

Electricity in the Transportation Field.

In no branch of science has the century now fast nearing its end witnessed more rapid advances or remarkable applications than in electricity, which in a brief space of 100 years, has developed from a scientific curiosity to one of the most potent forces that enter into our industrial life. It is still but ill-understood, & not even adequately definable. So vast have been the changes which it has already wrought in chemistry & manufactures, & so powerful may be the influence which it is destined to exert over the arts, that one involuntarily looks into the future for a glimpse of its possibilities in the twentieth century.

Present developments give no reason to expect that electricity will ever completely supersede steam as a motive power of great railway systems. In the transportation of heavy loads through long distances, the use of electricity is accompanied with many inconveniences & disadvantages. The steam-locomotive, on the other hand, ever remarkable for its great tractive power & high speed, has, in late years, been so considerably improved that it will undoubtedly hold its own in the economical, long-distance haulage of freight. Improvements in smoke-consuming devices, in constructions for lessening vibration, & in arrangements for increasing the heating surface & boiler capacity, follow one another so rapidly that the merits of concentrated power, cleanliness & compactness are almost as characteristic of the locomotive as they are of the electric motor. But, although electricity may never be exclusively used as the motive power of our large railroads, there are certain conditions under which it may be far more satisfactorily employed than steam. Scarcity of coal & a superabundance of water-power, for example, may favor the construction of electric rather than steam roads. In Switzerland

& the Alpine regions of Italy, short trains of moderate speed, running at frequent intervals & carrying but few passengers, are chiefly employed, electric power being used for reasons of economy; while there is every indication that electricity will be exclusively used in the subway systems of the future.

For suburban travel & the street railways of large cities, electricity is admirably adapted to meet the requirements of punctuality, security, & speed. Electric power is eminently suited to the needs of the small road; the cars are small, the trains short, the superstructure light, & the system cleanly. Whether the over or the underground trolley or the storage battery will be the prevailing system, it cannot be doubted that for city & suburban service electricity will remain the best form of motive power. So widely is it now employed on tramways, that it practically monopolizes the field; & further advancement must be looked for only in intensive improvement, in increased efficiency & safety.

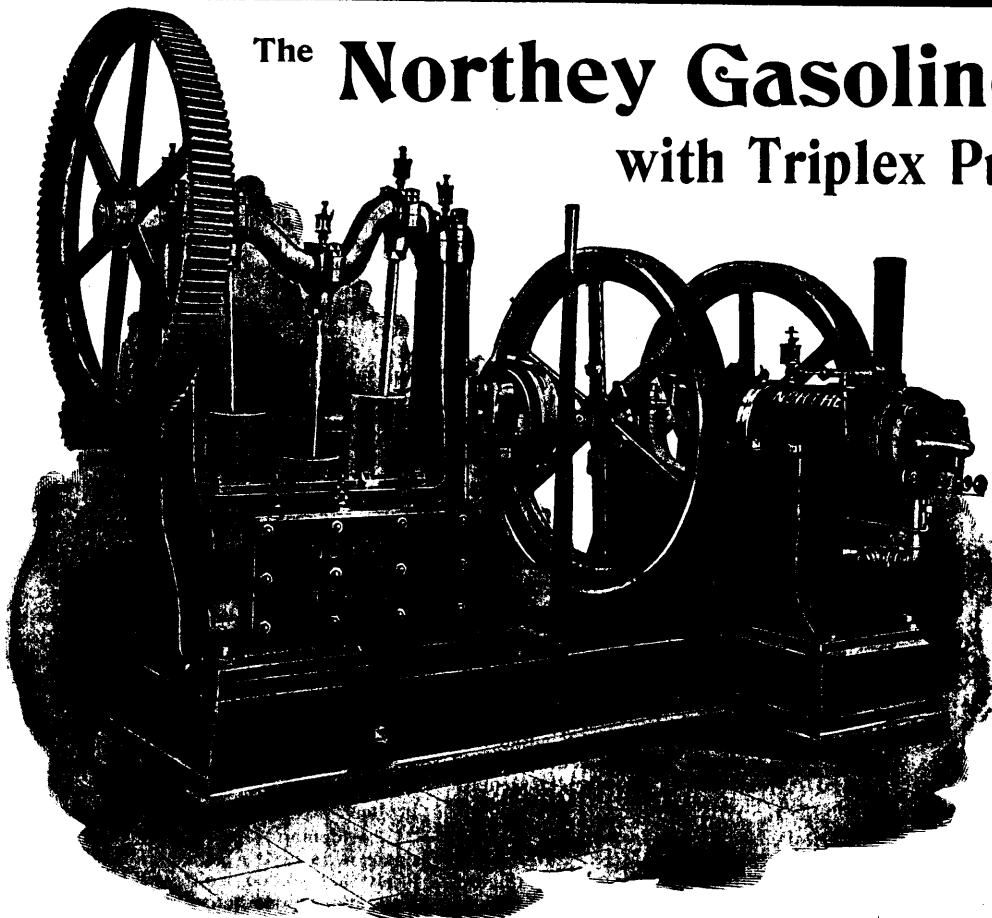
That electricity will actually supplant steam on short, industrial roads, such as those that connect mines with foundries, & factories with shipping wharves, is as certain as that it will be generally employed in city & suburban traffic. The small electric locomotive of great tractive power, easily controlled, ever ready for service, has proven itself of untold value, & to a certain extent, has already taken the place of the steam locomotive. The field which is here opened to electricity is not so limited as one might be inclined to imagine. The centralization noticeable in all branches of commerce, the combination of small factories to form giant industries, is becoming more pronounced with each succeeding year. Industrial plants, which cover acres of ground, & which swarm with workmen, require a quick means of transporting material from

building to building, & for this purpose electricity is the most convenient &, under many conditions, the cheapest form of energy that could possibly be employed. In many of these establishments large generating plants have been already built to drive the many motors, cranes, machine-tools, & labor-saving appliances, & the utilization of the same current employed in driving these machines, to operate short railways would be both practicable & economical.

Transportation by water will be affected by electricity less markedly than transportation by rail. The electric appliances which are now largely used on European canals have contributed much to increase the efficiency of these & other waterways. Electrically-operated cranes, elevating apparatus, & gates are multiplying; & the mule that now reigns supreme over the towpath is gradually giving way to the small, powerful, electric locomotive, capable of towing several barges at a time. On ocean-going steamers, electricity will occupy a minor place. At present it is employed in lighting & in operating the steering-gear & various auxiliary machines. On warships it will find a more extensive application. Although it will not supersede steam as a means of propulsion, it will be more widely used than at present in the manipulation of turrets, guns & ammunition hoists, & the operation of deck winches & boat cranes.

Electric communication on land, in spite of its phenomenal development, may still be vastly improved in economy. Our present system of rapid telegraphy is expensive; the sending of a message by wire is even yet far too costly for the ordinary affairs of mankind. If the twentieth century inventor will concern himself with increasing the efficiency & reducing the cost & expense of existing means of electric communication, he will confer

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