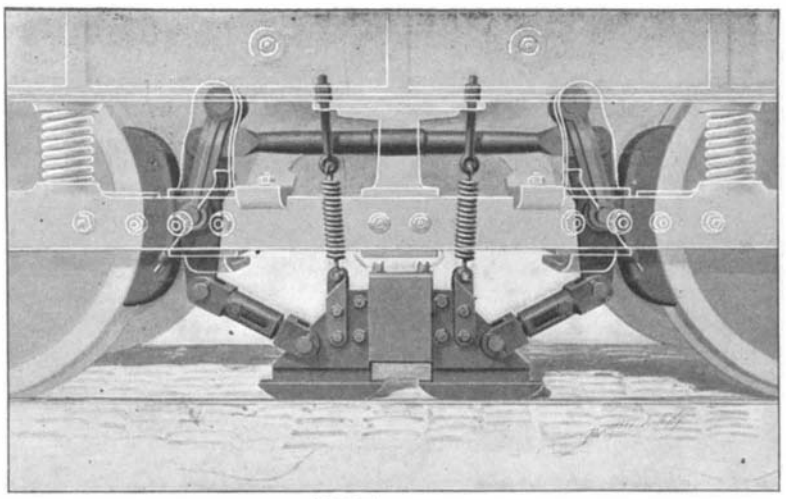
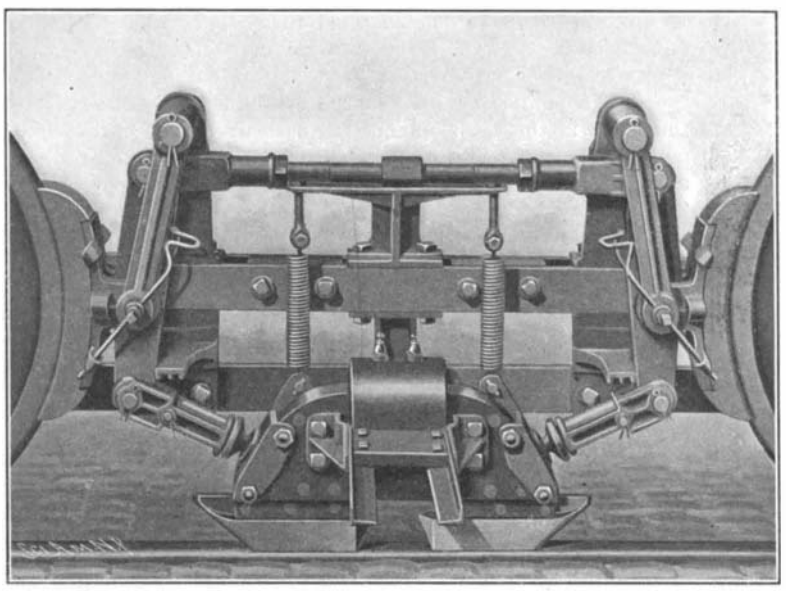
THE WESTINGHOUSE ELECTRIC BRAKE AND HEATER.

The subject of power brakes for street cars is attracting considerable attention, and it is probable that in the course of time city and town ordinances will require their use. The Newell electric brake, which we illustrate, is made by the Westinghouse Company, of Pittsburg. The apparatus consists of two elements, one a brake and the other a heater. The brake may be installed upon the cars independently, but the heater is dependent upon the use of the brake. The brake proper, which is shown in our transparent view, consists of a double track shoe, combined with a powerful electro-magnet, which when energized by the power motors, acting as generators, is strongly attracted to the rail by magnetic force. Brake heads and brake shoes of the ordinary type act directly on the wheel and constitute a wheel brake of maximum power and efficiency. There are also sundry castings and forgings for simultaneously transmitting a downward pull and resultant drag of the magnetic track brake into lateral pressure upon the wheels. The brake can, of course, be applied to a single or a double truck car. In addition to the truck equipment, whether single or double, a complete brake includes brake-controller attachments to use when the motor controllers are not provided with braking points, and a diverter or improved form of rheostat for dissipating the heat generated by any excess of current over and above that required to operate the brake when the heaters are not in service. Our transparent engraving shows the method of attaching the brake-rigging to the truck, and of suspending the brake shoes and magnetic frames directly over the track. When the brake is not in operation the suspension springs carry the track magnets and shoes entirely clear of the rails, and by reason of their flexibility they permit the shoes to ride over or clear any obstruction which is not sufficient in itself to cause the car to stop. When the brake is operated through the saturation of the magnets by current supplied by the car motors, acting as generators, the track shoes are so strongly attracted to the rails that three distinct results are produced. First, a noticeable increase in the pressure of the wheels on the track takes place, because of the downward pull of the magnets; second, there is a pronounced retardation by reason of the friction generated between the track shoes and the rails; and third, there is a maximum braking effect on the wheels obtained through the transmission of the resultant drag of the track shoes to the brake shoes by means of the mechanism provided for that purpose. It is obvious that the net result of these three effects combined represents a much higher braking power than can be obtained by the use of any other brake without skidding wheels; moreover, the feature of the powerful track brake which, instead of decreasing the weight upon the rails at the wheels, increases it, is as unique as it is valuable.

Our second engraving shows the brake from a point midway between the trucks, illustrating clearly the arrangement of the hangers, rods, etc., inside the truck-frames. The thrust against the wheel brake shoes, caused by the drag or frictional resistance between the track shoes and the rail, is similar in its effects to the thrust obtained from the expansive force of compressed air acting upon the brake cylinder piston in the well-known air brake, but the magnetic brake has the advantage that the brake shoe pressure is automatically regulated by the condition of the rail surface. This is a fortunate feature which results in securing the highest possible braking power at all times without danger of the wheel sliding. The track magnets are energized by current obtained from the car motors themselves acting as generators. This not only obviates any expense in that connection, but also effectually prevents the possibility of accident through sudden failure of the line current. The current necessary for the required magnetization is uniformly kept within safe limits by a proper adjustment of resistance always in circuit with the brakes, thus avoiding any injurious effect on the motors.



MAGNETIC BRAKE SHOWING METHOD OF ATTACHING BRAKE TO CAR FRAME.



VIEW OF BRAKE FROM UNDER CAR.

An additional advantage gained by the use of the magnetic brake is found by employing the improved form of rheostat, or diverter, previously mentioned, which has a constant resistance regardless of the heating produced by a continuous flow of current, in the automatic control of speed down long and steep grades. This result, owing to the fact that a certain resistance in the rheostat, insures a fixed current flow at a given speed; and this resistance can be readily adjusted so as to permit just enough current to pass through the track-shoe magnets to hold the car at the required speed, against the action of gravity, on any grade; any increase in speed increases the current and causes the brakes to act with greater force, while a decrease in speed instantly decreases the current and the brake action at the same time, so that the speed of a car may be automatically regulated within narrow limits regardless of changes in the gradient.

The brake can be readily applied to trailers by attaching the track magnets and accessories to them and connecting the magnetic coils to the wiring system of the motor cars.

The heating of the electric cars in the winter requires the expenditure of considerable power and it is quite evident that an electric car heater, occupying no valuable space, easily controlled and costing nothing to operate, will prove equally satisfactory both to street railway companies and their patrons. In the system which we are describing, the heaters are installed underneath and along the front of the seats. They are connected with the general system of wiring by means of a suitably arranged switch so constructed that the braking and starting currents, both of which are used for heating the car in cold weather, may be divided as desired and the whole or any portion thereof sent through the heaters, the remainder going through the proper portion of the diverter beneath the car. The ordinary car heaters with which the heat is generated by the line current have so much storage capacity that they are cooled to atmospheric temperature very quickly, when for any reason the current is interrupted. With the electric heater there is a great capacity to store and retain heat within its mass. In the event of blockades, or the failure of the line current from any cause, this heat-storage capacity is so great that the car is kept comfortable for an hour or more, even in severe weather. The operation of the heater is dependent upon the use of the brake and the heat produced is derived from energy which would otherwise be wasted. This brake and heater have been in practical use in Pittsburg and the results have been highly satisfactory.

FOG STUDY FROM MOUNT TAMALPAIS, CALIFORNIA, FROM THE OBSERVATORY.

FOG STUDY FROM MOUNT TAMALPAIS, CALIFORNIA.

FOG STUDIES ON MOUNT TAMALPAIS, CALIFORNIA.

Some very interesting studies on fogs have been conducted on Mount Tamalpais by A. G. McAdie, forecast official of the United States Weather Bureau. On the coast of California there is a city, San Francisco, justly famed for the abnormalities of its climate. Overcoats and heavy wraps are worn in midsummer and lilies bloom in December. From May to September almost no rain falls, but during this period, with clock-like regularity, great banks of fog float in every afternoon and cover the bare brown hills. Day after day the inhabitants walk about under a sediment of water vapor, knowing that 1,500 feet above the air is clear and 20 to 30 degrees warmer. The Monthly Weather Review justly says that it is an ideal locality in which to study the formation of the cloud, the birth of the cloud, and to note the shifting strata at the bottom of the atmospheric