

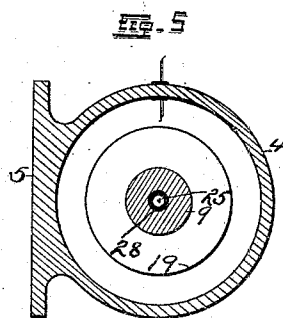
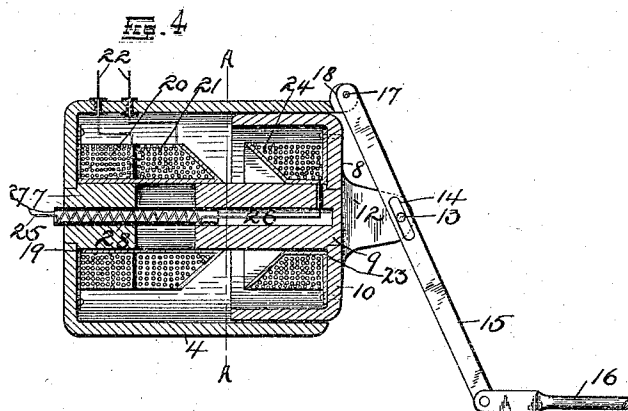
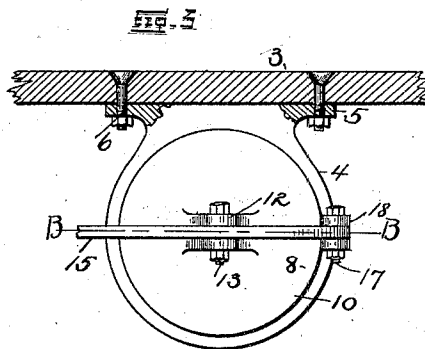
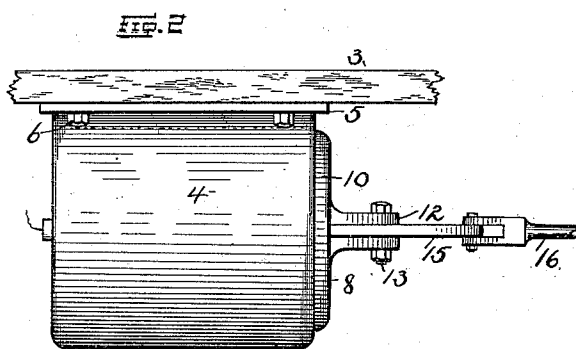
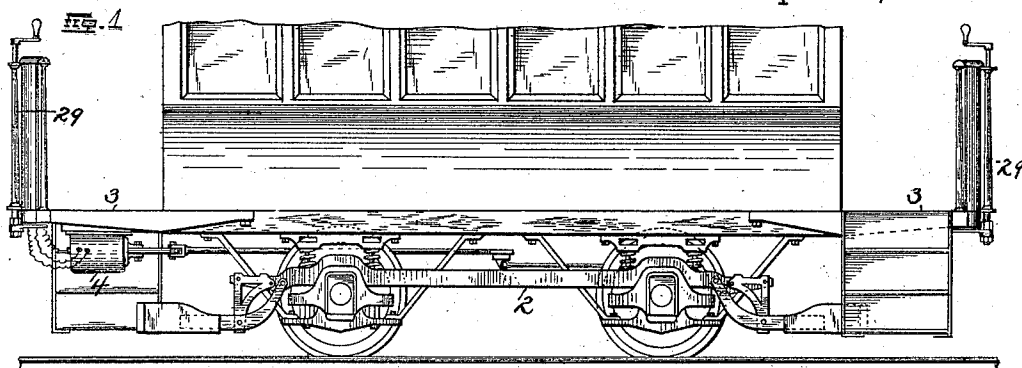
(No Model.)

2 Sheets—Sheet 1.

W. KOEDDING.
ELECTRIC BRAKE.

No. 546,120.

Patented Sept. 10, 1895.



Witnesses

Justus
Geo. Kloberty

Inventor

William Koedding

By *Eicker Robinson* Attorneys.

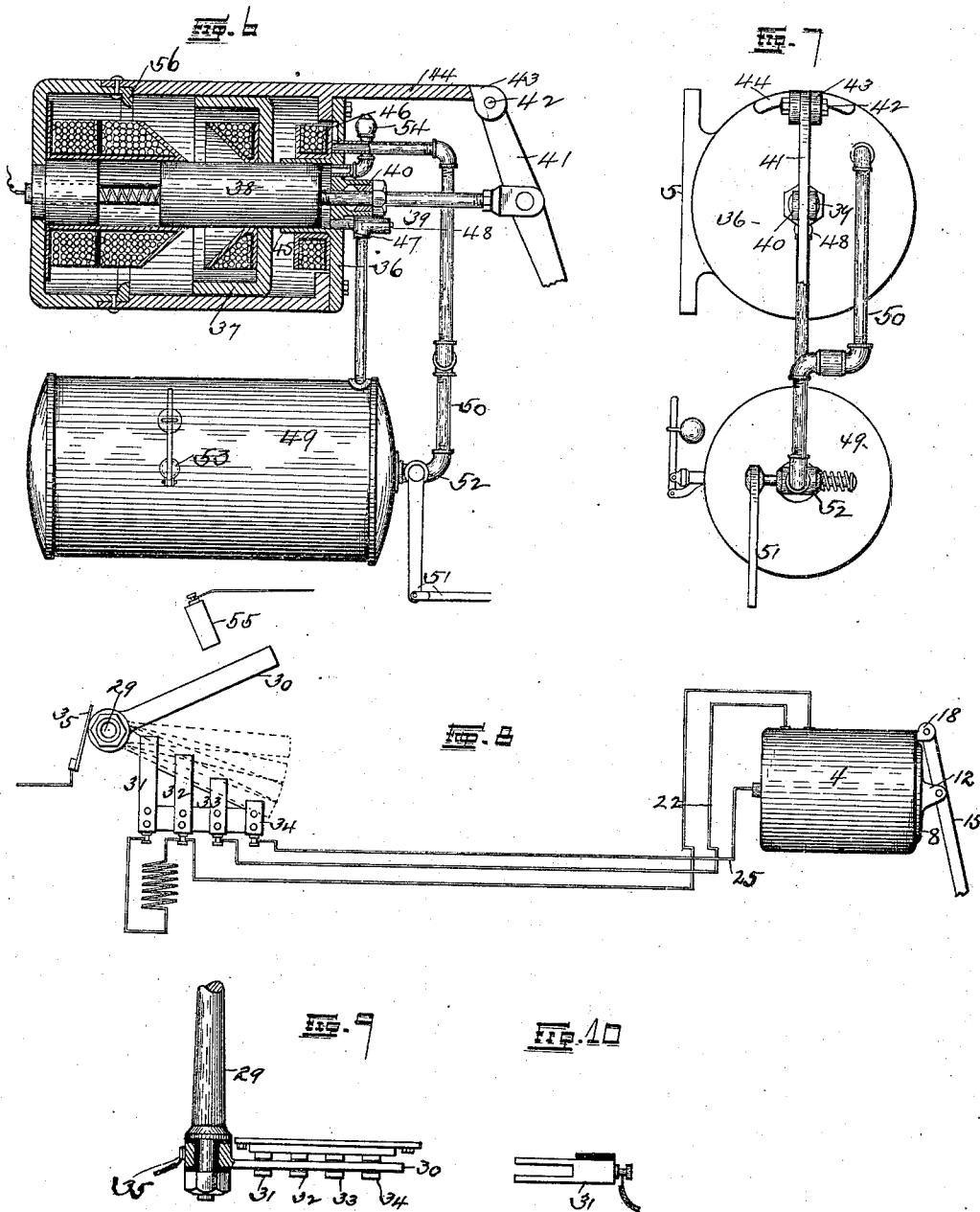
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2 Sheets—Sheet 2.

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and Beakety.

Inventor

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UNITED STATES PATENT OFFICE.

WILLIAM KOEDDING, OF ST. LOUIS, MISSOURI.

ELECTRIC BRAKE.

SPECIFICATION forming part of Letters Patent No. 546,120, dated September 10, 1895.

Application filed June 13, 1894. Serial No. 514,439. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM KOEDDING, a citizen of the United States, and a resident of St. Louis, State of Missouri, have invented certain new and useful Improvements in Electric Brakes, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to improvements in electric brakes; and it consists in the novel construction, arrangement, and combination of parts, as will be more fully hereinafter described, and set forth in the claims.

The object of my improvement is to construct a brake embodying features of simplicity and durability, one which in its operation is unvariable and designed for application to any kind of electric cars. As in other electric brakes, the current from the trolley is utilized to operate the brake and necessarily the ordinary style is rendered inoperative by the shutting off of the current from any cause; but in my invention I contemplate making a provision for using the brake, with air-power, the storage of this element being made by the brake when in operation by electric power.

It is thought that my invention in its construction and operation defines a novel and important improvement in this line of manufacture, and that my statements as to strength, durability, &c., are substantiated by the description and drawings.

In the drawings, Figure 1 is a side elevation of a car-truck and a portion of the car-body, showing the application of my invention thereto. Fig. 2 is a side elevation of the brake-casing which incloses the electric features of the construction. Fig. 3 is an end view of same. Fig. 4 is a horizontal sectional view taken on the line B B in Fig. 3. Fig. 5 is a transverse sectional view taken on the line A A in Fig. 4. Fig. 6 is a horizontal sectional view of the electric mechanism, showing its connection with the air-brake attachment. Fig. 7 is an end view of same. Fig. 8 is a diagrammatic view of the electric connections. Fig. 9 is an enlarged elevation of a portion of the controller-rod, showing its connection with the contacts. Fig. 10 is a detail side view of one of the contacts.

Referring to the drawings, as stated before, this brake is applicable to any form of surface or overhead electric car, the requisite point being the provision of electric power.

1 indicates a car of the ordinary type, which is supported upon a truck 2 and provided with the usual appurtenances found on all cars. One of the platforms 3 is used as a support, to which is secured the casing 4, which incloses the electric mechanism of my invention. This casing 4 is preferably made of cast-iron, and is cast with a squared longitudinal flange 5 along its side, through which bolts 6 or their equivalent are placed to hold the construction to the underside of the platform 3. Secured in the forward end of the casing 4 and extending inwardly therefrom is a soft-iron core 7, circular in form and adapted to be magnetized to form one pole of the magnet the energizing of which causes the brake to operate. Adapted to be reciprocated in the casing or shell 4, which is cylindrical in its interior outline, is a plunger 8, made in the form of a cylinder and adapted, in conjunction with the cylinder 4, to form a complete cylinder; or, in other words, the casing is an ironclad one to inclose all the parts. A soft-iron core 9 projects inwardly from the head 10 of the plunger 8 and is in alignment with the core 7 when the parts are in position. This core 9 forms the opposite pole of the magnet above referred to. The head 10 of the plunger 8 has two outwardly-projecting lugs or ears 12, carrying a wrist-pin 13, adapted to operate in a slot 14 in the lever 15, which connects with the brake-rod 16. The opposite end of the lever 15 is mounted upon a wrist-pin 17, carried by two ears or lugs 18 upon the rim of the cylinder 4. The slot 14 in the lever 15 allows a direct reciprocatory movement of the plunger 8 in the cylinder 4 without any risk of the bearings being out of alignment.

In Fig. 4 is shown the arrangement of the solenoids arranged in groups in both the cylinder and the plunger to energize the cores 7 and 9, which form the poles of magnetic influence exerted to operate the brake.

In a cylindrical shell 19, secured to the inner side of the cylinder-head, are placed two solenoidal coils 20 and 21, to the positive poles of which lead wires 22 from the source of electrical generation, while the negative poles

(not shown) are suitably grounded to some convenient point. It will be noted that the inner end of the cylinder 19 is tapered toward the plunger 8, and the coil 21 is made in a form to fit this portion of the cylinder. The cylinder 19 encompasses the core 7 and extends a considerable distance beyond its inner end to form a guide for the reception of the core 9. The plunger 8 is provided with a cylinder 23, upon which is wound a coil 24, the positive connection 25 of which passes through an opening 26 in the core 9 and through an insulating-tube 27, which passes through an opening 28 in the core 7. It will be noticed that the tube 27 is always in position in the openings 26 and 28, whether the plunger is at the outer or inner limit of its stroke. The negative pole of the solenoid 24 is grounded in a manner similar to the connections of the coils 20 and 21. The cylinder 23 has a funnel-shaped inner end adapted to receive the conical-shaped end of the cylinder 19. My object in constructing these cylinders in this manner is in order that a greater surface of magnetic influence will be displayed when the brake is in operation.

I will now describe the connections from the controller to the brake mechanism. The controller consists of a rod 29, suitably secured to the dash-board of the car and provided upon its lower end with a contact knife-blade 30 to operate in the contact-springs 31, 32, 33, and 34. The current is supplied to the blade 30 by a contact-spring 35, to which the current passes from the source of energy. The contact-spring 31 is connected through a coil of resistance with the contact 32, so that it is obvious that the successive entrance of the blade 30 into the contacts 31, 32, 33, and 34 causes the energizing of the coils 20, 21, and 24. This manner of controlling the electric currents prevents a sudden operation of the brake, which serves not only to rack the parts, but also deteriorates the successful consumption of the objects which the brake is designed to perform. The magnetic influences exerted by the magnetized coils upon the two cores, as well as upon the faces presented by the two meeting ends of the cylinders 19 and 23, afford a braking power greater than can be obtained by the ordinary direct magnetic action. Supposing the brake to be set and it is desired to release the same, the controller-rod 29 is reversed and the connections to the coils thus thrown out. The tension of the brake-shoes against the wheels when released causes a reverse movement of the plunger to its normal position.

I will now describe the application of the electric feature of my invention to the compression of air, the storing of the same, and its use in lieu of electricity for operating the brake in case the electric current for any reason is cut off. The cylinder 4 is made in two separate sections, as shown in Fig. 6, the rear head 36 being removable and adapted to support certain parts in connection with the

air-brake mechanism. The plunger 37 is secured to the center of the length of a core 38, which reciprocates in bearings provided by the cylinders upon which the coils are wound. A rod 39 is connected to the core 38 at its rear end and passes through a stuffing-box 40 to the lever 41, which connects with the brake-rod at one end and with a wrist-pin 42, held between the ears 43 upon a projection 44 of the cylinder-casing. Located against the head 36 of the cylinder and around the cylindrical bearing 45, which forms a guide for the core 38, is a coil 46, which is magnetized to draw the plunger 37 back toward the head of the cylinder. A passage 47 leads from within the cylindrical bearing 45, through a check-valve 48, to a storage-tank 49, which is secured under the car and adapted for the storage of compressed air by the backward movement of the plunger 37 when the coil 46 is magnetized and the forward coils demagnetized. A pipe 50 leads from the tank 49 to a point in the rear of the cylinder, and the compressed air is adapted to be let into said cylinder by the manipulation of a series of levers 51, adapted to operate a valve 52 located in the pipe 50. A pop-valve 53 is provided for the tank 49, and an inlet-valve 54 in the cylinder 45 to guard against over-pressure in the tank or in the cylinder.

In Fig. 8 is shown a contact 55, in which the blade 30 is adapted to engage when thrown back out of engagement with the contacts 31, 32, 33, and 34, the wire leading from said contact 55 to the coil 46, and said coil adapted to be energized by the contact above referred to to draw the plunger back toward the rear head of the cylinder.

In Fig. 6 it will be noticed that one portion of the shell is provided with an interior flange 56, which is adapted to form a surface of attraction for the inner edge of the plunger-shell, thereby enabling an even greater attractive power than above referred to. I desire, also, to mention that the connections under the car are so made that the brake is operative from either platform; but, as this point involves no invention, I do not deem it necessary to show the wiring therefor. Another point in the construction shown in Fig. 6 is the fact that the forward end of the shell may be made of iron and the rear portion of a non-magnetic material, or it may also be made of iron or other suitable material for the purpose.

It is thought that the above description demonstrates the practicability of the combined application of electricity and compressed air in forming a brake which is thoroughly practical, simple, and unvariable in its operation. It is easily seen that the air-space in the rear of the cylinder (see Fig. 6) may be termed an "air-cushion," to compensate for the force expended in the reverse movement of the plunger.

It has been found that one of the objectionable features in most electric brakes lies in

the suddenness with which the brake sets, the tendency of such a course being to rack and loosen the parts and prevent a successful operation of the brake for any great period of time. With this objection in mind, I have tried to develop my invention in such a way as to avoid the complications above referred to, and in so doing it is believed that the brake as herein set forth is an improvement in its particular line of manufacture, and that it only includes such features as are likely to make it simple, durable, and strong both in point of operation and construction.

Having fully described my invention, what I claim is—

1. An improved electric brake having a coil or series of coils, fixed within a stationary metallic cylinder, and around an internal core, a coil around the internal core of a second cylinder and moving within the first cylinder, the core facing end of the stationary coil being preferably cone shaped, and the corresponding core facing end of the movable coil funnel shaped, substantially as shown and described.

2. An improved electric brake comprising two concentric metallic cylinders, with internal cores, energizing coils within said cylinders and around said cores, means to connect the moving and stationary coils electrically, a brake lever secured to said stationary cylinder, and operated by the movable cylinder and pivoted to the braking mechanism, substantially as set forth.

3. An improved electric brake having a cylinder provided interiorly with coils adapted to be magnetized, said coils arranged in a se-

ries with the inner coil in the form of a truncated cone, at its inner extremity, and a plunger, to which is connected a brake rod, provided with a coil the one of which is provided with a depression adapted to receive the coil carried by the cylinder when the same are energized substantially as set forth.

4. An improved electrical brake comprising concentric cylinders with internal cores, coils 20, 21, and 24 within said cylinders to operate the brake electrically, a coil 46 within the same cylinder to assist the back pressure of the brake in storing up compressed air, a cylinder or sleeve surrounded by said coil 46 to serve as a compression chamber, and the surrounding space within the concentric cylinders and around the compressing chambers to serve as an actuating air chamber, substantially as shown and described.

5. An improved electric brake provided with a plunger, adapted to be reciprocated in a cylinder, a brake rod secured to said plunger, the backward movement of the plunger in said cylinder adapted to compress and force air into a storage tank located in connection therewith and a series of valves, controlling pipes leading from said storage tank to said cylinder to enable the use of the compressed air for operating the brake when the electric power is shut off for any reason as set forth.

In testimony whereof I affix my signature in the presence of two witnesses.

WILLIAM KOEDDING.

Witnesses:

HERBERT S. ROBINSON,
ALFRED A. EICKS.