

## ELECTRICITY AND STEAM.

## A Comparison of the Two Means of Supplying Power.

"It is remarkable what a number of persons of intelligence there are who have the impression that by the use of electricity five or six horse power will do the work of fifty or sixty horse power produced by steam," said an electrician. "Only a few days ago such a person said to me in good faith that he believed that electric motors would soon take the place of steam locomotives for general railroad use, because a little electric motor of five or six horse power would be able to do the work of the heaviest engine. A lot of clever inventors have also been at work with this same idea, and every once in a while some newspaper tells about one of their schemes and adds that the invention is to revolutionize railroading."

"The real economy of the electric motor does not lie in its being able to do any more work for each horse power than could be done by the steam engine, but in the fact that the power for many motors can be generated at one central station under conditions of much greater economy than can be secured in the locomotive or in small separate plants, and also in the greater efficiency for certain purposes of a rotary motor over the reciprocating action of the ordinary steam engine. Speaking generally, the power all comes from coal originally and the steam engine is used to drive the electric generators or dynamos, as they are called. If there are a hundred machines to be driven and each of these would take five horse power they would each require an electric motor of the same power as if the motor were a steam engine, and the whole would require a central station engine, which could furnish to them 500 horse power, in the aggregate. The loss of power in good practice amounts to from 6 to 10 per cent., so that the central station must actually produce, in such a case, fifty horse power, perhaps, more than the separate steam engines to perform the same work would be required to do."

"You wonder, then, where the economy of using electricity lies? Let us consider this as applied to the running of locomotives, for instance. An express locomotive, running under favourable conditions, will use four pounds of coal an hour for each horse power produced. Some runs have been made upon a consumption of three and one-half pounds an hour for each horse power. An engine drawing a local train will burn five pounds of coal every hour for each horse power, while the usual consumption of a freight locomotive is from six to ten pounds. Even this does not take in the coal wasted while the engine the engine is getting up steam, or that burned when the fires are drawn. Compare this with the results attained in good stationary plants. Some of these will produce power at an expense of one and five-tenths pounds of coal for each horse power an hour, while it is a poor plant which requires more than two pounds. In the new steamship Kaiser Wilhelm der Grosse the engines produce 20,000 horse power upon an average consumption of one and one-half pounds of coal for each horse power an hour for a run across the Atlantic. Coal can also be delivered and handled cheaper at large central stations, and the other expenses are also less. As a rule the cost of fuel on electric roads is about 5 per cent. of the operating expenses, while on steam roads it is about 10 per cent."

"The real reason why the electric locomotive does not at once take the place of the steam motor is the difficulty of cost of distributing the electric current for long distances without a great loss of current through the electrical resistance of the wires. To overcome this the roads operated by electricity are divided up into short sections, and separate copper feeder wires are run from the power house to each section. This would not entail so much expense if it were not for the fact that each feeder wire as it is increased in length must also be increased in size, or there would be a great loss of power, and the cost of the copper soon gets to be too great to warrant the increase in size. When the scheme for building the Broadway underground rapid transit railroad was being investigated by a supreme court commission in 1895 experts testified that to transmit the enormous amount of power which would be required for the proposed train service would take \$7,000,000 worth of copper wire alone if the power all came from one station."

These difficulties were very clearly set forth recently by Claude Marshall in a paper read before the Chicago Electrical Association, and Mr. Marshall also points out a way in which they may be overcome. He says in part:

"As far as an engineer can see into the future it is improbable that electricity will supplant steam for general railroading purposes, but there are some departments of the work where the adoption of electricity will be a great advancement. In thickly settled communities, as parts of the New England, North Atlantic and central states, the railroads will be forced to make changes in their service to successfully compete with the trolley lines."

"With the present equipment it seems

that 500 or 600 volts at most is the limitation of the direct current motor, and long lines can only be operated by placing power stations at frequent intervals, say ten or twelve miles apart. The transmission at this voltage involves enormous losses or great expense for copper. On one road recently tested the voltage varied from 525 volts near the station to 240 volts at the end of a line seven miles distant. It is obvious that for transmission alternating currents must be employed. How necessary high voltages are may be seen from a little calculation on the cost of copper for line wire. Mr. Stillwell gives the cost of copper required to deliver one horse power at motor shaft ten miles from the generator, allowing a 20 per cent drop and copper 15 cents per pound, at 500 volts, \$780.75 and at 10,000 volts, \$1.95. Thus it is seen that it costs 400 times as much to furnish copper at 500 volts as it does at 10,000. A voltage of 10,000 is well within the present engineering practice."

"It is generally believed that alternating current motors are out of consideration for traction purposes, and it is true that the experiments have not been successful on account of the low starting torque and lack of regulation; but the improvements which have of late been made go far in perfecting this machine."

### Dragged from a Condition of Physical Wretchedness and Misery.

### PAINE'S CELERY COMPANY WAS THE DELIVERER.

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Yours truly,  
JOHN BARRAND, Barrie, Ont.

#### High-Priced Relics.

A tooth of Sir Isaac Newton was sold in 1861 for the sum of \$3650. It was purchased by a nobleman, who had it set in a ring which he wore constantly on his finger.

The hat worn by Napoleon Bonaparte at the battle of Eylau was sold in Paris in 1835 for \$400. It was put up for sale at \$100, and there were thirty-two bidders.

The coat worn by Charles XII. at the battle of Pultowa, and preserved by one of his officers and attendants, was sold in 1825 for \$116,875.

The two pens employed in signing the treaty of Amiens were sold in 1825 for \$2500.

A wig that had belonged to Sterne was sold at a public auction in London in 1825 for \$525.

The prayer book used by Charles I., when on the scaffold, was sold in London in 1825 for \$525.

A waistcoat belonging to J. J. Rousseau was sold for \$190, and his watch for \$100.—San Francisco Chronicle.

#### A PROMINENT U. S. PHYSICIAN PRAISES DR. AGNEW'S OINTMENT

Dr. M. Barkman, Binghamton, N. Y., writes: "Send me 12 dozen more of Dr. Agnew's Ointment. I prescribe large quantities of it. It is a great remedy for tetter, salt rheum, eczema and all skin diseases, and also a cure for piles. Price 35 cents a box. Sold by Garden Bros."

Tegy—Aw—Miss Gwace, youah always in my mind don'tcher know. Miss Grace—Goodness! That is worse than living in a flat!

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the organs peculiarly feminine, often cause intense itching, which in many cases amounts to agony. In bed at night it grows worse and scratching intensifies the trouble.

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#### The Dreaded Comes to Pass.

"Hush, now; your shoes squeak! Take them off."  
"Do you think he is asleep?"  
"Yes, but don't breathe. Now wait."  
"How infernally dark the house is. Can't I light up a little?"  
"Sh-h! Certainly not. He would hear the match. Come."  
"Hang the stairs! How they creak!"  
"Step softly. Don't stumble."  
"Where are you?"  
"Keep quiet. Don't breathe so loud."  
"I—I can't help it. I can't hold it in."  
"Sh-h-h!"  
"Hang that infernal chair!"  
"Now you've gone and done it! The baby is awake!"—Cleveland Plain Dealer.

#### DOAN'S KIDNEY PILLS.

DOAN'S KIDNEY PILLS act on the kidneys, bladder and urinary organs only. They cure backaches, weak backs, rheumatism, diabetes, congestion, inflammation, gravel, Bright's disease and all other diseases arising from wrong action of the kidneys and bladder.

#### His Modest Role.

The fond mother of three children was obliged to remonstrate with her oldest boy because in the children's games he would always take the lead and assign subordinate positions to his little brother and sister. The boy promised not to be selfish in the future. A few days later the mother, happening to go into the nursery, saw the two younger children engaged in amateur theatricals. The elder boy stood aside, with arms folded, moodily watching them. "We are playing Adam and Eve," said the youngsters. The mother was much gratified, as she supposed that in this instance, at least, the boy had allowed his brother the principal role. She turned to the silent figure in the corner, about to praise him. "Who are you?" she asked. "God," was the answer.—New York Commercial Advertiser.

An ordinary cough or cold may not be thought much of at the time, but neglect may mean in the end a consumptive's grave. Dr. Chase's Syrup of Linseed and turpentine will not cure Consumption when the lungs are riddled with cavities; but it will stop the cough, will cure Consumption in its early stages, and even in its last stages gives such relief as to be a perfect Godsend to those whose lives are nearing a close.

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But the fish always suffers for it.

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Is worth its cost because it guarantees More Reserve Value. Profits can be used to shorten the period and make policy payable whenever the Reserve and the Surplus amount to the sum assured. You cannot obtain this policy in any other company. LOOK OUT FOR IT.

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We have finished taking stock, and will clear all our WINTER GOODS out at **KNOCK DOWN PRICES.**

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If you want to be in the swim, you should have one of the NEW HATS white with black band, or black with white and black band.

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