

# IN THE FIELD OF ELECTRICITY

**Subway Safety Equipment.**

**E**VER since the accident and loss of life in the Paris underground road, two years ago, car construction and electrical talent have been occupied in devising safety equipment for the New York subway, which is soon to be opened for business. The Interborough Rapid Transit company, which will operate the road, announces that all its motor cars are to be equipped with automatic controllers, so that when the conscious effort of the motorman to keep the circuit opened is relaxed and his hand is withdrawn, the current is cut off and the brake is applied. The announcement continues: "If he removes his hand from the controller handle the power is automatically shut off, and the air brakes are applied in the emergency application, the two actions being simultaneous. This device has been adopted after extended experiments, and for the first time in the history of rail-roading will be in use on the Interborough cars. The Interborough company has already perfected a device which will be put in soon on all cars on the Manhattan division, to accomplish the same result. The devices are now being manufactured, and many of them have already been delivered and are now being tested to overcome difficulties which arose when the motive power of the Manhattan Elevated railroad was changed from steam to electricity. From the experience obtained by officers of the Interborough company it has already been determined to place these devices on the entire equipment of the Manhattan division. The work at present is well advanced, and will probably be completed within sixty or ninety days." As a matter of fact, the electrical equipment of the subway is very much more perfect than this statement would lead the reader to believe. It includes a device known as the automatic train-control system. In addition to the usual visible signal equipment, which the motorman is supposed to observe and follow, it has an emergency provision which, when necessary, automatically cuts off the current and applies the brakes independent of the condition of the motorman. The track is divided into blocks, and when one block or section is occupied by a train, advancing, standing, or backing, a train following it cannot get upon the same block unless the motorman deliberately and consciously releases the restraint and puts it there. In certain conditions of mind the motorman might hold the handle of the controller against the spring tending to throw it back to zero. The fact that train accidents frequently happen which cannot be explained save that they result from the doing of things by engineers which are as inexplicable by them as by others, warrants the belief that the tension of duties of this character affects certain persons by producing abnormal psychological phenomena. To run by a danger signal without seeing it and hold the throttle open while a train dashes into one ahead of it which has been distinctly visible long enough to afford ample time to reverse the engine and put on the brakes are crimes the engineer does not commit deliberately. The most perfect signal system stops at the pole on which its signals are displayed. Experience in a hundred instances has shown that between the signal displayed and the man in the cab who is supposed to see it, but does not always do so, there is an interval to be bridged which is wide enough to engulf a train in utter destruction. The fact that the electrical equipment of the subway includes a device which in the ways described supplements the motorman's observation, vigilance and mental equilibrium, would have warranted the management in making much stronger claims for the completeness of its safety appliances than is included in the above quotation.

**Electric Power in Mills.**  
New light on the desirability of using

electric power in certain industries was afforded at the recent convention of the New England Cotton Manufacturers' association. E. W. Thomas of Columbia, S. C., read a paper before that organization giving some of the results of the system as tried in one of the largest cotton mills in the south. Though he was not yet in a position to give a final and complete statement concerning the practice, he was able to mention advantages which have not been recognized fully, if at all, before.

Hitherto the chief argument advanced in favor of distributing and applying the power in any kind of factory were that it dispensed with the friction of shafting and belting and made it unnecessary to run a machine when it was not needed. Inasmuch as from one-half to two-thirds of the power in most factories is wasted by the friction of shafting with bearings, an enormous economy would be effected by transmitting the power in the form of electricity by wires from the engine room to the machines to be operated. A gain of the same sort, though smaller in extent, would result in many shops where a lathe or other machine tool might not be used more than a few minutes at a time. In a different class of establishments, and particularly in mills devoted to the production of textile fabrics, all the machines in a given room are supposed to run continuously. If a loom, for instance, stops, the interruption is only momentary. Mr. Thomas points out, however, that even in a cotton mill it is often advisable to suspend operations entirely in a given department—say, the picker room—because it has more than caught up with its work. In that situation the movement of a single switch cuts off the power from that one quarter while all other departments continue to run. Such an economy can be insured where electric driving is in vogue, but it is impracticable where the old system is retained.

It appears that the meters in an electrically driven mill can be made to register automatically, and thus reveal important facts not easily ascertainable in any other way, and perhaps not even suspected. Mr. Thomas says that in his mill work is supposed to begin at 6:30, but the maximum demand for power is sometimes not felt until 7 o'clock. Again, the consumption will occasionally slacken at about 11:30, fully half an hour before the regular noon suspension. In other words, the switchboard can be employed to indicate the diligence of the operatives. In the same manner it is possible to detect the influence of certain atmospheric conditions or the relative efficiency of different lubricants. The beauty of these incidental kinds of service will be keenly appreciated by a progressive manufacturer who is continually facing competition with friendly rivals and who is alert to every chance to reduce expenses.

It is to be hoped that at some future time the owners of the Columbia mill will tell other manufacturers more about their experiment, and particularly about the cost of the installation. A detailed report on this phase of the subject should prove highly instructive.—New York Tribune.

#### Wonders of Rail-Laying.

Electricity and compressed air are joint forces employed in laying a new street railway in Philadelphia. The rails weigh 137 pounds to the yard and fifty feet in length. Electricity, which is so handily obtained from the trolley wire overhead, is used to run about all the machines, or, at least, to generate the compressed air which runs them. It is brought down to the machine by a wire attached to a piece of bamboo, in shape and size very much like a large fishing pole, the wire being bent in the form of a hook at the upper end, so that it may be hung on the trolley wire or taken off at pleasure.

When the old rails have been removed the trench is dug to the required depth, the temporary cross-ties are put in and the new rails placed upon them. The first

operation is then the cleaning of the ends of the rails of dirt and rust. This is done with a sand blast supplied through tubing from a wagon. It cuts everything off of the rail until the metal shines forth brightly. The operation makes such a cloud of fine sand and metal dust that the man who operates the blast is compelled to wear a hood something like a diver's helmet, with a fine-meshed screen in it for ventilation. What other workmen there may be in the immediate vicinity of the operation generally keep their mouths and noses covered with handkerchiefs.

After the sand blast comes the wagon with the reaming machine, run by compressed air. Holes have already been drilled or punched in both rails and fishplates, but the reaming enlarges the holes to the size of the bolts or rivets to be used. The wagon with the machinery for bolting or riveting the fishplates comes next. It has a crane that holds the bolting machine in position and at the back small coal fires, with electric blowers, for heating the rivets.

The fishplates are of such form that after being bolted to the rail some space is left between rail and plate. The eyes of the fishplate are stopped with clay and pieces of canvas and the whole joint is heated with a flame furnished by a combination of coal oil and compressed air supplied from another wagon. On the same wagon are pots full of melted metal heated in the same way, and this is run through funnels into the space between rail and fishplates on both sides. This makes the electric bond whereby the current passes along the ground circuit from one rail to the other.

When the rails are bolted and connected they are adjusted as to gauge or distance between them. The foundation on which they rest is a bed of concrete extending from rail to rail, the cross-ties being removed. At every six feet is an iron yoke extending downward from each rail into the body of the concrete, and the gauge is further maintained by the rods. The concrete extends up to above the bottom flange of the rail and over it is put the paving.

In the method described each of the various wagons has its separate crew, the work required being of an expert nature and with the helpers, the men who dig the ditches, the gaugers, the layers of the concrete and the layers of the pavement, the total number of workmen on the job is very large.

#### The Right to String Wires.

The superior court of Pennsylvania in two recent decisions has defined the rights of telephone and telegraph companies to the public highways in the country, which are of first-class importance. Mr. Thomas Raeburn White in the current number of the Legal Intelligencer calls the attention of the legal profession to these decisions, but they are no less interesting to laymen, whose rights against the telephone and telegraph companies they define and maintain.

Telephone wires go everywhere and are constantly being extended and multiplied. At one time the companies or their employees assumed that they owned the earth and were at liberty to go on any street and enter private property to string their wires. They even cut down or mutilated large and handsome trees in a private park to make a clear passage for their wires, and they assumed the right to use any man's housetop to sustain their wires, although the owner of the property received no service from them. They have been called down from both these positions. If their employees destroy or mutilate trees on private property the company must pay well for the destruction, and any man who finds wires placed on his house without his permission may cut them if he chooses. The telephone company in such a case is a trespasser and has no right that they can maintain in a court of justice.

In these two superior court decisions referred to it is emphatically laid down that

a telephone or telegraph company can have no right whatever on private property except what the owner grants them. They do not possess the right of eminent domain except on the public highway. In the country, according to these decisions, a wire strung along a highway is an additional servitude on that highway for which the owner of the fee—that is, the abutting property owner, is entitled to compensation. In other words, the telephone and telegraph companies must obtain permission of the land owner before occupying private land, and though they may occupy a public highway in the country without permission, they must make a just compensation to the abutting property owner.—Philadelphia Press.

#### Edison Battery Test.

R. A. Fless, who has been associated with Mr. Edison in the development of the nickel-iron storage battery, gave a talk about this invention to the American Institute of Electrical Engineers the other evening. It was mainly historical, and recited the various small steps by which the cell was carried to its present form. These details were technical, and of interest mainly to electricians. Comparatively little of a popular character was brought out which was not known several months ago. The most important revelations related to endurance tests. A cell which had been run over 4,000 miles was carefully examined for any deposit of material that had been loosened from the plates. There was a perceptible, but small amount. Mr. Fless showed it in a bottle. When the 4,000-mile run was ended no deposit at all was found. This was a striking contrast to his observations on lead batteries. He had charged and discharged one of the latter 190 times in succession, in a laboratory, without putting it on the road in a vehicle, yet a considerable quantity of material settled in the bottom of the cells. This was exhibited to the audience. The Edison batteries just mentioned were used in automobiles on all kinds of roads, and at the end of the trials they not only were uninjured, but each had apparently a slightly greater capacity than before. "We have done our best to ruin these batteries," said Mr. Fless, "but we have not succeeded yet."

#### A Bachelor's Reflections

The way to solve the financial problem of how to keep money in circulation is for everybody to get married.

After a girl gets engaged she acts like a man who has just bought a dog supposed to be able to lick anything in his class.

A girl has an idea a man is crazy over her if he wears a boutonniere that matches some of her ribbons she is wearing where nobody can see them.

What convinces a woman that she is an economical housekeeper is the way she can save on the furnace coal bills in summer and the ice bill in winter.

It is very foolish for a man to be married unless he is going to remember to say every once in so often how much better his health has been since he has always had meals he could enjoy.—New York Press.

#### Boss Made a Mistake

A senior of one of our large manufacturing concerns came through the store recently and noticed a boy sitting on a counter, swinging his legs and whistling merrily. The senior eyed him severely as he confronted him and inquired:

"Is that all you have to do?"

"Yes, sir."

"Very well; report to the cashier and tell him to pay you off. We don't need boys like you around here."

"But, sir," said the astonished boy, "I don't work for you. I have just bought some goods and am waiting for the bill."—Louisville Courier-Journal.

