

**No. 683,283.**

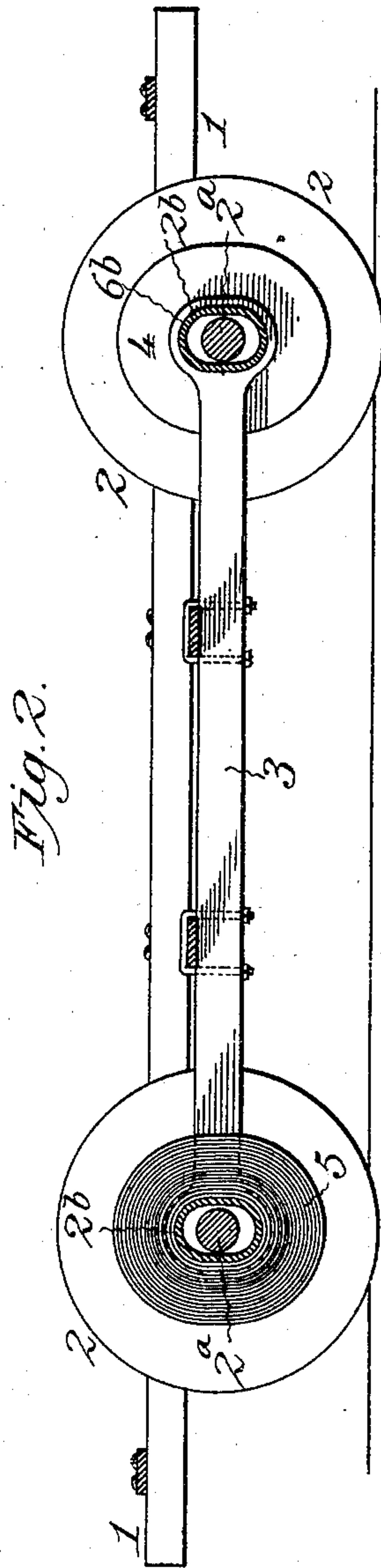
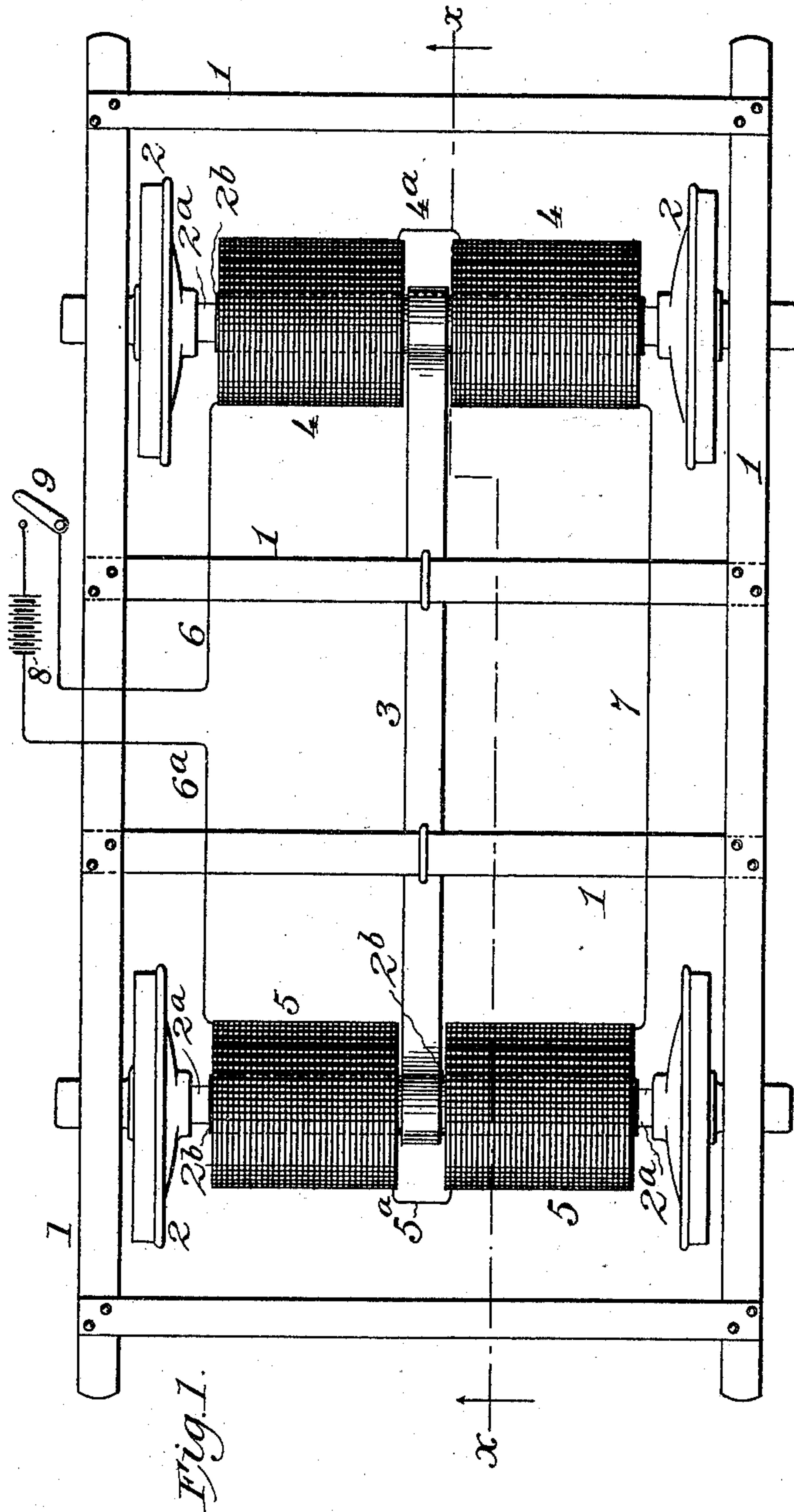
**Patented Sept. 24, 1901.**

**A. A. HONEY.**

## ELECTROMAGNETIC TRACTION INCREASING APPARATUS.

(Application filed Nov. 20, 1900.)

(No Model.)



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# UNITED STATES PATENT OFFICE.

ALBERT A. HONEY, OF TACOMA, WASHINGTON.

## ELECTROMAGNETIC TRACTION-INCREASING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 683,283, dated September 24, 1901.

Application filed November 20, 1900. Serial No. 37,168. (No model.)

*To all whom it may concern:*

Be it known that I, ALBERT A. HONEY, a citizen of the United States, residing at Tacoma, in the county of Pierce and State of Washington, have invented certain new and useful Improvements in Electromagnetic Traction-Increasing Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part thereof.

My invention relates to an electromagnetic traction system for railways, and has for its object the increase of the traction between the wheels of the cars and the rails by the influence of magnetism, the main advantage being the prevention of the slip of the wheels upon the rails by increasing the bearing effectiveness of the wheels thereupon, as will be readily understood.

Other advantages attend the use of my invention, among which may be mentioned the increased safety of the car while in rapid motion by reason of the reduction of its liability to leave the track upon curves or elsewhere. Further, the car will more readily ascend steep grades and may be expeditiously checked upon descending the same. Heretofore, so far as I am aware, cars whether provided with electromagnetic traction-increasers or not have been unable to ascend a grade greater than twelve per cent.; but experiments have shown that by the use of my invention a steeper grade may be readily ascended and with an expenditure of magnetism no greater than has been heretofore employed in other devices having the same general object in view. In the practical use of my invention in ascending and descending steep grades or in stopping or starting the car the use of sand is unnecessary. Furthermore, stops can be effected in the shortest possible time consistent with the safety of the car and its passengers. Great economy is found in the use of this invention by reason of the proper expenditure of all the power transmitted to the motor.

Other advantages of my invention will be evident to those skilled in the art and need not be here enumerated.

In the accompanying drawings, Figure 1 is a plan view of so much of the frame and trucks of an ordinary street-car as is necessary to fully illustrate my invention. Fig. 2

is a sectional elevation upon the line  $x x$  of Fig. 1.

Similar numerals of reference indicate similar parts in the respective figures.

Let 1 1 represent the main portions of the framework of a street-car to which my invention is shown adapted, although equally applicable to railway and other cars of a different type.

2 2 represent the wheels, which are suitably mounted upon axles  $2^a$ , having bearing-boxes. (Not shown.)

$2^b$  indicates a sleeve of elongated shape in cross-section mounted upon each axle  $2^a$ , and 3 shows what I term a "bridge," extending from one axle to the other and provided at each end with an elongated opening  $6^b$ , corresponding in shape with that of the sleeve in cross-section. The axle is thus enabled to rise and fall, as will be readily understood. The bridge 3, which is attached to the frame in any suitable manner or as shown, is of magnetizable metal. The sleeve may, however, in other forms of my invention be circular in cross-section and the bridge not secured to the frame. This arrangement would apply to other forms of truck.

4 and 5 represent magnets or helices, each in two sections, as shown, the two sections of each magnet or helix being mounted upon the sleeve  $2^b$  of one of the axles. The magnets 4 are wound in one direction, while the magnets 5 are wound in the opposite direction. The sections of the magnet or helix 4 are connected by means of a wire  $4^a$ , while the sections of the magnet or helix 5 are similarly united by a wire  $5^a$ . To one section of the magnet 4 is attached a wire 6, while a similar wire  $6^a$  is attached to the corresponding section of the opposite magnet 5. The wire 6 is attached to the positive pole of the magnet 4, while the wire  $6^a$  is secured to the negative pole of the magnet 5. The wires 6  $6^a$  lead to any suitable power producing or conveying agent, as a trolley-wire, storage battery, dynamo, or the like. A wire 7 connects the negative pole of the helix 4 with the positive pole of the helix 5. Thus it will be seen that the magnets are connected in a common circuit.

The function of the bridge 3 is that of converting one section of the helix 4, with the corresponding section of the helix 5, into a horse-



shoe-magnet and also of converting the opposite sections of the helices 4 and 5 into a second independent horseshoe-magnet, it being understood that there is the necessary metallic connection between the two sleeves 2<sup>b</sup> and the bridge 3, the sleeves and bridge being rigidly united.

The several helices 4 5 having been magnetized, the effect is the production of two horseshoe-magnets, the one being composed of one section of the magnet 4, the corresponding section of the magnet 5, and the connecting element or bridge 3, while the other horseshoe-magnet consists of the opposite sections of the two magnets and the same connecting-piece or bridge. The full magnetic influence of these two horseshoe-magnets is, as will be understood, transmitted to the four wheels of the car, which wheels become the poles of the magnets, those parts of the rails between which the wheels rest becoming parts of the magnetic circuit. The car may now be propelled upon the rails by its motor with the same expenditure of power as would be the case were the wheels not magnetized, and the increased tractive or adhesive effect is equal to that produced by an independent horseshoe-magnet of great power for each rail. In the use of the bridge 3 and in the production of two independent horseshoe-magnets, one for each rail, I believe my invention differs from anything which has preceded it, and, furthermore, by the winding reversely of the magnets 4 and 5 I effect advantageous results, which will be well understood.

Supposing the car to be in motion on a steep upgrade, the increased tractive or adhesive effect produced upon the wheels and rails will be of the highest value. Such increase of tractive effect is, I am aware, not new in itself, various attempts having been made to devise means for effectively and economically producing this result; but I believe that heretofore no attempt has been made to obtain between two wheels and the rails upon which they rest the magnetic effect produced by an independent horseshoe-magnet the helices of which are connected by a bridge, as here described. The effect, as has been shown, is the same upon both rails, there being an independent horseshoe-magnet for each rail.

Supposing the car to be descending a steep grade or approaching a curve, when it is necessary that the wheels should be given great adhesion to the rails, my invention produces this result to a most efficient degree. The adhesive or tractive effect may be continuously produced or applied, or it may by the use of suitable switches or other devices be instantly applied or discontinued, as occasion may require.

In the event of the failure of the brake to sufficiently control the car—say when descending a steep grade—there will be gener-

ated sufficient magnetism to effectively resist the movement of the car applied in adhesive or tractive energy. By winding the helices in different directions, the circuits of the electric current required to energize the magnets being connected in series with the motor of the car, the current working against opposite poles creates a frictional magnetic influence sufficient to control the slipping wheels on a downgrade. This frictional energy is only proposed to be used in emergency cases where the normal energizing power is temporarily suspended from any cause, it being obvious that it will have no value in moving the car, but only in stopping it.

Means for energizing and demagnetizing the magnet are provided in the battery 8 and switch 9.

The form in which my invention is here shown is one of many in which it may be embodied. As here illustrated, the sleeve is elongated in cross-section, the ends of the bridge being necessarily of the same shape, and the bridge is attached to the frame. These are not necessary features of my invention. Other changes in construction and arrangement may be made in this vehicle or apparatus without departing from the spirit of my improvement, and such changes or deviations as may suggest themselves to the skilled mechanic without the exercise of invention are considered by me to be within the scope of my claims.

I claim—

1. In an electromagnetic traction-increasing apparatus, the combination of wheels and axles, a sleeve mounted loosely upon each axle, a magnet or helix, each in two sections, mounted upon each of said sleeves, one section of each magnet being wound in one direction and the other section in the opposite direction, a bridge of magnetizable metal connecting the two sleeves, and wires by means of which the magnets are connected in a common circuit, substantially as set forth.

2. In an electromagnetic traction-increasing apparatus, the combination of wheels and axles, a sleeve mounted loosely upon each axle, a magnet or helix, each in two sections, mounted upon each of said sleeves, one section of each magnet being wound in one direction and the other section in the opposite direction, a bridge of magnetizable metal connecting the two sleeves, wires by means of which the magnets are connected in a common circuit, a generator, and means by which the magnets may be energized or demagnetized, substantially as set forth.

In testimony whereof I hereunto set my hand.

ALBERT A. HONEY.

Witnesses:

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GEO. H. HOWARD.