of a million of people were carried, not a single passenger accident occurred, the list of casualties to the crafts beginning and ending with a slight occasional injury to the propellor or the shaft by the floating and sunken debris in the lagoons. One of the companies that is actively pioneering this new and important branch of shipbuilding in this country is making a specialty of yacht tenders, auxiliary electric yachts and independent cruising launches. One of the latest outputs from its yards is a forty-foot launch, which has been tested with most satisfactory results. The launch is six feet six inches in beam, draws normally two feet of water, giving a displacement of about three tons, is equipped with seventy-two cells of battery, weighing 3,000 pounds and having a capacity of 150 ampere hours. During the test the craft made five and one-half miles an hour, and spurted up to eight miles an hour, and this with a very dirty hull. It is not only in smooth waters that this launch can give a good account of itself. In a storm off the Connecticut coast it was nearly run down by a large naptha launch that had dragged its anchor. To avoid collision it was forced to slip its cable and rely upon its motive power alone. Forging directly against the heavy sea and in the teeth of the gale, it weathered a dangerous reef, and then, turning in the trough of the sea, ran out of danger into the nearest safe harbor. A few such achievements as this will do much toward removing the impression, which is still quite common, that the electric launch is a mere toy, only fit for use in summery weather and the placidest of water.

## THAT FEARFUL BOILER EXPLOSION.

Referring to the recent fearful explosion of a boiler in a street car stable in New York, heretofore alluded to in these pages, the American Machinist says:—

It appears to take those responsible for the laws governing boiler inspection in New York City a long time to find out that a hydrostatic test is not sufficient to determine the condition of a boiler as to its safety. In fact, there is no evidence that they ever will learn it, though it would seem the disastrous effects of the Dry Dock and Battery Railway explosion, an account of which appeared in our issue of November 16th, if properly presented, might stir them up a little towards a realizing sense of what they did not know about boiler inspection, Sergeant Mullins, of the police department, who has the matter of boiler inspection in charge, is reported as saying that he has long been of the opinion that the hydrostatic test was insufficient—which could not be doubted if it is assumed that he is fit for the position—but that he has not been able to impress his views upon the law makers in a way to have the rules amended.

The verdict of the jury concerning this explosion called it an "accident," which was wrong to begin with. It was no more an accident than when two railway trains meet at full speed through an engineer guessing that the other train is behind time, and pulling out for the next siding. It was right, however, in concluding that the hydrostatic test was not sufficient.

Sergeant Mullins is of the opinion that the boiler was all right six months before the explosion, but at that time it was burned and rusted. How he knew it was all right at the time stated he does not say, and we have no doubt he was mistaken. We do not believe that it got into the condition it was in when the explosion occurred in six months' time, that is altogether improbable. He also believes parts of the boiler to have been red hot at this time. We have seen nothing to indicate that the boiler was overheated, and believe that it was not. Our opinion is that the boiler let go because it had become so thin in places that there was not strength enough to hold the pressure allowed, with a little extra strain incident to opening the throttle, which caused some commotion in the water. Instead of being in good condition six months before the explosion, the places had, beyond much doubt, been growing thin in spots for years, a fact that would have been revealed by a proper internal and external inspection.

The hydrostatic test has never been considered conclusive by the best engineers, and has always, by some, been considered dangerous. At the present time no engineer of ordinary intelligence places dependence upon it alone, and others will not willingly have it applied to boilers in their charge beyond the limits of the ordinary running pressure. In the first place there is always the danger of unduly straining the boiler by the cold over-pressure; and second, any one knowing the different strains in a boiler as between hot and cold, finds little to assure him in the hydrostatic test.

We believe that this example should be sufficient to stir up the authorities to get somewhere near current practice in inspecting boilers, and incidentally to amend the rules governing the examining and licensing of engineers in such a way that no one shall have boilers in charge if he cannot satisfy his examiners that he knows how to go to work to properly inspect their condition, nor be left in charge except he does make such inspection at intervals to be decided upon from a consideration of the conditions under which the boilers are operated, and the quality of the water. This, in some instances, may call for the employment of better engineers, which is something on all accounts to be hoped for. The very first requisite of safety is an engineer who does not have to be told whether or not his boiler is safe.

This particular explosion has revealed nothing new. It has only emphasized the old truth that boilers will wear out, and that it is important to know how fast they are doing so. Just as many other boiler explosions, it has its lessons, from which it is to be feared that nothing will be learned. It may be hoped, however, that the contrary will prove true. It is a matter that should be agitated.

## FUTURE OF ALUMINUM.

Mr. Edison was recently asked if aluminum would not solve many of the problems of science when it should ultimately become as cheap as iron, as it is soon destined to be.

"No," he said, "there is nothing in it. No matter how cheap it may become, it will be of no practical use in machinery or construction."

"How is that?"

"Aluminum has no strength," replied Mr. Edison. "You might as well use lead. It is as soft as lead. Its only peculiarity is its lightness, and it will only be useful as ornamental objects. It has fallen in price from some $15 a pound to about the cost of brass, 50 cents a pound; and it is cheaper than brass because you can get more to the pound. Having no strength, this new metal, as it has been called, is not available for machinery."

"Can it not be used for building steamships"

"No; because it lacks the strength, and weight does not count in the construction of a ship. An aluminum ship would hardly be stronger than one made out of paper. It only gains strength when alloyed with some other metal like copper."

"What is the metal of the future?"

"Nickel-steel is the coming thing," answered Mr. Edison, without hesitation. "It consists of steel with an addition of about 5 per cent. of nickel, which gives it ductility and increases its hardness and resistance. It is now used to some extent in battle-ships and guns. It makes splendid armor. The Harveyized steel is one variety of this metal. Steel will crack. Nickel-steel you cannot crack. Iron you can bore, but nickel-steel is hard to bore."

"It will then make the burglar-proof safe for which the world has been waiting?"

"No," said Mr. Edison, "you can no more make a burglar-proof safe than an unsinkable ship. Even with a safe which you could neither bore nor crack the burglar with a dynamite cartridge has it at his mercy. The burglar can carry in his pocket what is equal to 100-horse power. Ten pounds of coal may have the same horse power as a dynamite cartridge, but the coal in burning expends the power over a long time, while the dynamite concentrates it in a fraction of a second. No sooner is some new resisting substance found than we go to work and learn how to destroy it. This is the history of armor and guns, and they are now experimenting as to how the nickel-steel armor may be pierced. Indeed, nickel-steel has already been turned against itself, and is being made into guns, for which it is admirably adapted. The modern battleship with nickle-steel armor gains in space, and strength and lightness."

## HEATHER AS A DYESTUFF.

Heather contains a yellow colouring matter which is known as "ericin," and is obtained by extracting the plant, at the boil, for half an hour, with 1 part of alum to 10 of the plant and 30 of water. The author has examined the blossoms, leaves, stalks and roots of the plants separately and has made dye-trials on mordanted cotton, with the following results:—

On cotton mordanted with a strong iron mordant, the blossoms gave a reddish grey-brown or dark mode color; the stalks a yellowish drab; and the roots a light red drab. On cotton mordanted with a weak iron mordant the blossoms gave a reddish grey; the leaves a yellowish grey; the stalks a very light yellowish chamois; and the roots a reddish grey medium chamois. A strong alumina mordant gave with the blossoms a reddish medium mode colour; with the stalks, a very reddish cream colour; and with the roots, a flesh colour. A weak alumina mordant gave, with the blossoms, a drab; with the leaves, a light reddish yellow mode colour, and with the stalks, a very light reddish cream; while the roots gave a light flesh colour. The blossoms dyed on chrome-mordanted cotton a full chamois shade; and the whole plant a yellow