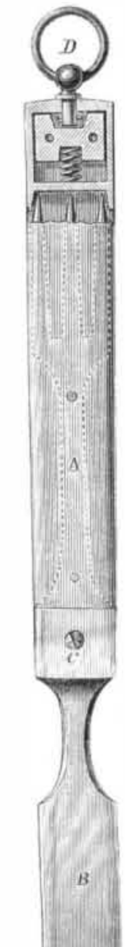
SUINE'S CULINARY INSTRUMENT.



The engraving represents an implement designed to subserve two or more purposes in culinary operations. It can be used as a lifting or steadying fork, or as a spatula or slice for lifting and turning fish, cakes, meats, omelets, etc. It is represented partially in section, and consists of a long handle, A, open at the side edges like a razor handle, the two sides being connected at the ends. The fork, shown by the dotted lines, and the blade, B, are of steel, in one piece, pivoted in the handle at C, so that it can be turned in either direction. At the upper end of the handle is a sliding plug sheath, shown in section, to which is attached a ring, D. By pulling on the ring the tension of the spiral spring is overcome, the sheath receded, and the blade or fork released, when the instrument can be transformed into a fork or slicer at will. The blade has rounding edges, the point being thin and square across.

It was patented through the Scientific American Patent Agency, Dec. 18, 1866, by P. L. Suine, Shirleysburgh, Pa., who will answer all letters of inquiry.

Central Fire of the Earth.

Our London cotemporary, the *Engineer,* discusses at great length the evidence of "fervent heat" with which the elements beneath the crust of our globe are melted, and transfers a wondrous scientific tale which has been running through the French press with solemn gravity. Some of our readers will perceive that, like the beetle's ball, the story has gained in size by being rolled across the Atlantic.

The story, as copied into the *Engineer,* runs thus: "Not far from the Falls of Niagara was a glacier, belonging to a company who realized enormous profits by the sale of the ice in the western cities during the summer months. A few days later than the Aspinwall explosion, an aurora borealis of magnificent proportions was observed wheeling its shafts several nights in succession in the northern sky, causing two lightning conductors on the top of the glacier (!) to emit long electrical flames of a bluish color. In the meantime a boiling noise was heard inside the glacier, accompanied with a disengagement of gas and occasional loud detonations. A captain of militia ventured to enter an opening in the ice with a light, when the glacier burst with an explosion that shook the whole country. Happily nobody was killed except the unfortunate captain, of whom not a trace could be found. The glacier contained 16,000 tuns of ice, and after the explosion there was a fall of lukewarm water over a space of 500 yards in diameter. The theory of the cause of the explosion is that the two lightning conductors on the glacier acted under the influence of the electricity as the two poles of a voltaic battery, and decomposed the ice into a mixture of oxygen and hydrogen gases, which of course exploded with resistless power on the introduction of a light."

FERRY ACROSS THE ENGLISH CHANNEL.

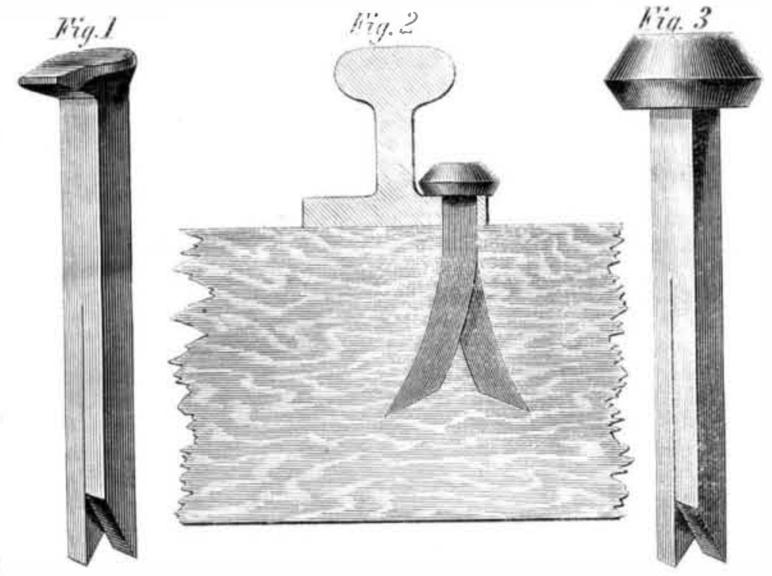
The proposition for a railroad ferry across the channel that divides England from the continent is by no means new, and it is not improbable that before many years it will have become an accomplished fact. Indeed, it is a matter of some surprise that this enterprise has not before this been ultimated into a reality. Of all the projects suggested, the tunnels of masonry, of iron, the sub-aqueous bridge, and the artificial islands, etc., that of the monster ferry appears to be the most practicable and feasible.

Engineering strongly recommends this plan, whether the boats employed are to carry a railway train with its passengers or not. It says: "It is a question of judgment how far we may go on increasing the size of our Channel steamboats. As a mere matter of construction we could make them of almost any size, even so that their length should form a respectable proportion of the whole distance between England and France. Our plans must be governed, however, by the probable traffic, and here, again, we are left to conjecture what increase of communication would follow a nearly total prevention of sea-sickness. We know that many of our ablest engineers, Mr. Hawkshaw among them, count so largely upon this increase as to believe that a tunnel, were it to cost ten or even fifteen millions, would eventually become a profitable undertaking. Yet even were the tunnel made, and supposing no apprehensions to exist as to its perfect security, it is not every one that would prefer a ride of twenty-five miles under the sea when he could cross over it in nearly the same time."

Engineering proposes boats 800 feet long with a beam of one-fifth or 160 feet, driven by four pairs of engines, each of 600 horse-power, working collectively to 12,000 indicated horse-power, and driving four wheels, the two pairs 300 feet apart. We believe with *Engineering* that boats so constructed and propelled would almost annihilate the proverbial miseries of the Channel passage; and, as it is a subject in which Americans have some interest, we sincerely hope the matter will be pushed forward by our enterprising cousins. Not unfrequently we hear the complaint that the passage from England to France is productive of more discomfort than a voyage across the Atlantic.

Improved Split Spikes.

Railroad spikes, as ordinarily constructed, are very liable to become loose by the jarring and trembling of the rails, also by contraction and expansion. The annexed engraving illustrates a split spike of a new construction, and one well calculated to retain its place in the sleeper until more than usual power is exerted to draw it out. The body and head of the spike are of the usual style. The body is split, as will be noticed by reference to the illustration, centrally and longitudinally, for about half of its length, and the ends of each prong are beveled on alternate sides, as shown clearly in Figs. 1 and 3. It will therefore be perceived that when the spike is driven into the sleeper the two prongs will diverge or turn outward, in a direction parallel with the plane of the split in the spike, as shown in Fig. 2; the chisel edges cut the way for each prong, and the bevel throws them outward. It is not necessary to previously bore a hole for the spike, as it can be driven with the same facility as a common solid spike.



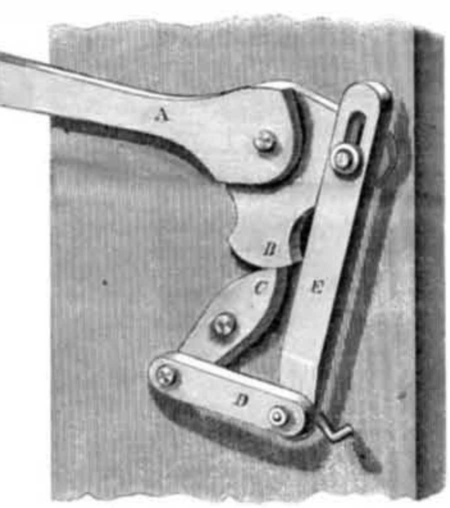
KIRKUP'S PATENT SPLIT SPIKE.

The power necessary to be exerted upon the spike to draw it is about three times that required for drawing an ordinary spike. The spike, when drawn, may, by a slight blow of the hammer, be fitted for use again.

This invention was patented in the United States, Jan. 2, 1866, and it has also been patented in Europe and other countries. For further information address H. A. R. Moën, at No. 71 Broadway, New York City.

A NEW LEVER MOVEMENT.

The accompanying engraving exhibits the plan of a new method of applying the action of a lever to the production of a rotary motion by means of a crank. The lever, A, has a double cam face, B, which engages with the lever, C, that by a connection, D, is attached to the crank. From the crank a connecting bar extends upward and by a slot is connected with the short end of the lever, A. Its operation is readily



understood. By raising the lever, A, the point of C slides over the face of B and falls by the weight of the bar, E, beyond the radius, where the front of B takes it and reverses its motion; the bar, E, gradually rising until near the vertical center, when the reciprocating movement of A completes the turn.

As the arrangement is made in the engraving—taken from a simple wood model—gravitation has much to do with its operation, but modifications could undoubtedly be made by which it could operate in any position. The inventor thinks this movement could be readily and usefully applied to the propulsion of hand cars on railroads and for the connections between marine engines and screws. He claims that the power exerted is by this plan applied directly to the crank. Practical mechanics can readily judge of the advantages or merits of this combination of levers and cam. It is the invention of Henry Maas, Homestead, Iowa.

The Teeth.

According to a paper by Dr. Latimer, in the *Dental Cosmos,* a deciduous set of twenty teeth—viz: eight incisors, or cutting teeth, four cuspids, or pointed teeth, and eight molars or grinders—are given to each human being, usually during the two and a half years succeeding the first six months of life. When the jaws are sufficiently grown, and the time approaches for the deciduous set to be replaced by strong and permanent teeth, they lose their roots by absorption, become loose, and work out, one by one. The first four molars, one on each side of each jaw, are usually replaced first, at about five or six years of age. Next them, at 12 to 14 years, appear a second quaternion of molars; and at 17 to 21, a third and entirely new set, making in all twelve. Meanwhile, the new incisors come on, from six to nine, the central ones first, and the cuspids follow, from nine to twelve.

Teeth, nails and hair originate from the skin, and the four in general bear a common family likeness The teeth being in great part composed of phosphate of lime, which is abundantly diffused among vegetable substances by nature, a natural diet nourishes them with their special ingredients. An artificial diet, if not shaped by science as well as the arts, *starves* the teeth by superfining the food of its mineral elements. Wheat deprived of its russet shell by fine bolting, contains little or no strong mineral food for the bony system; but instead of this, we substitute mineral poisons in the bread, which attack the enfeebled teeth with disastrous success.

Microscopic photography has lately been made a valuable auxiliary to the study of the structure and internal economy of the teeth. Very striking exhibitions of the secrets of nature are thus fixed upon paper, and will doubtless become more and more popular in the future. Magnifying glasses of considerable power are also adapted to the use of dentists in examining the teeth and in working out their excavations, fillings and finishings to perfection.

[For the Scientific American.]

SNOW MELTED BY FRICTION--DANGEROUS PAPER.

BY PROFESSOR CHARLES A. SEELEY.

MELTING SNOW BY FRICTION.

Latterly, there is no good sleighing on Broadway. The pleasure sleighs avoid Broadway and seek the avenues, or go beyond the limits of the city. The huge stage-sleighs, drawn by six to twelve horses, and carrying a hundred frolicking passengers, which used to be the most exhilarating incident of the winter on Broadway, now belong to the past. And yet as much snow as ever falls in the winter, and it is never carted away as in some other cities. Lately, the snow, instead of being looked upon as a source of comfort and good humor on Broadway, is pronounced to be a very serious nuisance.

People account for the change by telling us that the great and increasing traffic on Broadway cuts up the snow, and thus spoils it for sleighing. This reason, although good enough for a short one, is not sufficiently specific and comprehensive for the philosopher, or the readers of this paper. It seems to have in view only such evident circumstances as evenness in depth and compactness. I invite attention to a single fact which very few of those who are satisfied with the cutting-up theory have taken into account.

The snow on Broadway does not last so long as in other streets: it actually melts faster there. I have observed that the melting goes on most rapidly in the middle of the street; practically, there is a streak of warmth up and down. Some of the merchants have found out this warm streak, for I have seen men employed pitching the snow into it, that is, under the horses' feet in the carriage path. Wherever this was done, the snow was cleared off the premises very promptly. If the practice were generally adopted from Bowling green to Union square, it would very much diminish the peril of navigating Broadway in winter; shoveling the snow where it will melt, is much better than salting it, as was once the custom here.

But why does the snow melt more rapidly in the carriage way? Is it really warmer there, and why?

There are two reasons which are pertinent to the case, and which perhaps sufficiently explain it. First: The friction in the snow produced by the trampling of horses and the passage of vehicles. Friction always produces heat. Two pieces of ice may be melted by rubbing them together: water which is much agitated is prevented from freezing, and water in a bottle may be boiled by shaking it, provided that the heat produced by the friction be retained in it. I know that a little friction does not produce much heat, that a pound of water requires an expenditure of 772 foot pounds of force to warm it one degree, and that to melt a pound of snow demands 140 times as much. Yet, on the other hand, when we calculate the thousands of tons of horse, man, stage, cart, express wagon, and merchandize, incessantly crushing and stirring up the snow on Broadway, we must conclude that here is a force adequate for a notable result. *Causa aequat effectum.* Second: Absorption of the sun-heat. The sunlight is absorbed and disappears on dark-colored surfaces, and carries all the heat with it: white surfaces reject both. The pure white snow is very slow to melt, because it refuses to take in the heat. Sprinkle ink or lampblack on the snow, and it will melt when the air is below zero, if the bright sunbeams fall on it. The case is plain: the white snow of the side of the street, when thrown in the roadway, becomes inked over with dirt, and now is eager for the sun heat.

There are other causes which might be discussed, such as the warmth of animals, the better exposure to the sun of the middle of the street, etc., but they are insignificant compared to the two above named.

DANGEROUS PAPER.

There is a great difference in the combustibility of common paper. Enameled card paper, on account of its compact body and the presence of mineral matter, white lead or barytes, is quite disinclined to burn: in fact, some kinds are practically fire-proof. White writing and printing paper can seldom be lighted by a spark, and when ignited by a flame, it requires dexterity to keep it burning. On the other hand, there is a common reddish-yellow paper which, in some circumstances, is as dangerous as gunpowder. It takes fire by the smallest spark, and burns like tinder: when once lighted, if left alone, it is sure to be consumed completely. All the yellow and buff paper which I have tested, out of which envelopes are made, partakes more or less of the same character. I have no doubt that such paper has been the occasion of some of the fires in this city which have been otherwise explained, such as the fires in paper warehouses and offices of professional men. A spark of fire, or the stump of a lighted cigar, falling in a waste basket containing yellow envelopes with other kinds of paper, would have a good chance of setting the whole on fire.

NATURE'S TERRACULTOR.

The common earthworm or angleworm is a veritable dirt-eater. It takes no other food than the earth by which it is surrounded, and the prevailing notion, that it feeds on roots and seeds and is harmful to the garden, is an error. The worm is a tidy animal; after he has extracted out of the earth he has devoured whatever is nutritious to him—namely, the adhering organic matter and water—he bores a passage to the surface of the ground and discharges the refuse. The "worm-castings," or excreta, may be observed during the summer in every garden. Thus the worm is constantly employed in transporting the fine soil from the depths of his subterranean burrowing-places. What a single worm can do in this way in his life-time may be insignificant, but the aggregate work of all the worms is something which may employ the engineer and geologist to determine. We must remember that this work has been the habit of worms for ages, and we know that a still more insignificant creature, the coral polyp, has constructed many large islands in the sea and a considerable part of the continents.

When the fine soil is broughtto the surface, the coarser particles, gravel and stones, sink down and may be covered up. In one case, Mr. Darwin, the author of the Darwinian theory, found that the fine soil over a large area was brought up at the rate of over an inch in depth in five years.

The earthworm is Nature's terracultor. He breaks up the soil, buries the stones, and brings the fertile earth where the husbandman needs it. There is no agricultural machine which can compete with the worm in the neatness and perfection of his work. Those who know these facts will never again despise our humble friend.

MUELLER'S STOVE HANDLES.

One of the greatest annoyances of daily life is certainly the heated handles or knobs of stove and furnace doors, the dampers and the cover lifters, when left on the stove, often raising blisters and the temper of the person so unlucky as to touch them. This great annoyance has been overcome by a simple, strong, and neat contrivance, by means of which the door or damper can be opened or shut without burning the fingers—certainly a great desideratum. This invention also does away with holders and other protectors for the hands, so liable to be mislaid. This handle is not only useful but ornamental.

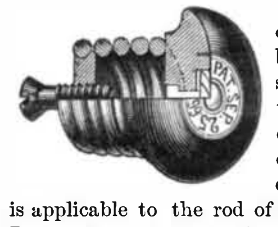


Fig. 1. shows one of the forms covered by the patent, which can be applied to old as well as new stoves. It consists of a heat-radiating coil, fastened at one end by a disk and screw to the door, the other end being riveted to a wooden handle. The same contrivance is applicable to the rod of the well-known Self-Regulating Parlor Stoves, and in different forms and sizes to all wood and to almost all coal stoves.

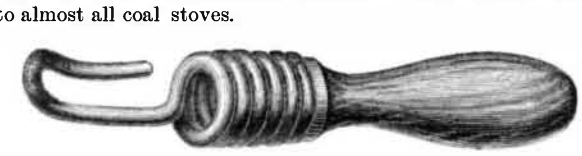


Fig. 2 shows a lifter for covers, made on the same principle, which can be easily fitted to any size or form of groove.

This invention was patented September 25, 1866, by J. U. Mueller, and its practicability having been fully tested, a company has been formed for the manufacture of the different sizes and varieties of handles.

For further particulars address Mueller & Hannimann, No. 207 Groghan street, Detroit, Mich.

SUB-CALIBER SHOT.—The enormous friction of an elongated cylindrical shot, in passing through the gun, detracts materially from the range and effect of the missile. To remedy this loss of power, a recent improvement reduces the diameter of the shot so as to be easy in the caliber of the gun, while a tight rifled disk is placed behind it to receive and communicate the full force of the explosion. The disk drops in the wake of the shot, and therefore cannot well be used in field firing, over the heads of troops. Bourne, the eminent English engineer, writes decidedly in favor of the improvement.

FARADAY asserts that the products of combustion from an ordinary grate fire during twelve hours, will render 42,000 gallons of air unfit for supporting life.

Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

NEW RULE FOR ISOMETRICAL PROJECTIONS.

In this kind of perspective, the effect of distance on apparent size is disregarded and an equal measure or scale applied to every part of the drawing.

The distorted appearance when brought too close to the eye of the observer, disappears on more distant inspection; experience teaching him that the "vanishing" element is practically eliminated by distance, as for example, when a house is viewed from a lofty hill-top or a small object such as a work box is looked at from the opposite side of a room;

Fig. 2

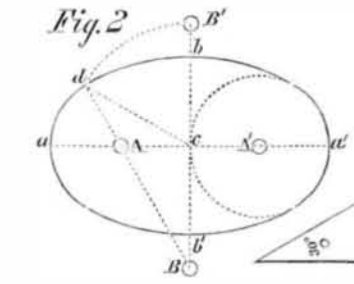
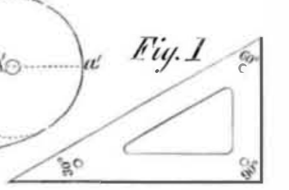


Fig. 1



so that to make this class of representations appear correct, they have but to be sufficiently removed from the observer. Indeed the so-called "true" or "vanishing" perspective as actually practised is less correct, preserving as it does the parallelism of all vertical lines, although of course subject to the same law of convergence, as may be plainly seen in any photograph of street buildings.

In isometric projection, as commonly practised, the top and two nearest sides of any rectangular object are presented at an equal angle to the visual line; so that by use of a common T square and a triangle of 30° and 90°—see Fig. 1—almost every right line in a machine or implement can be laid down to a given scale and measurements taken therefrom with the same facility, as from a simple plan or elevation.

Fig. 3

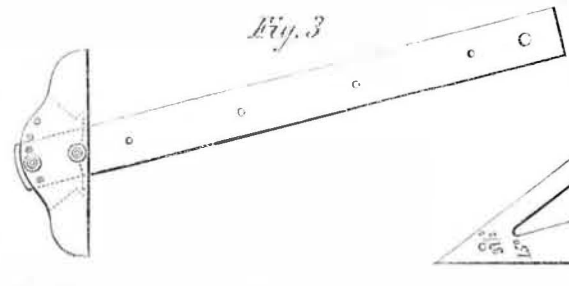
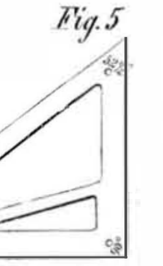


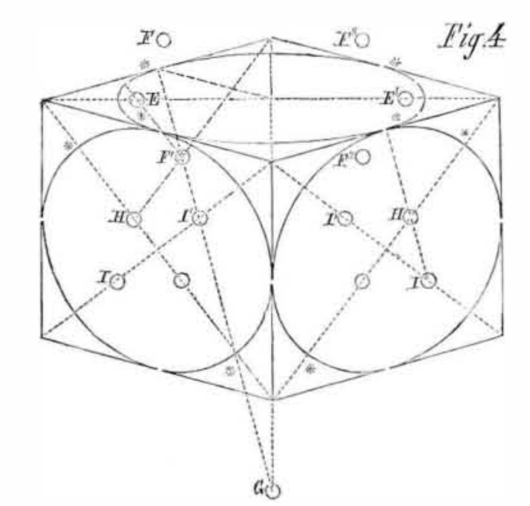
Fig. 5



But the representations of circles, being of course ~~so many~~ ellipses of various sizes though mostly of one shape, was comparatively tedious, and the writer devised a plan now generally adopted, of which Fig. 2 is an illustration, whereby all ellipses in one of the three principal planes could be struck with a tolerable approximation to truth, by circular arcs *a a'*, *b b'*, described from four centers A A' B B', the actual radius being laid off on the semi-conjugate *d c*.

But a more effective and pleasing projection for most objects is obtained by use of two angles of 15° and 37½° (see Fig. 5), the horizontal ellipses being struck approximatively from six centers, to wit E, E,' F, F', F'', F''', G and a center G',

Fig. 4



not shown, and the vertical ellipses from four centers H H' I I' (see Fig. 4), in which the 15° and 37½° angles are shown respectively by equal and unequal dots. The arcs marked * are all of equal radius.

The T square (see Fig. 3) may be so constructed as to dispense with the triangles. GEO. H. KNIGHT.

Cincinnati, Dec. 4th, 1866.

THE COMPASS—LOCAL ATTRACTION.

[For the Scientific American.]

In the October number of the *London Quarterly Review* there is an elaborate article on the mariner's compass, alluding to no less than thirty-eight publications covering a period from 1779 to 1865. Among the well-recognized names in England are Flanders, Barlow, Airy, Ross, Sabine, Scoresby, Smith, Walker, Evans, Fitzroy, and others. This is, at least, proof positive that this all-important subject has not been neglected by the *savants* of Europe. Let us inquire what has been the practical result of their researches. In carefully perusing the fifteen close pages of the *Quarterly*, what does the practical seaman find? An elaborate review of all the theories of distinguished men, showing pretty plainly that the causes of the deviation of the compass, in iron ships especially, are very well understood: that is to say, it is known that when a ship's head is to the east or west, the north point of the card is drawn one way in north latitude, and another way in south latitude; that when the ship heads nearly north or south, the deviation is less than in the cases just named; that a ship corrected for local attraction at Liverpool may go across the Atlantic with tolerable safety, by help of a table of errors and a mechanical arrangement by which the helmsman can steer the right course; it not being pretended by any of the experts in compass correction that it can be made to tell the truth on all courses without a table of errors varying from one-fourth to one point, more or less. Neither is it pretended, so far as we know, that any iron ship corrected in Great Britain for considerable errors arising from local attraction, can be safely navigated by means of such corrections in the other hemisphere.

It is well known that there is induced magnetism, sub-permanent and permanent magnetism, vertical and horizontal induction; and that soft well-hammered iron differs essentially in its intensity or magnetic effect from cast iron: it is also well known that every piece of iron in a ship has its north and its south pole; that is to say, one end will attract and the other repel the points of the needle; and it is generally understood that these poles, or properties of attraction and repulsion, are reversed on going into another hemisphere, unless, by manipulation individually—by hammering—they be changed while in the same hemisphere.

It is well known that many iron and steel vessels corrected in England get safely out of the channel and find their compasses very much out of the way on approaching the West Indies, and in the run to Brazil; and it is a well-known fact that vessels corrected in the Mersey have been found many points in error on getting into the St. Lawrence.

It is also well known that a ship built with her head in a certain direction may retain her original magnetism in a great degree on being launched and put into a different position; while another vessel built with her head in another direction may undergo a great change on being launched. It is, or ought to be, well known that no two ships can be treated precisely alike, even if they be built on the same blocks and of precisely similar dimensions. One of them may have, by a singular and improbable coincidence, all the north or south poles of her beams one way, and the other ship may have her beams in the opposite direction. One may have a single soft iron stanchion in such a position relatively to the locality of the standard compass that the needle will be moved to the ~~left, while a stanchion similar~~ to the eye, in the other ship, will move the needle directly opposite.

It is generally understood that the heeling and even the pitching of an iron ship in a rough sea will affect the compass not simply by the oscillation of the ship, but because the magnetic lines are temporarily changed thereby. It is also understood that a corrected ship, if laid up in certain places and in certain positions will prove to be more in error, or nearer correct, when put into commission again.

All these matters, and many more, pertinent to the subject, are fully and skillfully discussed in the October *Quarterly*. The diseases to which iron ships are subject always, as well as the less severe ones of wooden steamers and sailing ships with wire rigging, metallic boats, etc., seem to be pretty well understood—but where are the remedies? The writer has been familiar with ships and shipping for about half a century: twenty years ago he had never heard of local attraction, but soon after, he came near losing two wooden steamers from this cause. Since the more general introduction of iron into the construction of ships, in the shape of plates, rigging, steering gear and machinery, errors of compasses arising from this insidious agent have attracted much attention, by reason mostly of the great losses of life and property that have resulted therefrom. How many valuable ships have been lost on the coasts of North America? How many in the West Indies? Could the truth be known, all or nearly all have been lost for want of correct compasses—or rather, for want of correction in the ships themselves: for it is a misnomer to speak of correcting the compass, when treating of local attraction; though to speak the whole truth, many compasses are sadly in want of correcting. Scoresby tells us in his narrative of his voyage in the *Royal Charter* to Australia, that no corrections made in the Northern hemisphere can be depended on in the Southern, and that the only safe or tolerably safe expedient is to place a compass aloft out of the reach of the local attraction of the ship.

Having thus alluded to the amount of thought expended by the *savants* of Europe on the disease called local attraction, and to the paucity of remedies therefor, let us recite some of our experiences during the last twenty years. The iron tow-boat *R. B. Forbes*, belonging to certain of the underwriters of Boston, ran for some time corrected by a gentleman of New York. His method did not prove to be reliable. Her captain, Griffith Morris, an uneducated seaman who had scarcely heard of Barlow, Scoresby, and Airy, turned his attention to the study of local attraction, and after several years of anxious experiments, he mastered the enemy. The tow-boat under his command never went much further than New York, but she went there often in thick weather, over the intricate shoals, and always went safe, towing valuable ships with poor compasses. Her compasses were situated in her wheel house, over the forward ends of her boilers, and not very far from her very large smoke