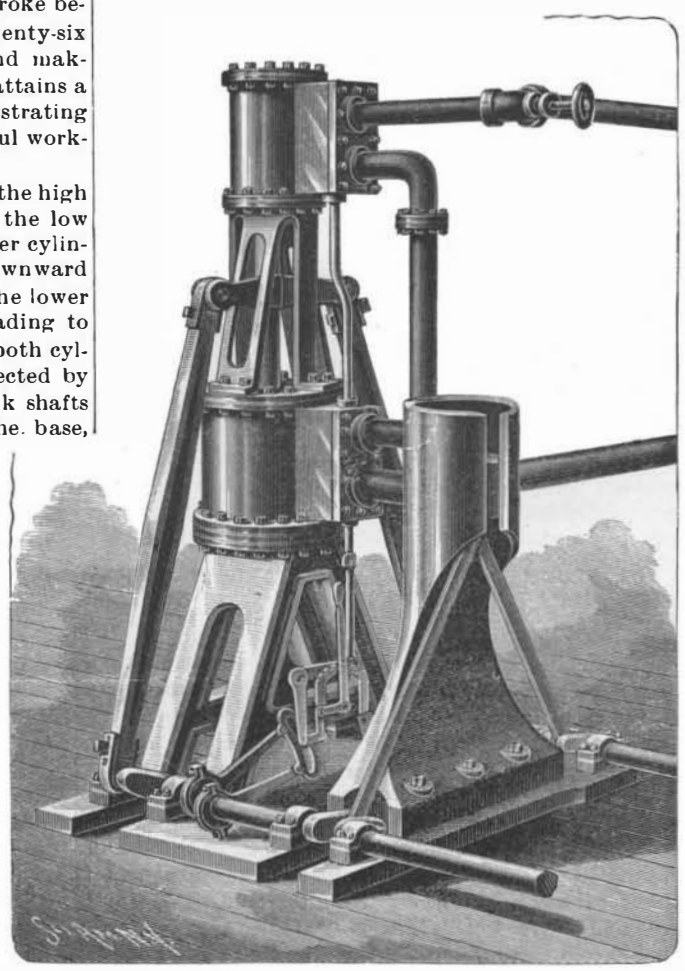
A TWIN SCREW LAUNCH RUN BY A COMPOUND ENGINE.

The launch shown in our illustration was built in New Westminster, British Columbia, Canada. She is 42 ft. keel and 7 ft. beam, and has 4 ft. depth of hold. She has an improved Clarke compound engine, also shown in an accompanying illustration, with a high pressure piston four inches in diameter, and a low pressure piston eight inches in diameter, the stroke being six inches, and the engine driving two twenty-six inch screws. With 130 pounds of steam, and making 275 revolutions per minute, the launch attains a speed of nine miles per hour, thus fully demonstrating the adaptability of this engine to the successful working of twin screws.

In the Clarke engine, the exhaust pipe from the high pressure cylinder leads to the steam chest of the low pressure clylinder, while the piston in the upper cylinder is secured on a piston rod extending downward and connected with a piston operating in the lower cylinder, the exhaust pipe from the latter leading to the outside. On the piston rod common to both cylinders is secured a crosshead pivotally connected by two pitmen with opposite crank arms on crank shafts mounted to turn in suitable bearings on the base, which also supports a frame carrying the low pressure cylinder, on top of which is a frame supporting the high pressure cylinder. The valves in the two steam chests are connected with each other by a valve rod connected at its lower end in the usual manner with the reversing link, operated from eccentrics secured on one of the crank shafts.

The crank arms stand at angles to each other, so that the crank shafts are turned in opposite directions, and the position of the link is such that it can be readily changed by the reversing lever to simultaneously reverse the motion of the crank shafts. On the crank shafts are also formed two other crank arms pivotally connected by opposite pitmen with a slide mounted in vertical guideways, supported on a frame erected on the base, the motion of the crank shafts causing the vertical sliding motion of the slide traveling loosely in the guideways, and thus serving as a governor, as, in case one of the propellers becomes disabled, the power of the shaft carrying the disabled propeller is directly transferred to the other shaft through the crank arms, pitmen, and slide, and the other propeller is caused to do all the work. All the parts of the engine are within easy reach of the engineer, and there are so few working parts in motion that the friction is reduced to a minimum.

It is said that the plan of construction and the operation of this engine have been carefully observed by practical engineers, and that, considering the dimensions of the boat, her speed, the smallness of the power, the ease with which she passes the centers, the absence of vibration while running, and the very few working parts in motion, the engine is a notable success. She can be run at a very high velocity without injury or risk, and is designed to be very economical in cost and in weight and space. This engine has been recently patented in the United States and foreign countries by Mr. James A. Clarke, of New Westminster.

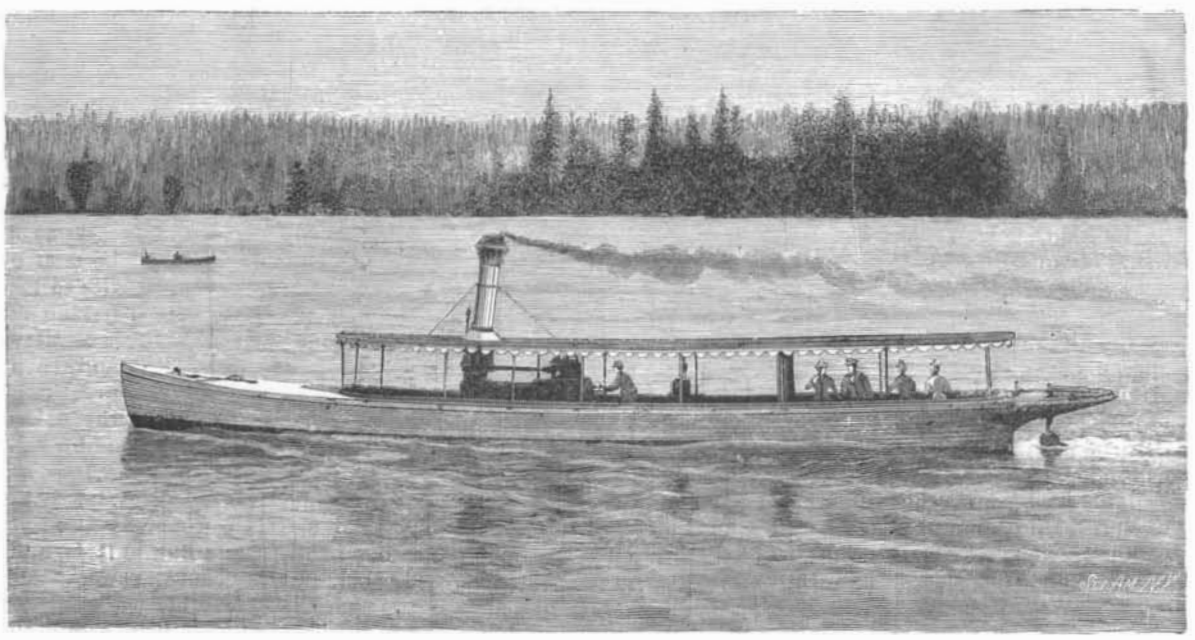


THE CLARKE COMPOUND TWIN-SCREW OPERATING ENGINE.

Electric Cars in Boston.

At the recent meeting of the American Street Railway Association Mr. Pearson of Boston said his road has about 350 cars equipped with electric motors. The expense of operation with horses is about 25 cents per car mile, including everything connected with the operation, fixed charges and the track repairs. In Boston the cost of operation is quite high as compared with some other cities. You will find in many cities the cost of operation of horse cars is below 25 cents, but we pay a good price for labor, on account of the running of our lines in the congested parts of the city, where we cannot get as much work out of a man as you can in other cities. This makes a greater cost of operation. The cost of operation with electric motors up to the present has been about 20 cents per car mile. The increased cost of operation in our city is also true to a great extent with electricity. We pay 25 cents a day more for motor men and electric car conductors than we do for horse conductors and drivers. That has been our experience up to this time. We save about 25 per cent. Our men are expected to work 10 hours a day, but we really get anywhere from 7½ to 9½ hours a day. The amount of power consumed is considerably more, on account of the slow speed with which the motor cars have to operate in the downtown sections of the city. There the streets are crowded with teams and cars, and I suppose that the cars run at an average of perhaps one or two miles an hour for a distance of from one-half to one mile, which of course decreases the profits very materially. We expect to get the cost of operation down to 16 or 17 cents per car mile. Another item of expense to us is the high cost of power, we having been obliged to hire power from an electric light company and pay them a good price for it, of course much more than it would cost a street railway company if they had their own power house. As I said before, the saving of electric cars, as compared with the horse system, is about 25 per cent, being about 20 cents per car mile for the electric cars and 25 cents per car mile for horse cars.

We began with a sixteen-foot motor car very similar to the old horse cars. We have changed from that to a long car, which is 26 or 28 ft. long in the body and 35 ft. over all; that is the car we have adopted as our standard. For our purpose we find a decided improvement in earnings and saving in operating expenses per passenger with the long car. I imagine that the conditions in Boston determine that for us, and in other cities it may be that the short car would be more profitable for operation. We find the long car earns a great deal more per car mile, and we need only the same number of men to operate it as with the short one. From our tests we find that the amount of power consumed on a level track is very little more for the long car than with the short one; in fact, the weight which we have in the car seems to have little to do with the current consumed, as long as the car is on a level track. From tests, we found that with a long car empty, weighing, perhaps, 18,000 pounds, using a certain average amount of current, the same car loaded with 15,000 pounds of weight used very little additional power until we come to a grade. We have experimented in this matter, and could hardly tell from the reading which was the empty and which was the loaded car. That being the case, it does not cost much more to operate long cars than short cars. Again, they carry nearly double the people, and do it with the same expense for conductors and drivers. Just how much more heavy cars will increase the track repairs of course we cannot tell at present.



THE TWIN-SCREW STEAM LAUNCH GEMINI.

A Poisonous Thimble.

Among the numberless causes of blood poisoning through the skin, one which was lately recorded is worth noting on account of its evident simplicity and the ease of its prevention. In the case referred to the sufferer was a seamstress, and the mischief resulted from her using a dirty metal thimble marked with verdigris, a little of which appears to have entered a scratch on the thimble finger. We can well believe that this accident was not the first of its kind. Verdigris, it is true, is a mere metallic irritant, and not comparable in virulence to most living germs of disease. It is quite enough, notwithstanding, to excite local inflammation, which friction, contact with dyed cloth material, or the entrance of dirt in any form would quickly convert into a dangerous and general disorder. There is really no excuse for women who trust their fingers in these cheap and worse than useless articles. Steel thimbles are much safer and cost very little. Another variety also in common use is enameled within, and is, if possible, even freer from objection. Let us not forget to add a caution that cuts or scratches on the hand should never be neglected by sewing women so long as dyes continue to be used in cloth manufacture.—*Lancet.*

Spectroscopic Analysis.

Prof. Ostwald (*Chemiker Zeitung*), in a discourse on the progress of physical chemistry, delivered before the Congress of German Naturalists and Physicians, declared that, owing to the recent investigations of Baluezs, Deslandres, Kayser, Runge, and others, results have been reached which justify the most sanguine hopes. It is generally believed that all substances are dissociated in the electric arc into their elements, and that thus a spectrum of their components is obtained. All substances which are formed with absorption of heat become more permanent as the temperature rises, and inversely. In many instances this inverse case occurs, but it cannot be assumed as the universal and sole cause of the phenomena.

Horse Chestnuts and Acorns as Human Food.

At the recent Congress of German Naturalists and Physicians. P. Soltsien (*Chemiker Zeitung*) recommended the use of ammonia at 10 per cent. as a suitable agent for removing tannin and poisonous alkaloids. Horse chestnuts and acorns must be previously comminuted. As lupins contain no starch, it should be added to the purified product in the shape of ground acorns. The attempts at utilizing horse chestnuts (essentially removal of sapotoxine) are not very satisfactory, as the loss of substance is very considerable. Fragments of the rind must also be removed, as they contain much tannin. Attempts to make horse chestnuts edible by roasting have not yielded good results; the sapotoxine is certainly destroyed, but the nuts cannot be eaten, as the fatty oil takes an unpleasant taste on roasting. The results which the author obtained in removing the bitterness of acorns are noteworthy. In addition to the ammonia process he obtained good results by extracting the acorns six to eight times with cold soft water, and drying immediately afterward. The loss by this method is still too great (25 per cent), consequently Soltsien prefers to make the acorns up into a paste with milk, and allow them to ferment. Acorn meal so prepared costs at most 4d. per kilo.

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