THOMAS A. EDISON.

We present as a frontispiece to this number of the ELECTRICAL NEWS an excellent portrait of Thomas A. Edison, the famous electrical discoverer and inventor. Mr Edison, who is of Dutch extraction, was born in Erie County, Ohio, 46 years ago. Owing to reverses which overtook his family, he was at an early age obliged to seek his own living. He began his business career as a newsboy on the Grand Trunk railway and while thus employed commenced studying and experimenting in chemistry. At seventeen years of age he is said to have become one of the most expert telegraphers on the railroad. The history of his greatest achievement, the incandescent electric lamp, and the legal battles which he has had to fight to maintain his rights as the inventor, will be fresh in the minds of our readers. The inventive character of Mr. Edison's mind can be judged by the fact that he has been granted no less than 720 patents, while in addition he has 150 applications on file.

THE BEST RESISTANCE FOR THE RECEIVING INSTRUMENT ON A LEAKY TELEGRAPH LINE.*

By Prof W. E. Ayrton, F. R. S., and C. S. Whitehead, M. A.

1. If there be a single earth fault at any one point of an otherwise good telegraph line, P Q (Fig. 1), it is easy to prove that the best resistance to give the receiving instrument at either end of the line is equal to the apparent resistance of the line tested from *that* end when put to the earth at the other end through a resistance equal to that of the signalling battery at that end. For example, if we desire to know what should be the value of q, the

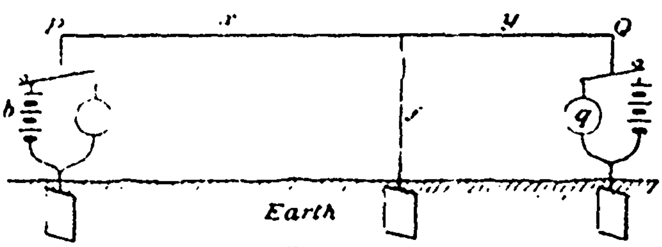

Fig. 1.

resistance of the receiving instrument at the Q end, the line must be tested *from* the Q end (Fig. 2) when put to the earth at the P end through a resistance, b, equal to that of the signalling battery usually employed at that end.

And the magnetic effect produced by an electro-magnet of given size, shape, and construction is proportional to the product of the current into the square root of the resistance of the wire with which the coil is wound. Therefore it follows that the magnetic effect of the receiving instrument at Q is proportional to A $\sqrt{q}$, and this has a maximum when q is equal to the apparent resistance of the line tested from the Q end and put to earth at the P end through a resistance b.

2. During the course of some lectures at the Guilds Central Technical College last year on faults on telegraph lines, the question arose whether the above result was universally true for a distributed leak all along the line, or only for a single earth fault; and, if this solution were not generally true, then what was the best resistance to give to the receiving instrument at the end of a telegraph line the leakage along which followed any law. The complete solution of this question shows that when the line is uniformly leaky the receiving instrument ought to have a resistance equal to the apparent resistance of the line when tested at the receiving end and put direct to earth at the sending end.

The resistance of the signalling battery does not in this case appear in the best value to give to q, but that arises from the fact that, whereas when we are dealing with a single earth fault we assume that the signalling battery had a fixed E. M. F. and a fixed resistance, here we have assumed that the potential of the

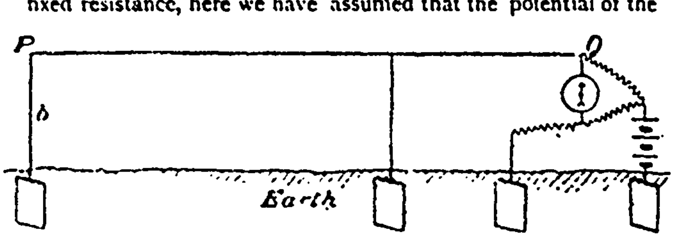

Fig. 2.

sending end of the line, was kept constant. Now this is the same thing as supposing that the signalling battery of fixed E. M. F. has an extremely low internal resistance. The two results are therefore the same.

If the distributed leak follow *any* law, the general differential equation cannot be integrated, and we must deal with the problem of determining the best resistance to give to the receiving instrument at the end of the leaky telegraph line without actually integrating equation, and without expressing in an explicit form the value of the current that passes through the receiving instrument. The Paper shows by an elaborate mathematical calculation that, whatever be the nature of a leak on a telegraph line whether the leak be a single one, or be distributed along the line according to any law of distribution the same rule holds true for the best resistance to give the receiving instrument, viz., the receiving instrument at either end should have a resistance equal to the apparent resistance of the line when tested from that end and put direct to earth at other end.

* Abstract of a Paper read before the Institute of Electrical Engineers.

THE HAMILTON PUMPING ENGINES.

HAMILTON, ONT., June 14th, 1894.

Editor ELECTRICAL NEWS.

SIR,—There has been a great deal said of late about the Hamilton pumping engines. I took a trip to see them, and think the less said about them the better. They look as though they had been at war with something. If they have not broken down what have all the iron straps been put on them for? As for the test, like many another made in this city, it was of a kind which any capable man should be ashamed to have anything to do with. Can any one point me to a first class engine made in Hamilton in twenty years, with one exception? I know there has been a great deal said in favor of the engines made and sold here, but if one of them should be loaded to its rated capacity, there would be witnessed lots of fun. We expect to see a first-class engine turned out of Hamilton in a few days. In the meantime let us have a rest from the Hamilton pumps. What with pumps, engines, parks and mountain, we are a laughing stock for the country.

Yours truly,

"OIL CAN."

MOONLIGHT SCHEDULE FOR JULY.

Day of Month.	Light.	Extinguish.	No. of Hours.
	H.M.	H.M.	
1......	P. M. 7.50	A. M. 3.40	7.50
2......	" 7.50	" 3.40	7.50
3......	" 7.50	" 3.40	7.50
4......	" 7.50	" 3.40	7.50
5......	" 7.50	" 3.40	7.50
6......	" 7.50	" 3.40	7.50
7......	" 8.50	" 3.40	6.50
8......	" 9.50	" 3.40	5.50
9......	" 10.20	" 3.40	5 [illegible]
10......	" 11.00	" 3.40	4.
11......	" 11.30	....	
12......	....	" 3.40	4.10
13......	A.M. 12.30	" 3.50	3.20
14......	" 1.00	" 3.50	2.50
15......	" 1.40	" 3.50	2.10
16......	No light.	No light.	....
17......	No light.	No light.	....
18......	No light.	No light.	...
19......	P. M. 7.40	P. M. 10.10	2.30
20......	" 7.40	" 10.40	3.00
21......	" 7.40	" 11.00	3.20
22......	" 7.40	" 11.30	3.50
23......	" 7.40	" 12.00	4.20
24......	" 7.40	A. M. 12.20	4.40
25......	" 7.40	" 12.50	5.10
26......	" 7.40	" 1.10	5.30
27......	" 7.40	" 1.30	5.50
28......	" 7.30	" 2.20	6.50
29......	" 7.30	" 3.20	7.50
30......	" 7.30	" 4.00	8.30
31......	" 7.30	" 4.00	8.30
		Total,	152.00

CAUSES OF EXPLOSIONS.

THE causes of explosions may be summed up in one sentence, namely, lack of strength to withstand the pressure. This want of strength may be due to faulty construction, but as a rule it is due to some acquired weakness, unknown simply because unlooked for. Weakness results from unequal heating, which produces unequal expansion, from corrosion, improper setting, scale, low water and want of circulation. It may not always be possible to avoid unequal heating, as for example, in getting up steam many boilers will be hotter in some parts than in others, but scale can be prevented by "boiler compounds," and low water by a little care. In some types of boilers no provision is made for water circulation, and unequal heating is bound to occur. A thorough inspection from time to time will inform the engineer if his boiler is weakened by it, but the best plan is to use some other type. To sum up, the engineer must understand and act upon the motto, "eternal vigilance is the price of safety."—Safety-Valve.

The receipts of the Montreal Street Railway for May were the largest since the adoption of the electrical system, amounting to $85,000, an increase of $25,000 over the corresponding month of last year.