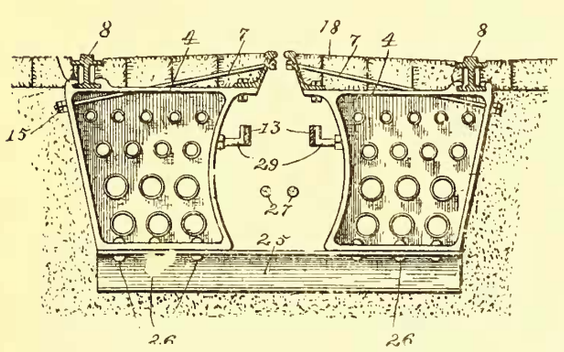
ends. When the tubes between two or more brackets are in place, the space between the brackets and around the conduit channel is filled with a suitable cement or concrete, which securely embeds and protects the tubes and serves as a support for the paving blocks.

At intervals of one or two blocks, manholes are provided for gaining access to the ducts or tubes, and for making connection between the conductors or wires carried in the main conduit and those of branch or distributing conduits at street intersections.

The interior of the paper ducts is perfectly smooth, and the additional expense for providing and laying them is comparatively slight, a fact that especially commends them to localities where the burying of overhead wires is receiving consideration.

The depth of conduit channel necessary is but 6 in., and the entire depth of conduit shown in Fig. 1 and 2, measured from the street surface, does not exceed 18 in. It

Fig. 3



ORDINARY CABLE RAILWAY CONDUIT.

will be apparent that the wire ducts are not essential to the conduit, but may be omitted in localities where they are not required.

This system provides for the operation of both electric and cable railways from the same conduit, as also the conversion of a cable into an electric railway.

S. H. Short's Electric Road at Columbus, O.

The new Short-Nesmith system* of Overhead Series Electrical Railway was for the first time put into operation a few days since on one of the lines of the Columbus Consolidated Street Railway Co., at Columbus, O., and was operated with signal success. On this line there are four ¼ in. copper wires, supported above the tracks upon cables which cross the street and are attached to poles at each end. Each pair of wires is 7 in. apart and so supported that four-wheeled trolleys may run along upon them. Each trolley has wires passing down to the roof of the car, by which the current is conveyed to the motor placed beneath the floor of the car. The motors are geared to the car axle by raw-hide gears, made by Pratt & Whitney. The motors are beautifully boxed and are dust and water tight, with ventilating apertures covered with dust screens. The top of the motor is provided with a magnetic shield of soft iron, which prevents any lines of magnetic force entering the car to affect the watches of the passengers.

The commutator opens on one side of the car, to admit of oiling and changing brushes. There are no resistance coils needed where a constant current is used, and the current is allowed to pass through the motor at all times. The stopping, starting, reversing and speeding is all accomplished by rocking the brushes around the commutator. These motions can be controlled from either end of the car by means of a simple lever handle placed on top of an ordinary brake staff, which is fastened outside of the dash board of the car. The ordinary brakes of the street car are still retained in service, although seldom used, as the car can be easily handled by means of the motor.

These motors have been constructed by the Brush Electric Co., of Cleveland, O., with special care and reference to the street car service, and return 80 per cent of the horse power used, at the driving wheels of the car. They do not heat or spark at the commutator, but pull their heavy cars, which are 27 ft. long and carry 120 passengers, with still another coach attached, up the steep grades with perfect ease.

The propulsion of street cars by electricity, by the Series or constant current system, it is claimed, is both practical and economical. In operating electric motors by means of a constant current, small quantity is necessary and the entire current passes through each motor in succession, just as the current passes from a dynamo through a large number of arc lights and the many miles of wire, or as the current from a battery passes through any number of telegraph instruments and hundreds of miles of wire.

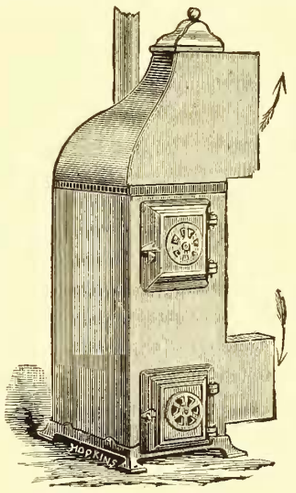
This method of transmitting power by electricity has met with success in every instance, and the proprietors claim that it is to this that street railway men must look for the solution of the electrical railway problem; that with the Series system of transmitting power by electricity as high as from 65 to 80 per cent of the power of the steam engine can be delivered or regained at the driving wheels of the cars. The more cars used upon such a system the more economically can the road be operated, and it meets the demand for a method by which few or many cars can be used as the traffic of the road varies.

This system can be applied to existing lines operating any number of cars, where rapid transit is required and heavy traffic met, and the line can be equipped with overhead wires at a very slight cost per mile; or the system can be applied as a conduit system, where the overhead wires are not allowed. It is simple in all its details, and promises to meet perfectly all the demands for street locomotion.

*U. S. Electric Co., Denver, Col.

The Root Car Heater.

This heater*, shown in the cut, stands on the front of the car and discharges its smoke and products of combustion through a 3 in. vertical pipe that passes up through the roof. It consists of an air-tight fire-pot, surrounded by an air space through which the air of the car circulates, cold air entering at the bottom, and hot air passing out at the top. The hot and cold air registers are indicated by arrows. The heater occupies a floor space only 14 in. long and 10½ in. wide, and, as it is placed on the platform, it does not lessen either



the sitting or standing capacity of the car.

*Toledo Car Heater Co., Water and Cherry sts., Toledo, O.

A Car Horse's Soliloquy.

By night and day
I go my way,
Patiently bearing my lot;
With iron shod feet,
Pacing the street,
Swinging the same old trot.

Harnessed for life,
My path of strife
Is narrow and long and straight;
Through Broadway's throng
I amble along
Swinging the same old gait.

I am not proud,
Although a crowd
I generally manage to draw;
The red-headed girl,
The country churl,
And the learned man of law.

The English peer,
The bank cashier,
And the man who broke the bank;
The political chief,
The uncaught thief,
The messenger boy and the crank.

Compare my fate,
With this human freight,
Steeped in humanity's ills:
I'm a horse, it is true,
But I've nothing to do
With politics, whiskey or bills.