Correspondence.

Putting Boilers in Rowboats.

To the Editor of the Scientific American:

I notice a sub-committee of the Committee on Commerce of the House of Representatives has been appointed to recommend some special legislation in regard to yachts. Would it not be well to get some official decision as to what constitutes a "vessel" under the law making rules for the government of "vessels propelled in whole or in part by steam," which I think is the phraseology of the law?

I have a rowboat, and conclude to put a one horse engine in her, and do so. Until then she was a "skiff," and the eye of the law knew her not. With this simple addition I am notified she has become a "vessel," and more officials than she can possibly contain demand that I shall immediately, under heavy penalties for non-compliance, take out a license for a pilot, engineer. and captain. My boiler must be of a particular style, and so must be the safety valve. I must carry so many "floats," an ax, water pails, lanterns, and an anchor, and must post up my licenses in some designated place, which shall be conspicuous.

I find it impossible to comply with these requirements; remove my engine, depend upon the "white ash breeze," and the eye of the law closes upon my being.

Should a craft of limited size, carrying neither passengers nor freight, used solely for private purposes, be subject to the rules regulating our steam commercial marine? CHARLES DOTY.

Alton, Ill., Feb. 17, 1886.

Tricks of Microscope Venders.

To the Editor of the Scientific American:

Venders of cheap microscopes continue to play tricks upon the unwary. I will give you the secret. They use a small particle of sour paste, pretending it is a drop of water, and the objects shown are *anguilulæ*, or paste eels. The following is the method of working the trick:

The vender has standing before him on the stand with his instruments a glass of clear water, usually containing a bit of ice. The instruments consist of a short fenestrated brass tube carrying two plano-convex non-achromatic lenses, one of which is about 1·0" and the other 0·5" focal length, and so arranged that the visual focus falls on the plane surface of the smaller lens. Besides the instruments and a glass of water, a number of clean wooden toothpicks lie carelessly scattered on the stand. On a little bench under the table, and concealed from public view, there is a small box of sour paste, plentifully supplied with anguilulæ.

When a customer steps up, the chances are a hundred to one, as every microscopist knows, that his first question will be, "Does this here show the animalcules in water?" The ready answer is, "Show 'em? Certainly! Fact is, I don't dare to look at the water. *I* keep melted ice water for my use. That generally ain't got many." "Has that water got any in it?" continues the querist. "We can see," says the vender, and he picks up a clean toothpick, dips it into the glass, and prepares to put a drop on the front lens. His hand, however, is shaky, and the toothpick drops, falling generally on the little shelf which projects slightly from under the table. He picks it up again, and under pretense of wiping it sticks it into the paste, gets a very minute particle to adhere, again touches it to the water, and smears the front of the field or objective lens.

The victim then looks, and is amazed and delighted, and straightway invests in a 'scope, paying from one to two dollars for what costs the vender less than fifteen cents ($1.75 per dozen).

This ingenious piece of rascality was the invention of a man who formerly made his headquarters in Pittsburg, Pa., and who, for years, has derived a large revenue from this and similar "fakes" gotten up for the use of street venders, who either pay him a royalty on their use or buy outright the privilege of using them. I was told by three different individuals that they paid this man fifty dollars each for the secret of this "fake," but that, not being able always to find paste which contained eels, they were also compelled to purchase from him at a large price some "starting" or cultivating fluid. All sour paste does not contain the anguilulæ; vinegar eels are sometimes used, but only when the cultivated paste eels cannot be gotten, as they are too large—one of them frequently stretching entirely across the field of vision. The eels raised in paste without the use of this fertilizing fluid are much larger than those obtained by its aid.

The number of educated people who are caught by this trick is really astonishing to one who habitually uses the microscope. A street vender here tells me that he has repeatedly sold 'scopes to physicians whom he had fooled into believing that the instruments possessed amplifying power sufficient to enable them to distinguish blood and pus corpuscles, and even bacteria. FRANK L. JAMES, PH.D., M.D.,
Pres. St. Louis Soc. Microscopists.

St. Louis, Feb. 16, 1886.

Closing the Straits of Belle Isle.

To the Editor of the Scientific American:

In a recent issue of your paper, Mr. John C. Goodridge suggested a novel way of elevating the temperature of the New England States and the Dominion maritime provinces. The polar current, running southward through the Straits of Belle Isle, interposes a cold wall between the North American continent and the Gulf Stream. By building a dam across the straits and shutting off this current, Mr. Goodridge imagines that the Gulf Stream would hug our shores and give us a climate similar to that of Great Britain.

But if we consider the *cause* of the polar currents—why they move down from the high latitudes on the eastern coast of America, but *do not* on the western coast of Europe and Africa—it will be seen that Mr. Goodridge's philosophy is unsound.

It is well known that when warm water is in the act of cooling it undergoes contraction till within a few degrees of the freezing point, so that a cubic foot of cold water is heavier than a cubic foot of warm. Hence it is found that even under the equator, where the water is warm on the surface of the ocean, at the depth of two or three hundred fathoms it is several degrees below the freezing point. The cold water being heavier sinks to the bottom, so that even the Gulf Stream has an Arctic bed of water beneath it.

In consequence of the difference in the specific gravity of the polar and tropical oceans, there is a constant pour of waters from the northern regions southward, and a corresponding movement of the displaced equatorial waters northward.

But why does this cold south bound current run close along the American shore, while the warm currents are crowded eastward? In other words, why is the ocean on the west coast of Europe and Africa warmer than on our eastern coast? For the same reason that the cold Arctic water occupies the bed of the ocean, even under the equator, while forcing the warm water upon the surface. Because it is heavier. The earth's diurnal motion toward the east imparts a tendency to bodies on the surface to move westward, as seen, for instance, in the polar currents taking a westerly course when approaching the equator; and hence the cold water, being heavier, is always found on the eastern shores of the continents. Hence the cold climate of Labrador and the warm climate of England in the same latitude; the cold climate of eastern China and the warm climate of British Columbia. Damming the Straits of Belle Isle, therefore, could have no effect in warding off the Arctic current or bringing the Gulf Stream nearer to us. So long as our planet's diurnal motion exists, so long will a cold Arctic current run southward along the east coast of China and the east coast of North America.

But, admitting that Mr. Goodridge is correct, would it pay to dam the Straits of Belle Isle? It would not, for the effect would be the destruction of our fisheries. There are few fish, and none that are good, in the warm waters of the Gulf Stream, our fisheries being confined to the cold waters of this Arctic current, which Mr. Goodridge is so anxious to shunt off into mid-Atlantic.

E. STONE HIGGINS.

Ottawa, March, 1886.

"Fire from Steam Pipes."

To the Editor of the Scientific American:

A pertinent article, under this heading, appears in your issue of January 16 last.

I am of opinion, from practical experience, that hot water pipes in contact with woodwork are dangerous, and I only wonder that insurance companies do not refuse to insure where the necessary precautions are not taken to isolate pipes sufficiently to prevent danger, which, as I shall presently show, it is so easy to do. During soft weather, steam and hot water pipes become very hot from the surrounding air being too warm to relieve them of or abstract their heat, as colder air does. On one occasion this winter, a very soft day, my steam boiler had raised the temperature throughout all the pipes about the house to such a scorching heat that everywhere the woodwork was very hot, and I could not bear my hand on any portion of it without burning it, as if I held it on a hot stove. It is only two or three weeks ago that a towel laid across the coil in a room on the third floor of the house was actually scorched, as if by a red hot iron, and this has happened more than once.

True, water heated under atmospheric pressure only attains to a heat of 212° Fah., or 100° C.; but in a five story house, with even an open well or cistern in the garret above—a height, say, of 50 feet, equal to a pressure per square inch of nearly 22 pounds—the water, of course, reaches a much higher temperature, as it does in any closed vessel; and if to this be added the additional pressure or resistance in the rising mains due to the retardation by friction through long stretches of pipe with numerous right angled bends, it is easy to understand how the temperature required to force the column of water along may be increased so as to become exceedingly dangerous.

Partly on that account, and to prevent the motion due to continual expansion and contraction from breaking the plastering, as it always does through walls, partitions, and ceilings when the under-mentioned precaution is not taken, I specify that the holes for the steam or hot water pipes are to be bored so much larger than the pipe (a quarter of an inch is sufficient) as to allow of inserting a sheet iron or, better still, a tin tube, leaving a space of say one-eighth of an inch all around the pipe, with two or three little tacks or stone or iron wedges between them to keep the hot pipe from contact with the outer metallic ring.

Bright, clean tin is the best thing that can be used, as, when not in contact, it never heats. So true is this that, when used as a screen around a red hot coal stove, though not an inch therefrom, it reflects back all the rays of heat thrown upon it; you can touch it with impunity, and it actually feels not even warm, but comparatively cold or cool.

The precaution I advocate is extremely simple, and in no way costly. It can cost nothing to bore the holes through skirtings, studding, floors, etc., the fraction of an inch larger, and $5 or $10 in any house would cover the whole cost of the pieces of tin or iron pipe required for the purpose of insulation.

CHS. BOILLOIRGE, M.A., F.R.S.C., etc.,
City Engineer, Quebec.

French Academy Prizes for 1886.

The following are among the prizes offered this year by the Paris Academy of Sciences:

Geometry: A study of the surfaces admitting all the symmetrical planes of one of the regular polyhedrons—3,000f.; Francœur prize, the work most conducive to the progress of the pure and applied mathematical sciences—1,000f. Mechanics: Extraordinary prize of 6,000f. for any work tending most to increase the efficiency of the French naval forces; Montyon—700f.—invention or improvement of instruments useful to the progress of agriculture, of the mechanical arts or sciences; Plumey—2,500f.—improvement of steam engines or any other invention contributing most to the progress of steam navigation; Dalmont—3,000f.—the best work by any of the Ingenieurs des Ponts et Chaussees in connection with any section of the Academy. Astronomy: Laland prize—gold medal worth 540f.—for the most interesting observation on work most conducive to the progress of astronomy; Damoiseau—10,000f. —best work on the theory of Jupiter's satellites, discussing the observations and deducing the constants contained in it, especially that which furnishes a direct determination of the velocity of light; Valz—460f.—for the most interesting astronomical observation made during the course of the year. Physics: Grand prize of the mathematical sciences—3,000f.—for any important improvement in the theory of the application of electricity to the transmission of force. Statistics: A prize of 500f. for the best work on the statistics of France. Chemistry: Jecker prize—5,000f.—for the work most conducive to the progress of organic chemistry. Geology: Vaillant prize, on the influence exercised on earthquakes by the geological constitution of a country, by the action of water, or of any other physical causes.

The Singer Sewing Machine Company.

The Singer Sewing Machine Company have in the United States 1,500 offices, the business being transacted from twenty-two centers, located in the large cities.

The Canadian business is similarly managed from two central offices, one at Montreal and the other at Toronto. The London (England) office controls immense interests, including South America, middle and northern Europe. The western Asia business is controlled from Hamburg, Germany, under the charge of Herr Neidlinger, one of the best managers in the Singer service. Most of the woodwork is made at the South Bend, Ind., factory.

This company have several factories. One at Elizabeth, N. J.; one at Montreal, Can.; one at Killbowie, Scotland; and one at Vienna, Austria, the latter intended to supply the trade of Russia, Turkey, and eastern Asia. The total number of company offices throughout the entire world is something over 4,500. In fact, says the *Journal*, it is the largest industrial company in existence.

Danger of Chloral.

At a recent meeting of the Cincinnati Academy of Medicine the uses of "chloral" as a remedy were pretty thoroughly discussed. The experience of the profession seemed to be that "chloral was an uncertain and treacherous remedy." Some persons are more affected by a dose of four grains than others are by a dose of twenty grains. Cases were reported where 200 grains per day had been given, and one case, reported by Dr. Beck, of the Baden army, where 430 grains were given in three and a half hours, the patient sleeping for thirty hours and recovering. The profession also agreed that chloral cannot successfully be administered hypodermically. There were cases reported also where death was caused by the administration of ten or twenty grain doses, and where dangerous symptoms resulted from a single five grain dose. Such a remedy cannot be regarded less than dangerous in any except the most skillful hands.

Submarine Torpedo Boats.

On this subject Mr. Nordenfelt lately read an interesting paper before the Royal Service Institution, London, from which we take the following points relating to his new submarine boat, illustrated in the SCIENTIFIC AMERICAN of November 7, 1885.

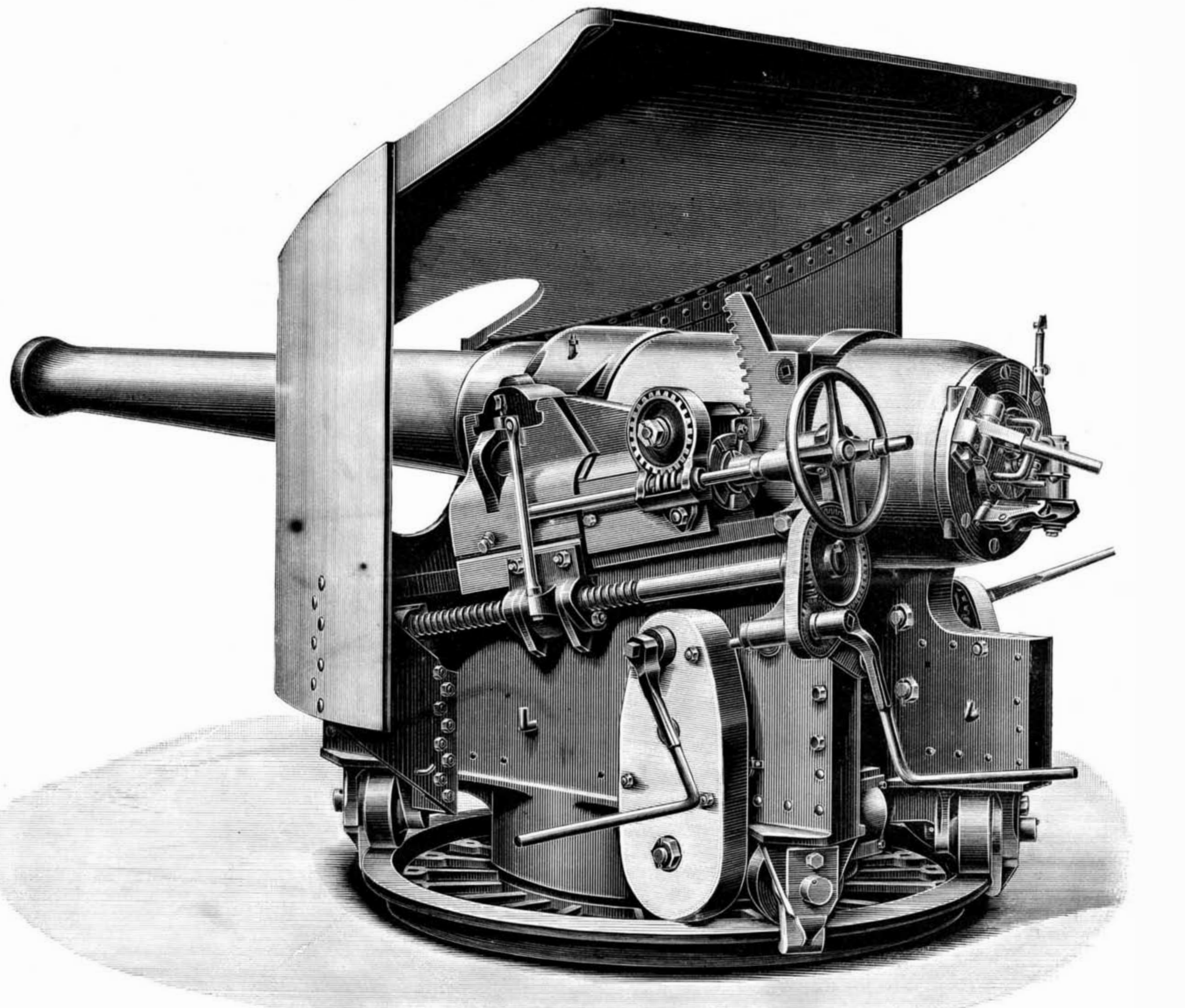
This fast boat was 64 feet long, 9 feet beam, over sponson 12 feet, with 60 tons displacement, and 100 horse power engines. Speed, 9 knots, capable of going 150 miles without recoaling. It carried a fish torpedo outside, to be discharged mechanically. It is intended to run on the surface, but blowing its smoke out under water, till it nears an enemy, when it descends and moves "awash," with a cupola alone above water. When this is liable to be seen, she descends altogether under water by means of propellers. The vessel is kept in the horizontal position longitudinally by means of rudders in the bow, which by the action of a plumb weight bring the boat back to this position should anything suddenly make her leave it.

Three features are specially emphasized by Nordenfelt: (1) The employment of heated water to give off steam as an unfailing reservoir of energy. (2) The submersion of the boat by mechanical means, which is much safer than depending on specific gravity, because practically the density of water alters so slowly with the depth that a vessel that descends below the surface may descend to a great depth. The horizontal position protects the boat from dangerous impetus downward, and the mere cessation of working the special propellers causes the boat to rise. (3) The use of rudders to keep the vessel always horizontal. There is no difficulty as to sufficiency of air and heat. After fourteen miles run, when the crew had been inclosed for three hours, the temperature was only 32° C., or 90° F., and a tallow candle even on the floor burnt without visible diminution. The turtle back of the boat can be protected against machine or quick-firing guns by an inch steel plate, but it is so oblique to the direction of fire that it would, Mr. Nordenfelt believes, resist it without. When "awash," the water would protect the vessel. Two Whitehead fish torpedoes are carried, but more is expected from an electrical controlled torpedo, which would push in any protecting netting, and would fire 300 pounds of dynamite. There is a quick-firing 2-pounder for use against torpedo boats if necessary. Finally, Mr. Nordenfelt prognosticated the employment of such boats in the defense of channels all over the world, declaring them to be most sober, business-like affairs, although they might be suggestive of the conceptions of Jules Verne.

It may be well for our naval people and Congressmen to consider the points here given before they waste millions of dollars upon great hulks for a new navy.

TEN INCH BREECH LOADING NAVAL GUN.

Our illustration, which is from *Engineering*, shows a ten inch breech loader with Vavasseur carriage, complete with all the latest appliances for rapid firing and quick change in the direction of the cannon. When we compare one of these guns, with all their attachments of levers, cog wheels, screw gears, etc., with the simple great guns of twenty-five years ago, it will be seen that mechanical ingenuity has greatly advanced; probably the efficiency of the gun itself has been correspondingly improved. In a future number we intend to refer to the subject again.



TEN INCH BREECH LOADER GUN WITH VAVASSEUR CARRIAGE.

Sinking Tubular Foundations with Dynamite.

Le Genie Civil, in describing the construction of the Palma bridge over the Guadalquivir River in Spain, notes the use of explosives in sinking several of the tubular piers.

Work was commenced in the spring of 1884 upon the foundations, and compressed air was employed on the first pier, which was made up of two cast iron columns, each 8 feet in diameter. But progress was interfered with by frequent rises in the river to the extent of 16 to 18 feet, and by the fact that the depth to hard bottom was only about 34 feet below the water surface, and the heavy counterweight thus required to overcome the lifting effect of the compressed air was awkward to handle under the controlling conditions.

M. Jardin, the engineer in charge, finding it impracticable to increase the weight, conceived the idea of employing dynamite as an aid in sinking his piers. His method was as follows: The cylinder being cleaned out and all made ready for a "sink," holes were bored horizontally out under the cutting edge, and cartridges of dynamite inserted. Wanting electrical apparatus, the firing was done by fuse cut to a length sufficient to permit the men to escape from the cylinder, which was filled with water before firing. The simultaneous explosion of the cartridges produced the intended effect, and the process was repeated until the desired point was reached.

M. Jardin claims that this method may be applied without danger, provided that the cartridges are placed as far as possible away from the cylinder, which would otherwise be broken. The effect upon the soil was comparable to a light earthquake shock, at times accompanied by jets of water thrown up around the pier; but more frequently, with depths of 27 to 30 feet of earth, the gases of explosion escaped into the interior of the tube without making any outside demonstrations.

THE CATHEDRAL OF GRANADA.

A good idea of the architectural beauties presented by some of the old Spanish churches may be gathered from an examination of the picture of the Perdon entrance or doorway of the Cathedral of Granada, herewith presented, and for which we are indebted to *La Ilustracion Espanola*. The first stone of this great edifice was laid March 15, 1529, with solemn ceremonies. The architect was Diego de Syloe; he died long before the completion of his great work. Over a hundred years elapsed before it was finished.

We have in this design the variety and profusion of adornments which are so characteristic of the Renaissance. The elegant arches adorned with the richest mouldings; the figures of Justice and Faith, which sustain a Latin inscription, written by the confessor of Queen Isabella; the airy columns that rise at the sides, girdled with floral wreaths and crowned with capitals at whose corners appear little faces from between thistle leaves; the magnificent frieze and the shaded cornice of its entablature; the grand shield of arms carved on the two salient pillars; the delicate proportions of the second division, which give character to the figures of Moses, of David, and the Eternal Father—all that Syloe left complete—contribute to render this work one of the most faultless creations of ornamental architecture.