BENEATH BUSY STREETS.

The first practical electrical underground conduit railway in this country is now in operation in New York City, connected to the great cable-traction system of the Metropolitan Traction company. The public can now travel from the Battery to 146th street with one transfer, from the cable car to the electric car, at West 108th street.

The underground electric system employed differs radically from all other systems of electric underground conduit railways both in the construction of the conduit itself and the method of taking the current from the conductors for the motors. It has been operated more or less experimentally for the last month, and its success has justified the sanguine predictions of the electricians and engineers who effected the installation.

The introduction of this system upon the surface lines of the city is the result of the determination of the Metropolitan Traction company to give New York a satisfactory electrical system of propulsion which would not be the subject of that peculiar popular prejudice which has acted to debar it from the advantages of the overhead-trolley system. Consideration of the question resulted in the selection of a conduit system designed and manufactured by the General Electric company, and the long stretch of road on Lenox avenue was chosen as the scene of the experiment.

In formulating the project the Traction company proceeded upon the most conservative lines, and determined to reduce the consequences of failure to the minimum of damage which would inevitably arise from any stoppage in the service. The plan therefore contemplated the construction of the line as if for a cable road, in order that, should the electric system prove unsuccessful, the electrical portion could be taken out, and the cables and pulleys of the regular cable system introduced into the conduit without loss of time and at comparatively small expense.

The Lenox avenue line is a double-track road, starting at the car house at 146th street and running directly south to 116th street, into which it turns and proceeds as far west as Manhattan avenue. It turns here and runs as far south as 108th street, along which it is carried to the junction of that street and Columbus avenue. The district which this line will serve is at present somewhat sparsely settled; but the facilities of transit which it will afford will probably result in the rapid development of a new residence section for New Yorkers on both sides of the Harlem.

The power house is located on 146th street, a few yards west of Lenox avenue.

Steam is supplied from two Babcock & Wilcox water-tube boilers to the horizontal cross-compound 650 horsepower Allis-Corliss machines. To each of the engines is coupled a General Electric 400 K.-W. dynamo of standard construction, but wound for 350 volts instead of 500 volts, as is the usual practice in railway work. This machine is placed between the high and low pressure sides of the engines.

From the generators the cables run to the switchboard and thence to a subway under the sidewalk on 146th street, extending as far as Lenox avenue, where they are introduced into the five-inch iron pipes running parallel with the conduit. For the present the line will be operated directly from the power house, but feed wires will probably be placed in the pipes and will be joined to the conductor at the necessary points, and the line will then be divided up into sections.

The construction of the underground contact system is simplicity itself. The plough suspended from the car truck passes through the slot in the center of the track and presses against the flat surfaces of two iron conductors running the entire length of the conduit. These conductors are placed each three inches on each side away from the center of the slot to avoid deleterious effects of any drip which would otherwise reach them, and are of channel iron four inches deep and thirty feet long. They are suspended from the ceiling of the conduit by means of insulators devised for this special purpose, and are at a depth of thirteen inches below the conduit slot. Each conductor is sufficiently rigid to require suspension at the ends and centers only. The ends are located in the manholes and handholes are placed at the centers; inspection and repair are thus rendered comparatively easy.

A modification of this system of suspension of conductors is introduced for a length of about one hundred yards of single track on 116th street, between Lenox and Seventh avenues. At the manholes, instead of insulators suspended from the ceiling of the conduit, the conductors are supported by a soapstone pillar, provided with an iron cap furnished with brackets, to which conductors are bolted, and continuous connection is secured by means of a bond of flat copper strips riveted to the webs. The soapstone blocks are set in iron bases erected in the manholes.

Every twelfth manhole is connected with the power house by telephone. Quick break electric switches are located at intervals in these manholes, in order that any section of the line may be cut out in case of trouble or accident. At the track switches each conductor is provided with a flaring nose to facilitate the entrance of the plough into the conductors. The manholes in which the insulators are placed are constructed of brick with walls that rest on concrete foundations. The floors are laid with six inches of concrete and provided with drains for carrying off water. With this provision for drainage no trouble from water in the conduit will, it is believed, be experienced. The conduit was built along the grade of the street, but with sufficient pitch to permit any water flowing into the conduit to find its way into the manholes, located every thirty feet, and from thence into the sewers.

The current does not return by means of the rails, as is usually the case with the overhead trolley. This is a distinct feature and advantage of the new system. Each conductor forms one side of the working circuit. The current is led into the positive conductor and returns over the other or negative conductor. The current merely rises on one side of the plough, passes through the controllers into the motors and after performing its duty returns by the other side to the opposite or negative conductor.

The plough or traveling contact arrangement is also essentially novel. It consists of two pieces of iron, one on each side of the plough, supported on spring leaves, which cause them to press outwardly against the two conductors. The plough is suspended from a longitudinal bar bolted to cross-beams set upon the track, and is constructed of two sheets of steel laid each one upon a plate of fibre. The two sheets of fibre are then brought together, enclosing strip copper conductors connected at the top to the motor cables, and at the bottom riveted to two other pieces of sheet steel. These run on each side of the plough and serve as supports for the hinges which carry the sliding contact pieces. A heavy sheet of fibre continues downward and serves to separate these contacts.

The motors employed are the standard general electric 800 machines, controlled by K2 controllers, and the cars which are used on the line resemble those used on the Broadway cable line. They are lighted by nine incandescent lamps arranged in groups of three each.

This system seems to offer the best solution yet discovered for electric traction on city streets without incurring any popular odium from what is called the trolley difficulty. It is free from the objectionable features characteristic of other methods attempted elsewhere. Instead of a plough fitted with wheels running under or over wires strung in the conduit, instead of any of the other numerous and elaborate expedients to secure a workable underground conduit electrical system, a surprisingly simple method of contact is adopted. This new system is cheap and easy to install, can be kept in repair at small cost, and can be inspected without difficulty.

The introduction of this system in New York, where the crying need for rapid transit is almost equaled by the determination not to admit the overhead trolly, is only a start. Its satisfactory operation, safety and economy, when compared with cable or horse traction, will probably result in its general adoption upon the surface roads, and another step toward real rapid city transit will be made.

INDIAN TROUBLE.

OMAHA, Neb., July 21.—A special to the *Bee* from Lander, Wyo., says: What is going on at Fort Washakie seems to be a military secret. Word comes from there, however, that the Indian judges and two policemen who were sent to Jackson's Hole ten or twelve days ago, returned last night. They report that they were detained as captives by the Bannocks for several days, but at last made their escape. Nothing has transpired to indicate what the report is, except that a movement of a small body of troops from the fort is apparent, as wagons are being loaded with supplies today, and everything is active. Preparations are going forward for some kind of a movement, but with only forty-two men at the post, it will not be a formidable army.

The people here are indignant that Fort Washakie has been neglected, but