(No Model.)

3 Sheets—Sheet 1.

# J. F. PLACE.

## ELECTRIC TRACTION MOTOR.

No. 559,342. Patented Apr. 28, 1896.

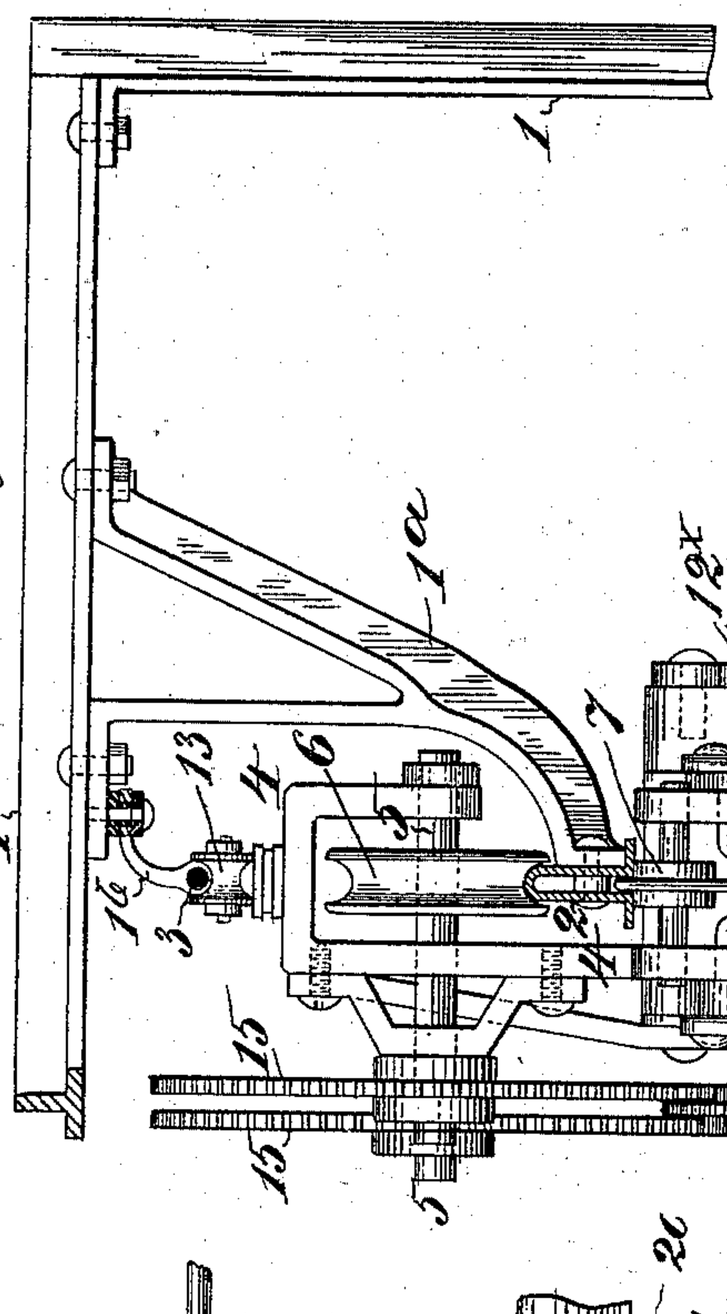

Fig. 2.



Fig. 1.

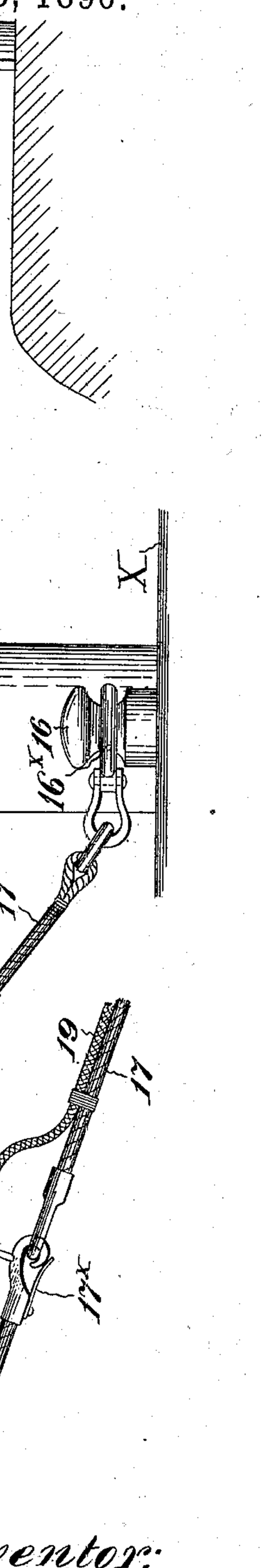

Fig. 1a



Fig. 1b

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(No Model.) 3 Sheets—Sheet 2.

# J. F. PLACE.

## ELECTRIC TRACTION MOTOR.

No. 559,342. Patented Apr. 28, 1896.

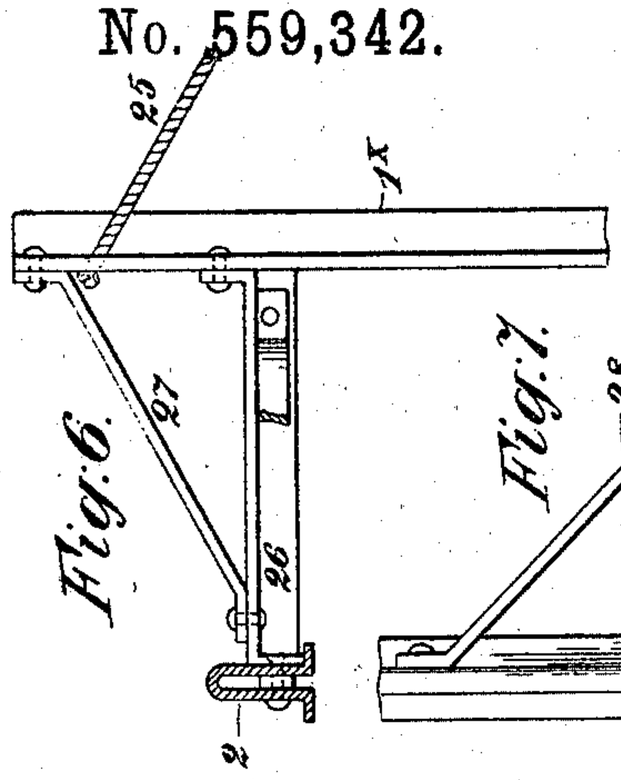


Fig. 6.

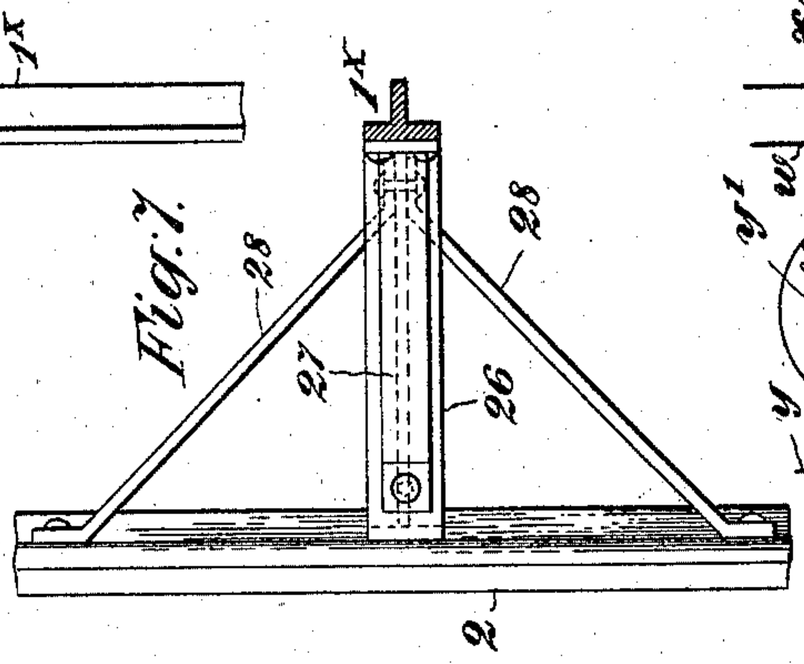


Fig. 7.

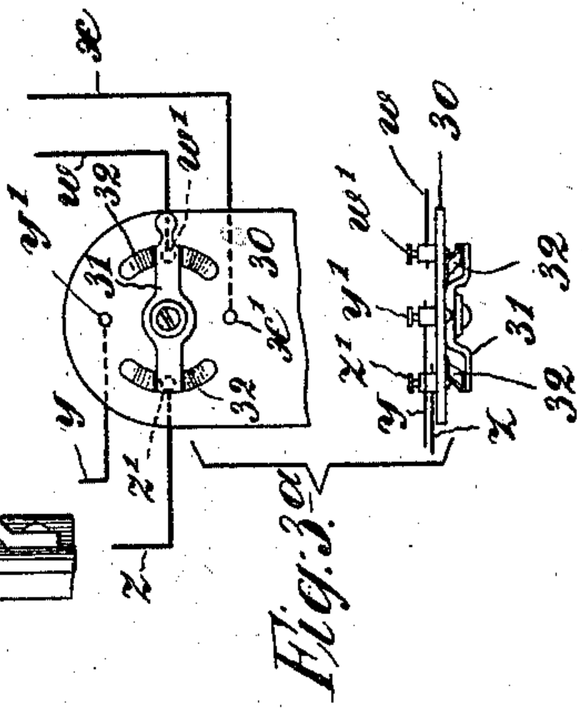


Fig. 3a.

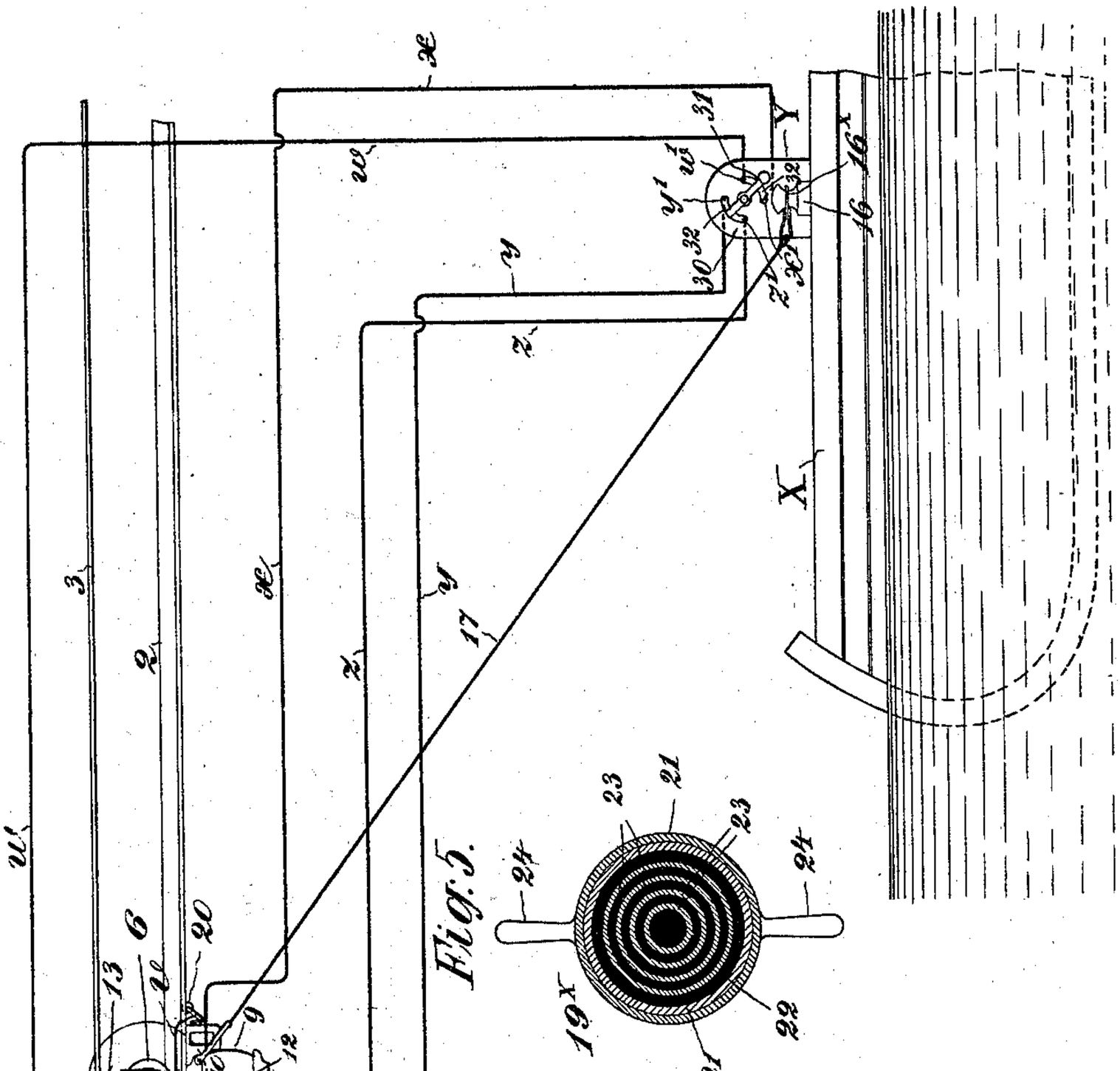


Fig. 3




Fig. 5.

Fig. 4.

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(No Model.) 3 Sheets—Sheet 3.

# J. F. PLACE.

## ELECTRIC TRACTION MOTOR.

No. 559,342. Patented Apr. 28, 1896.

*Fig. 11.*

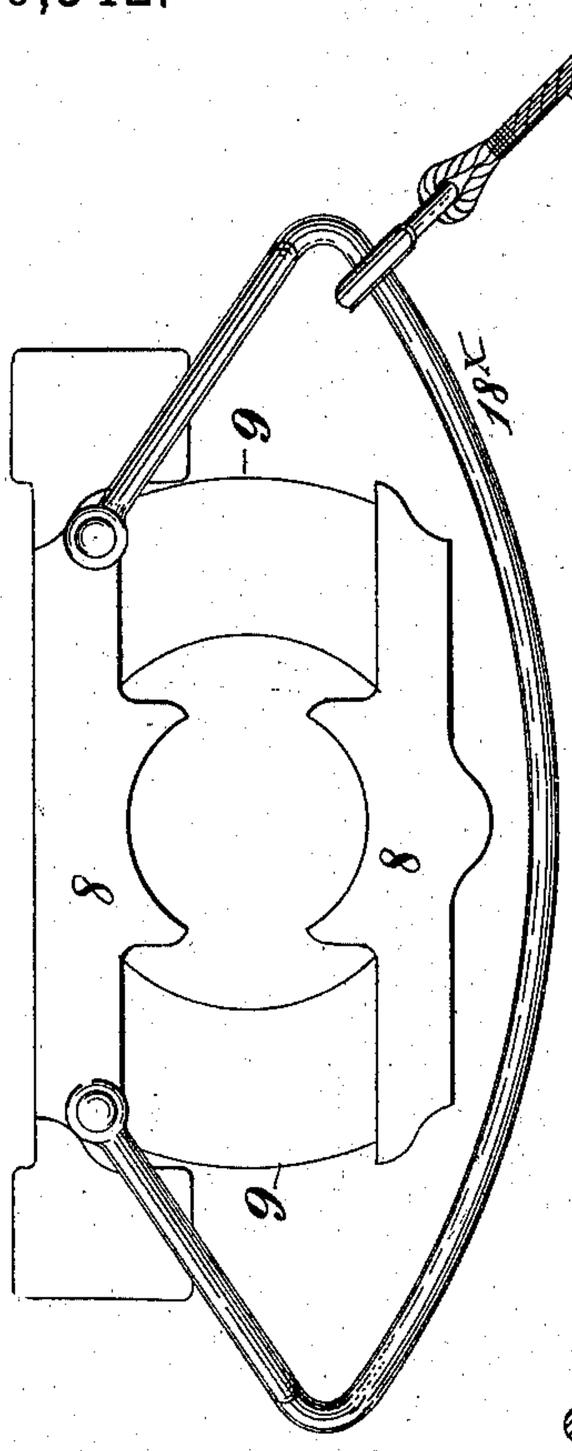



*Fig. 12.*

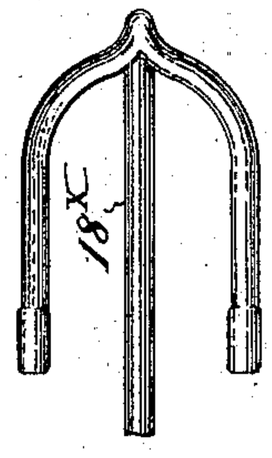



*Fig. 13.*

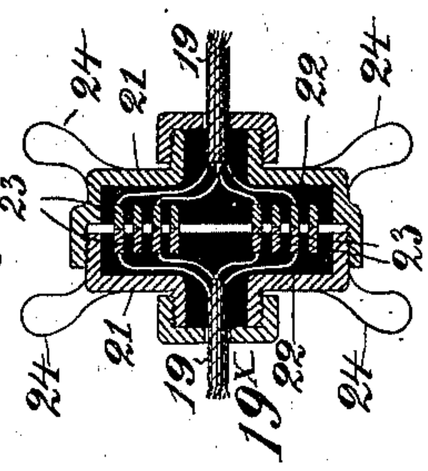



*Fig. 9*

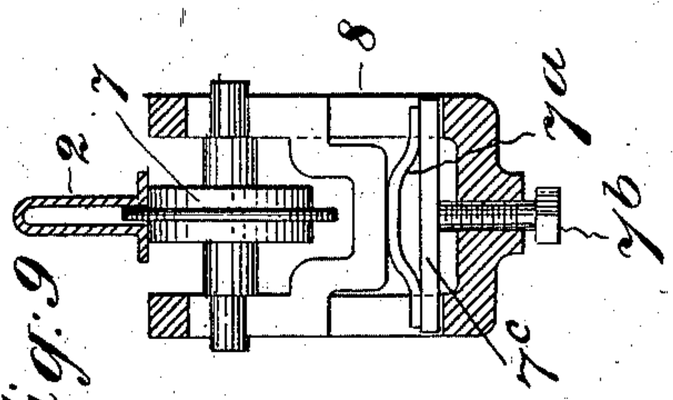



*Fig. 10.*

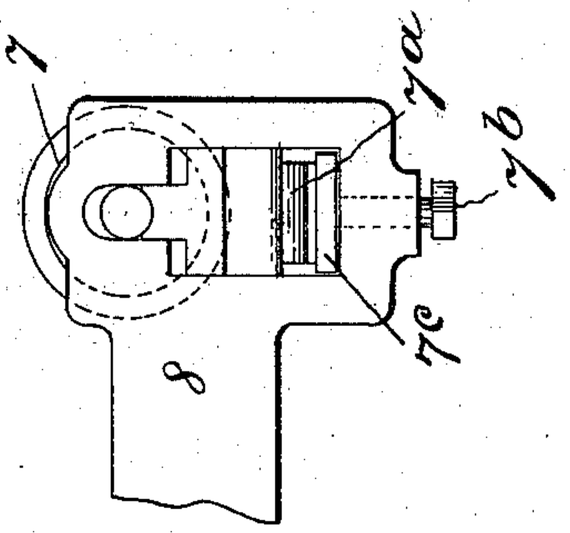
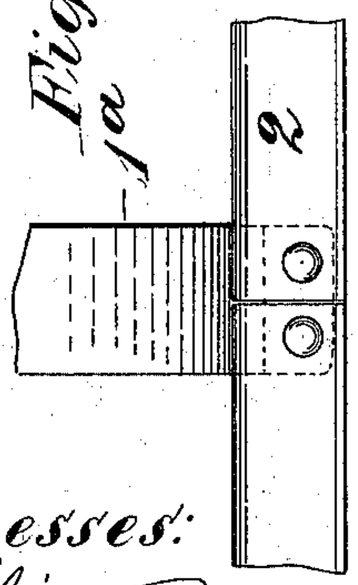



*Fig. 8.*

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# UNITED STATES PATENT OFFICE.

JAMES F. PLACE, OF MONTCLAIR, NEW JERSEY, ASSIGNOR OF ONE-HALF TO CHARLES S. UPTON, OF NEW YORK, N. Y.

## ELECTRIC TRACTION-MOTOR.

SPECIFICATION forming part of Letters Patent No. 559,342, dated April 28, 1896.

Application filed March 16, 1894. Serial No. 503,888. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES FRANK PLACE, a citizen of the United States, residing at Montclair, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Electric Traction-Motors, of which the following is a specification.

My invention relates to that class of self-propelled electric traction-motors wherein the motor is mounted on an aerial track and has wheels which clamp the track in a manner to provide the necessary traction for towing a boat along a waterway. In this class of devices the electric energy is ordinarily supplied from a conductor arranged along and parallel with the track, and the return-current is carried by a conductor to the boat and thence to the water, a circuit-closer on the boat serving to stop and start the motor.

The object of the present invention is, in part, to provide for reversing the motor from the boat, as well as to stop and start it; in part to provide for cutting the motor entirely out of the circuit whenever it is stopped from the boat; in part to provide for automatically cutting the motor out from the circuit whenever the cable connecting the motor and boat is uncoupled; in part to provide a novel and efficient coupling for the conductor-cable; in part to provide the boat with a switch whereby the motor may be cut out and controlled, and in part to other details of the invention, which will be hereinafter set forth.

In the accompanying drawings, which illustrate an embodiment of the invention, Figure 1 is a side view of the self-propelling motor, together with a part of the track-rail and main conductor. Fig. 1[a] is a side view of the switch on the boat or vehicle, showing also the attachment for the tow-line. Fig. 1[b] is a side view of the coupling devices of the tow-line and of an electric cable leading to the switch. Fig. 2 is a front or end view of the motor as seen from the left in Fig. 1. The track-rail and main conductor are represented in cross-section. Fig. 3 is a diagrammatic view showing the arrangement of the circuits and the switch on the boat. Fig. 3[a] illustrates the switch on the boat on a larger scale. One view is a face view and the other an edge view to illustrate the contacts. Fig. 4 is a diametrical section of one form of the electric-cable coupling, and Fig. 5 is a section of said coupling at right angles to that of Fig. 4. Figs. 6 and 7 are respectively a side view and plan illustrating a form of the supporting structure for the track-rail and main conductor adapted for roads or waterways where it is not convenient or desirable to extend the structure over said road or waterway. Fig. 8 is a fragmentary face view showing the manner of securing the sections of the track-rail to the supporting-bracket. Figs. 9 and 10 are respectively a sectional and side view of the bearings for one of the lower track-wheels. Figs. 11 and 12 are respectively a side view and plan of a bail for attaching the tow-line to the motor. Fig. 13 is a sectional view of the preferred form of the electric-cable coupling seen in Figs. 4 and 5.

Referring primarily to Figs. 1 and 2, 1 represents a frame adapted to span a roadway or waterway, as a canal, for the support of overhead track-rails and conductors. These frames, which will be placed at proper intervals along the way, will each comprise two uprights, a cross-beam, and brackets 1[a], pendent from the cross-beam. Only one track-rail and one conductor are shown herein. The bracket 1[a] is secured to the cross-beam above, Fig. 2, and to its lower extremity is bolted the track-rail 2. This rail is formed, as here shown, of a plate bent to a U shape in cross-section, flanged, and mounted with its open side down. Above and directly over the rail 2, as here shown, is the main live conductor 3. This conductor is gripped by arms 1[b], secured to the cross-beam of the frame and insulated therefrom. Fig. 2 shows the preferred construction.

The motor is mounted on the track-rail 2, and comprises a frame 4, in which are mounted two shafts 5, on which are fixed two sheaves or grooved track-wheels 6 6, which rest on the top or crown of the track-rail. Mounted in the frame below the track-rail are two lower clamping track-wheels 7 7. Each of these wheels has a central flange which takes into the hollow of the U-shaped rail, the faces of the wheel at the sides of the flange rolling on the base-flanges formed on the rail 2. The

engagement of the flanges on the two sets of track-wheels with the rail prevents any lateral movement of the motor on the same. The lower track-wheels 7 are backed by springs, which keep them pressed up to the track and serve to cause the two sets of wheels to clamp the rail between them and thus produce the desired traction. In Figs. 1 and 2 I have shown rubber spring-blocks $7^a$, upheld by a bridge-piece $7^c$ and a set-screw $7^b$, bearing on the under side of said bridge-piece. By this means the desired tension is maintained, while in Figs. 9 and 10 a steel leaf-spring is represented in lieu of a rubber spring.

The electric motor possesses no special novel features.

8 8 are the pole-pieces; 9 9, the field-magnets; 10, the armature; 11, the commutator, and 12 $12^\times$ the brushes.

13 is the trolley, mounted on the frame of the carriage. This trolley takes the current from the main conductor 3. On the arbor $10^\times$ of the armature is secured a gear-wheel 14, which gears with two wheels 15 15, fixed on the respective shafts 5 of the upper track-wheels 6. As the wheels 15 overlap each other and gear with the wheel 14 in different planes, the latter wheel is by preference provided with a central flange $14^\times$, as clearly shown in Fig. 2. Thus, through these gear-wheels, the motor is propelled along the track.

X represents (in Figs. $1^a$ and 3) a boat or any form of vehicle to be drawn or towed by the motor on the track, and on this boat is a post 16 or the like, to which the tow-line 17 is attached. The post may have a loose ring $16^\times$, to which the tow-line is coupled, and this line may be a steel-wire rope. To couple the boat X conveniently and quickly to the motor, I prefer to provide the tow-line 17 with a suitable snap-coupling $17^\times$, such as that shown in Fig. $1^b$, or with some similar means of readily coupling and uncoupling the two sections of the tow-line. In Fig. 1 I have shown the tow-line coupled to the motor through the medium of a bail 18, two of which are provided on the field-magnet; but the motor may be furnished with a bail $18^\times$ similar to that represented in Figs. 11 and 12. This bail extends down under the motor in such a manner that the ring on the tow-line may be slipped along it from end to end and thus enable the motor to tow in either direction without releasing the line from the bail.

I will now explain the arrangement of the circuit-conductors. On the boat X is a switch Y, to which the circuit-conductors, combined to form a cable 19, Figs. 1, $1^a$, and $1^b$, are led along the tow-line 17. This cable has a coupling $19^\times$, (seen in Fig. $1^b$,) which enables the cable to be coupled and uncoupled at the same time as the tow-line. This coupling will be hereinafter described in detail.

The diagrammatic view, Fig. 3, and the detail view, Fig. $3^a$, of the switch and connections show the arrangement of the circuit-conductors clearly. From the trolley 13 the current flows by a conductor $w$ to the terminal contact $w'$ at the switch Y, thence through a contact-plate of the switch to a terminal contact $x'$, thence by a conductor $x$ to one terminal of the coil of the field-magnet 9, through the coils of the field-magnet to the other terminal thereof, thence by a conductor $y$ to the terminal contact $y'$ at the switch, thence through the other contact-plate of the switch to a terminal contact $z'$, thence by a conductor $z$ to the brush 12 of the motor, thence through the armature 10 of the motor to the other brush $12^\times$, and thence to the source or the earth by way of a conductor $v$ and a trolley or brush 20, which has a rolling or rubbing contact with the track-rail 2.

When the switch is set as above described, and as shown in Fig. 3, the motor will move forward on the track—that is, to the left in Figs. 1 and 3. If, however, the switch be shifted until one of its contact-plates connects the terminals $z'$ and $x'$ and the other connects the terminals $y'$ and $w'$, the motor will be reversed. If the switch be set in an intermediate position, (see Figs. $1^a$ and $3^a$,) the circuit will be broken and no current will flow through the motor. The switch may be of any known kind and will require only a brief description. As seen in Fig. $3^a$, the wires $w$ $x$ $y$ $z$ connect each with a binding-post at the back of the switchboard 30, said posts projecting through said board to the front thereof and forming the respective terminal contacts $w'$, $x'$, $y'$, and $z'$. Mounted to turn on the face of the switchboard concentrically with the contacts is a lever 31, carrying two contact-plates 32, insulated from the lever and having somewhat the form of leaf-springs. When the lever stands as seen in Fig. $3^a$, the ends of the contact-plates will rest on the board and not on the terminal contacts.

The electric-cable coupling $19^\times$ is illustrated more in detail in Figs. 4 and 5 and in Fig. 13. This latter is the preferred form and it differs from the other only in some slight details of mechanical construction. This coupling comprises two circular cups 21, filled with hard rubber or similar non-conducting material 22 and adapted to screw together. The two parts of the cable 19 enter the respective cups and the four conductor-wires $w$, $x$, $y$, and $z$ of the respective parts of the cable are connected, respectively, with concentrically-arranged metal rings or ring-segments 23, set in the insulating material in the cup. When the two cups or coupling members are screwed together, the rings 23 of one member are brought into electric contact with the corresponding rings of the other member and electrical communication is thus established in the wires of the cable. The difference of construction between the coupling as shown in Fig. 13 and the form shown in Figs. 4 and 5 lies in this: In the former the metal rings 23 project a little beyond the faces of the insulating-blocks in which they are set and in the latter they do not. In the former, also, the insu-

lating material fills both cups, while in the latter space is provided in one cup (that at the left in Fig. 4) to allow the raised screw-threaded rim on the other cup to enter. The cups may have thumb-pieces 24 to facilitate screwing them together. It is not important that the contact-pieces shall be complete rings, but they must be concentric with those in the other member.

Where it is not desirable to carry the superstructure 1 across the canal or roadway, the construction seen in Figs. 6 and 7 may be employed. In this construction a series of posts $1^{\times}$ are set up along the way and braced from the land side by wire ropes 25. On each post is a bracket or arm 26, to which the rail 2 is secured. This arm may be provided with a suitable diagonal brace 27, extending from the end of the arm up to the post above, and two lateral braces 28, extending obliquely from the heel of the arm to the track-rail, as best seen in Fig. 7.

The construction embodied in this application is distinguished by an arrangement of the circuit whereby the live current is led first to the switch on the boat and then to the motor-coils, and the current, after passing through the field-magnet coils, is led first to the switch on the boat and then to the commutator-brush. The conductors forming the circuit are grouped in a single cable, and a coupling is provided in this cable between the motor and the boat, as well as in the tow-line.

I have used the word "boat" herein as a boat in the special form of conveyance illustrated in the drawings and the form of conveyance best suited for towing by my traction-motor; but any form of conveyance—as a wheeled vehicle, for example—might be towed in the same manner.

I prefer to arrange the live supply-conductor 3 over the track-rail 2, but this is not essential; nor is the exact form of the rail 2 here shown a necessity, but this form is preferred.

Having thus described my invention, I claim—

1. The combination, with a track-rail, an electrical supply-conductor arranged along said track-rail, an electric traction-motor on said track-rail, a conveyance to be towed by said motor, an electric switch on said conveyance, and a tow-line for connecting said motor and conveyance, of a cable composed of four insulated conductors connecting the motor and the switch on the conveyance, two of said conductors connecting the switch respectively, with the line supply-conductor and one terminal of the field-magnet coil, and the other two connecting the switch, respectively, with the other terminal of the field-magnet coil and one commutator-brush, and a return-conductor connecting the other brush with the earth, substantially as set forth.

2. An electric traction-motor comprising as its essentials, clamping track-wheels, a field-magnet and armature, a commutator and brushes, trolleys 13 and 20, an electric-cable coupling, an electric cable containing four conductors which, at one end, terminate at said coupling and at their other ends terminate, one at the trolley 13, one at a commutator-brush, and two at the respective terminals of the field-magnet coil, and a conductor leading from the other commutator-brush to the trolley 20, substantially as set forth.

3. The combination with an aerial track-rail, a supply-conductor arranged parallel with the said rail, and an electric traction-motor mounted on said rail and having wheels which clamp said rail for traction purposes, said motor-carriage carrying a brush or trolley which takes the current from the supply-conductor, of a conveyance, a tow-line connecting the motor with the conveyance, an electric switch on said conveyance, and an electric circuit including the conductors $w$, $x$, $y$, $z$, having terminals $w'$, $x'$, $y'$ and $z'$, at the switch, the trolley 20, the coils of the field-magnet 9, the armature 10, and its commutator, and the brushes 12 and $12^{\times}$, all arranged to operate substantially as set forth.

4. The combination with the aerial track and main supply-conductor, the electric, traction-motor on the track, a conveyance provided with an electric switch, a tow-line 17, and a cable 19, containing conductors connecting the motor with the switch, the said cable and tow-line being connected or tied together, of the couplings in the respective tow-line and cable, for the purpose set forth.

5. The combination with an aerial track-rail having in it a groove, and a supply-conductor arranged parallel with said track-rail, of an electric traction-motor, mounted on said track, for drawing or towing a conveyance, said motor having grooved wheels to embrace the rail on one side, and flanged wheels to embrace the rail on the other side and engage the groove in the rail, and springs which cause said wheels to clamp the rail, a tow-line connected with the carriage, and means for taking the current from the supply-conductor and delivering it to the track-rail.

6. A coupling for an electric cable containing conductors, comprising two cup-like members 21, adapted to screw together, face to face, insulating material 22, in said members, rings of metal 23, set concentrically in the said insulating material, those of one set registering with those of the other, and the conductors forming the parts of the cable connected with the respective rings 23, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JAS. F. PLACE.

Witnesses:
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JAS. KING DUFFY.