bodies meet, the lighter will be overcome by the heavier. Quite so, but the speed of the heavier will be diminished in proportion to the weight of the lighter. Therefore, the heavier the wind the slower the boat working against it, and, of course, the larger the surface acted upon the greater the retardation. The error here is on assuming that the weight of the boat (15,000 tons) is any factor. It is not the weight of the boat versus the wind, but the power of the engines, whatever that may be, versus the power of the wind, with the uneven surface to act upon. But the success of the new departure must be judged by results. Taking the power put into the boat, the manner of its application, and the resistance of the peculiar form of the hull into consideration, it was estimated by experts and practical men that the speed in still water would be about four miles per hour This at the experimental trials proved to be the limit, thus demonstrating the accuracy of the calculations. The same power on a similar displacement with a scientifically shaped hull would have developed about 15 miles at least. But supposing a reasonable amount of speed had been obtained, what then? The monstrosity is incapable of fulfilling any one of the ordinary requirements of navigation. There can be no accommodation for passengers. It would be impossible to carry cargo in such a shape that it would not be ground to powder as it was rolled around. The vessel could not be brought to an anchor, if it became necessary. In fact a more utterly unpractical form of ship could not be devised, even if the inventor had had that in view as the sole object of his labors.

A contingency that the inventor cannot have considered as he talks of a mile a minute, and that is that at this speed, allowing 20 per cent. slip, the 20-foot hull would have to revolve 100 revolutions per minute, at which speed the centrifugal force would send the cargo through the ship's bottom, and if not accurately balanced, would shake the vessel to pieces.

In an interview with one of the Toronto papers, Mr. Knapp said he would not attempt to steam against a gale, but as winds move in cyclones where diameter is never more than 400 miles, he would just roll out of the boundary of one of these cyclones, and then go on. R. F. Stupart, Director of the Meteorological Service, has some knowledge of the character and extent of cyclonic movements of wind, and in reply to an enquiry on this matter, Mr. Stupart says. 'It sometimes happens that severe tropical cyclones are not more than 400 miles in diameter, and sometimes considerably less; it is seldom, however, that the storms occurring on the trans Atlantic and Pacific routes are less than 1,000 miles in diameter, and frequently they are much more. A southerly gale in advance of a storm centre will oftentimes begin to blow near the coast of Ireland, while in the rear of the same storm centre a north westerly gale is still blowing off the coast of Newfoundland. As these storms do not progress eastward at a greater average rate than 30 miles per hour, it will doubtless be possible for the roller boat when it acquires a speed of *sixty miles per hour*, to keep out of the bad weather."

ELEVATORS, HYDRAULIC V. ELECTRIC.

Editor CANADIAN ENGINEER:

In your January issue, P. W. Moses, consulting electrical engineer, of New York, takes exception to some of the statements in the article on elevators in the December issue. I can not see where Mr. Moses proves my statements to be incorrect, and therefore it is difficult to answer him. Also he is an expert, and the article was written for an engineer like myself, and I feel flattered that it was of such moment that it was taken up by a New York electrical engineer, but as Mr. Moses has given his opinion, I will try to follow him, and simply repeat what I stated before, and what are practical facts.

In the first place, I do know more about hydraulic than electrical elevators. I am as well acquainted with electrical elevators as I care to be, and I very likely know a great deal more about the generating end of the electrical plant than Mr. Moses does, not theoretically, but practically. It is easy to figure on any subject, but figures are not what we pay for; it is coal, oil, and repairs, with labor, interest, etc. Mr. Moses says that an engine and generator can be put in for $5,000. It can, but it is not enough, and will not purchase a plant large enough for five elevators, let alone a duplicate plant, whereas a first class compound pumping engine can be put in in duplicate large enough for five elevators for the sum of $5,000, and if the architect put in an electric generating plant in keeping with the rest of the building, it would not be a one-horse show that could be purchased for $5,000. I know what it costs to install generating apparatus, also hydraulic elevators, and if the proper specifications were got out, and the manufacturers thought that they would get a fair show, the five elevators could be installed in a first-class manner with pumping machinery, for $30,000. The elevators, if electric, cannot run off the lighting engines satisfactorily, no matter what Mr. Moses thinks, it is very seldom done, except in very large stations or where they have only one elevator.

In the matter of safety, Mr. Moses proves just what I stated, namely, that the electric is more complicated, which does not tend to safety, but is dangerous, for the electric devices that you are depending on often fail to work when you want them, because the current is off. He says that there is not an elaborate cycle of changes during the time of starting, and then goes on to describe the very changes I spoke of. The electric man says that all you have to do is to push the button in the car and it starts, but just trace out all that occurs from the time the button was pushed until the car was at full speed. Then watch the hydraulic apparatus. You move the hand-wheel and it moves the valve direct. Nothing could be simpler, but the electric is simple enough to anyone looking through electric spectacles. Mr. Moses says that the electric elevator does not appear complicated. It does not appear so, but it is very complicated. Just the same in comparison with hydraulic. Even when he compares the electric elevator with the hod-hoist, which, by the way, I think is an apt comparison. He states that they are in use in hundreds of New York buildings, and receive the least possible care and attention. That may be one of the reasons that they run so badly, or they may get the least possible care, and yet, that least possible may mean a great deal of work. A gentleman went to New York to look into elevators before installing a large plant, and everywhere that they had hydraulic the practical men around the plant spoke well of them, and where they had been electric, almost invariably they were dissatisfied, and said, "put in hydraulic by all means."

Mr. Moses also says that the comparative wear and tear is yet to be determined. It may be by Mr. Moses, but I can cite cases in Montreal, Buffalo, and Toronto, where electric elevators cost more for worn out parts in the first six months than any hydraulic would in two years, and he acknowledges that the life is shorter for the generating apparatus, and as that generating apparatus costs more than three times what the same size pumping plant would cost, it does matter a great deal. I will not go into figures, as I can prove by figures that the electric is the more economic as far as coal is concerned, but I also know that it costs more for repairs on certain electric elevators than it costs for current, and when material and labor are taken into account, the economy is on the side of the hydraulic.

I again make the statement that the plant should be the full capacity of the five elevators, and my practical experience as engineer of the Incandescent Light Company proves that, and anything short would be folly. My experience there proved to me also that nearly all the complaints from customers were due to elevators coming on when the load was light, and the company has since put them all on a separate circuit, thereby improving the lighting system wonderfully. When the load is heavy, the elevator adds such a small percentage that the effect is not noticed That is why the New York companies can run the electric elevator with practically no effect, as their load is heavy all the time.

In conclusion, I know more about the condition of Toronto and its City Hall than Mr. Moses does, and I could prove even to Mr. Moses that hydraulic elevators is what the City Hall should have, if he were anything but an electrical engineer. One of the proofs in the previous article was, that all the manufacturers making both kinds of elevators says they should be hydraulic, and only one, who makes only electric elevators, says they should be electric, and of necessity electrical engineers would say the same. Mr. Moses knows more about electricity than I do, no doubt, but he very likely has not the knowledge that the practical side of the question gives by long experience.

Toronto, Jan. 25th, 1898. ED. PHILIP.