electro-magnets, and means to periodically energize such magnets when introduced into such way whereby the carrier is levitated, and means for causing the carrier to traverse said way when levitated.

2. In transmitting apparatus, the combination of a guide-way of non-magnetic conductive material, a carrier, electro-magnets on the carrier, means for periodically energizing such magnets to establish an electro-magnetic-field to levitate the carrier when in such way, and means for moving the carrier along said way when levitated.

3. Transmitting apparatus, comprising a line or guide-way of non-magnetic conductive material, a carrier provided with a series of electro-magnets, means for periodically energizing the magnets to create a magnetic-field around the carrier whereby the carrier is levitated when placed in the line, and means for impelling the carrier along the line when levitated.

4. Transmitting apparatus, comprising an aluminum guide-way, a carrier, a series of electro-magnets thereon, means to periodically energize such magnets to cause them to levitate the carrier when placed in the said guide-way, and means for impelling the carrier along the way while levitated.

5. In transmitting apparatus, the combination of an aluminum guide-way, a carrier adapted to traverse said guide-way, a series of electro-magnets on the carrier, means for periodically energizing the magnets to levitate the carrier when placed in the said guide-way, and electro-magnetic means to impel the carrier along the way while levitated.

6. In combination, a relatively fixed body of non-magnetic conducting material, a carrier, an electro-magnet connected therewith, means for periodically energizing the magnet when opposite said body, whereby the carrier is levitated, and means for causing the carrier to move while levitated.

7. In levitating transmitting apparatus, a carrier, means on the carrier for establishing a periodic electro-magnetic-field, and a guide way for the carrier extending at an angle to the line of repulsion and formed of non-magnetic conducting material, the carrier being adapted to levitate in said guide way when the magnetic-field is established.

8. An electro-magnetic levitating apparatus, comprising a body formed of non-magnetic conducting material, such as aluminum, a carrier, means on the carrier for producing a periodic magnetic-field whereby the carrier is caused to levitate when brought opposite said body, and means for controlling the movement of the carrier.

In testimony that I claim the foregoing as my own, I affix my signature in presence of two witnesses.

EMILE BACHELET.

Witnesses:
C. W. FOWLER,
JAMES R. MANSFIELD.