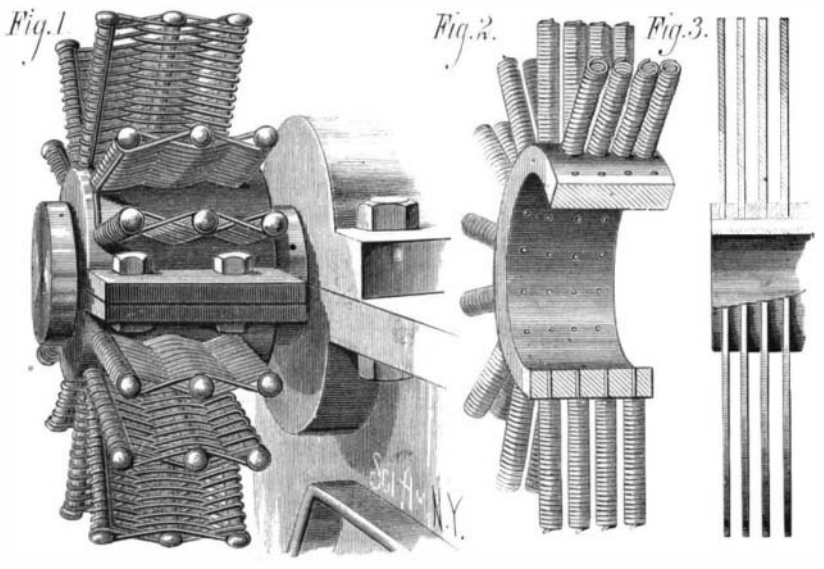
Casamajor has, says *Les Mondes*, resumed the study of the question and adopted the views of Romieu. He instances the following crucial experiment: At the same time that the bits of camphor are thrown upon the water insert a glass rod which has been rubbed with flannel; the motion immediately stops. If the electricity is removed from the rod by rubbing it with tinfoil, it loses its power of checking the eddies.

A NEW DEVICE FOR PREVENTING JOURNALS FROM HEATING.

It frequently happens that in spite of any amount of precaution the journals of machinery will heat and cause trouble and delay and work injury to the bearings. In many cases the difficulty may be overcome by the reconstruction of the entire machine, but this is expensive and inconvenient. The invention of Mr. James Dempsey, of Lewiston, Me., which is shown in the annexed engraving, is intended to obviate this difficulty by conducting away and dissipating the heat by means of metallic conductors, exposing a large surface to the air. Three forms of the device, all based on the same principle, are shown in the engraving. That shown in Fig. 1 consists of a copper collar fitted closely to the shaft near the bearing, and provided with a number of radial pins, around which copper wire is wound or woven so as to present a large radiating surface to the surrounding air. The temperature of the shaft can never greatly exceed that of the collar clamped upon it, and the temperature of the collar cannot become much higher than the air in which the pins and surrounding wires revolve.

In the form shown in Fig. 2, spiral copper wires are inserted in the collar to conduct away and dissipate the heat; and in the form shown in Fig. 3, metallic disks are employed as radiators instead of wires. There are, in fact, many forms in which the device may be constructed, and, as will be necessary, modify the apparatus for different applications, the inventor does not limit himself to any particular form. The device is applicable to the bearings of shafting, to car axles, to the shafts of calender rolls, and other journals liable to heating. The inventor says that in actual use it has proved very efficient.



DEMPSEY'S COOLER FOR JOURNALS.

NOVEL STEAM GENERATOR.

We give herewith an engraving of a steam generator recently patented by Mr. Charles Ward, of Charleston, W. Va., and lately tested both as to efficiency and economy on the experimental stern-wheel steamer Wild Goose, plying on the Kanawha river. We understand that the boiler easily evaporates 85 cubic feet of water per hour, with a natural draught, and supplies steam at 190 lb. pressure to an engine having a 9¾ inch cylinder and 3 foot stroke. The boiler occupies a space 7x8 feet on the deck of the boat, is 8 feet high, and has 28 square feet of grate surface; the smoke stack is 30 inches in diameter, and the weight of the boiler is only one-fourth that of flue boilers of the same capacity. Its construction is such that a perfect and rapid circulation of water is secured. The inventor claims that the effect secured in rotating boilers is secured in this without mechanical contrivances.

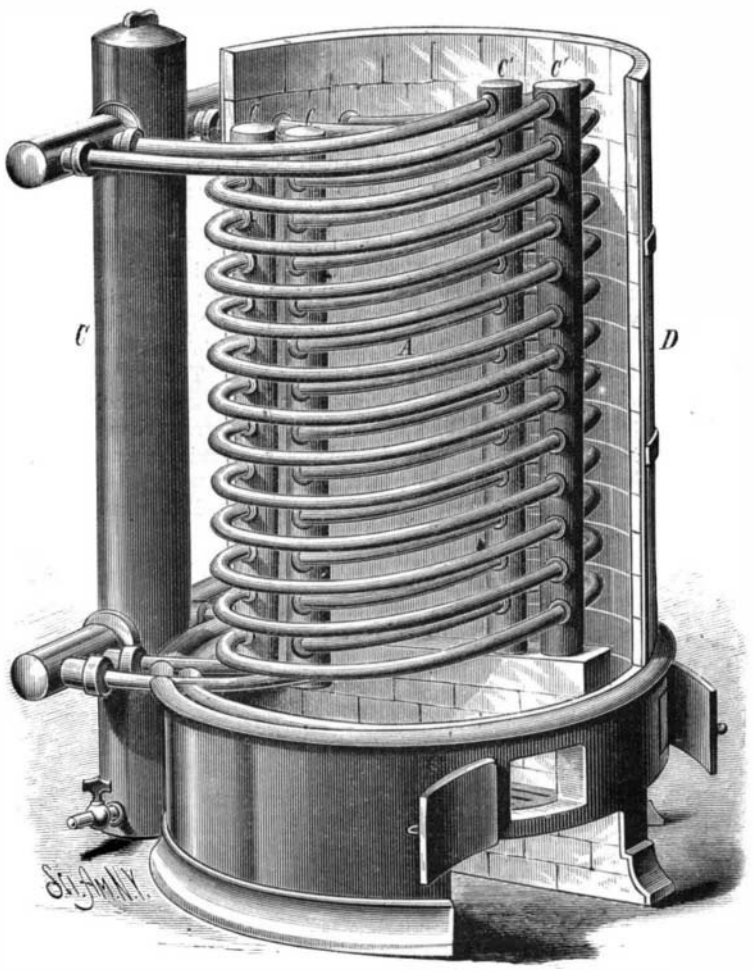
The Wild Goose is running daily, and is considered a perfect success by her projectors. The boiler has been twice inspected by the U. S. Steamboat Inspectors, and is allowed to carry 193 lb. per square inch. The boiler consists of 4 piles of 20 circular 2-inch iron tubes, the coils having respectively a diameter of 2, 3, 4, and 5 feet, all having perfect connection with each other, and by their arrangement securing compactness, lightness, a maximum of heating surface with a minimum of fuel, and practically absolute freedom from danger of explosion.

Our engraving represents a boiler having only two sets of curved tubes instead of four, but otherwise the same as that used on the Wild Goose. The connected series of curved pipes, A, are concentrically arranged and are inclosed by a concentric iron casing, D, having a firebrick lining. The inner series of pipes surrounds a vertical cylinder having a firebrick facing. The curved tubes are inclined and connected with vertical stand pipes, *c c'*, which are located on opposite sides of the boiler in line with the division wall of the fire box. The curved pipes are inclined, to facilitate the flow of water and steam toward the upper end of the stand pipes.

The flame and products of combustion pass up from each portion of the fire box in the spaces between the pipes, and between the pipes and the outer casing and the central cylinder. These firebrick surfaces reflect the heat upon the curved tubes, and this, together with the direct action of the flame and heat from the fire, insures the rapid generation of steam. The steam and water are separated by the cylinder, C, which is connected at its upper end with the upper ends of the stand pipes, *c'*, and at its lower end with the lower ends of the stand pipes, *c*. As the steam and water enter the cylinder, C, through the upper connecting pipes, the water falls while the steam is taken to the engine. A perforated diaphragm is placed across the cylinder just above the upper connecting pipes and below the engine supply pipe, to prevent the water from following the steam.

The water that falls in the cylinder returns to the boiler through the lower connecting pipes.

The stern-wheel steamer Wild Goose, upon which Mr. Ward's boiler is used, is said to be the lightest and fastest boat of its class ever built. It is 110 feet long, 16 feet beam, and 3 feet depth of hold, and draws but 16 inches. The wheel is 13 feet in diameter and 10 feet 6 inches wide. The boat has made 10 miles in 45 minutes, with a current of two miles, and it is claimed that it has no equal in stemming the chutes or rapids on shallow rivers.



WARD'S STEAM GENERATOR.

AGRICULTURAL INVENTIONS.

Mr. Moses N. Ward, of Cedar Rapids, Iowa, has patented a simple but efficient arrangement for operating the dasher of the churn. The invention consists in a short slotted lever and a long vibratory lever connected by a screw in combination with a shaft and dasher.

Mr. Will Adair, of Canmer, Ky., has patented an improved cotton and hay press for baling cotton, hay, etc., or pressing and packing other commodities. The platen is attached to a sliding beam, and the mechanism for actuating it is attached to another sliding beam, which is arranged in alignment with the platen beam, and is allowed to move downward alternately with the platen. The mechanism consists of a train of gears and an involute wheel or eccentric, which is operated thereby, and acts intermittently on the head of the platen beam or stem to force the follower downward.

Hose Pipes.

In a little pamphlet entitled "Fire Hose," the writer of which is an Englishman, and also evidently a firm believer in leather hose, we find the following:

"The history of flexible fire hose is not a long one. Its invention is claimed by two Dutchmen, both named Jan Van der Heide, who were inspectors of fire apparatus in the principal city of their country. In the year 1672 it was first publicly tried, and was found to be so successful that, within a twelvemonth, the old engines were discarded, and were replaced by new ones to work with flexible suction and delivery hoses. Five years later the Van der Heides were granted an exclusive privilege, which secured to them the right to manufacture these hoses for a period of 25 years. This hose was made in 50 foot lengths, and was coupled by brass connecting screws. We find also that at this time, besides the leather hose, pipe of sailcloth or canvas was manufactured, and that 'a seamless fabric, covered with cement or paint, was used.' Here, then, we have the canvas and woven hose which has lately been brought forward as a new invention. The reason of this is to be found in the fact that canvas hose rapidly gave way before its rival, leather, which, although it was by no means perfect, being 'sewn together like a boot leg,' and far from water tight, yet, to the mind of our forefathers, was evidently the superior of the two. It was not till 1760, eighty years after the invention, that flexible hose was introduced into this country. In 1808 copper-riveted leather hose was first made by Messrs. Sellers & Pennock, of Philadelphia; thus the honor of so great an improvement in such a valuable article belongs to an American house. Eleven years later Mr. Jacob Perkins introduced copper-riveted hose into Great Britain, and at the same time brought into use an improved coupling, which connected the hose without twisting it or diminishing the water-way, for which he was awarded a silver medal by the Society of Arts. Hempen hose, woven without seam, was made in Leipsic by one Beck, a lace weaver, in the year 1720. After this it was made by Erke, a linen weaver at Weimar; and at a later period of linen at Dresden, and also at Silesia. The canvas hose, recently introduced and flaunted before the public as something new, has been tried and abandoned 150 years ago. India rubber hose was brought out about the year 1827, by Mr. Thomas Hancock, of Fulham, and is thus the latest invented of any of the principal descriptions of hose that are in extensive use."

MECHANICAL INVENTIONS.

An improvement in plates for holding screw-cutting dies has been patented by Mr. Johan G. Geiser, of Fort Clark, Brackettville, Texas. This invention relates to hand plates for holding screw-cutting taps and dies. It consists in certain novel features by which screw threads may be more conveniently cut than heretofore, and whereby left hand taps may be formed from blanks by right hand screw-cutting devices.

Mr. Aaron T. Hammer, of Sedan, Kan., has patented an improved sewing machine motor, which consists in the combination of devices by which the vertical motion of a platform is converted into rotary motion and transmitted to the band wheel when the platform moves down.

An improvement in dumping wagons has been patented by Miss Annie McFarlane, of San Bernardino, Cal. The object of the invention is to provide a cheap, simple, and convenient dumping cart or barrow that will be especially serviceable in mines.

Mr. Benjamin F. Walters, of Norfolk, Va., has invented an improved machine for removing the stems, particles of dirt, and other adhering impurities from peanuts, and for polishing and assorting them for the market; and it consists in a peculiar arrangement of a polishing brush, and in means for rendering a picking apron detachable from the discharge end of the separator.

Mr. Daniel M. Holmes, of Arlington, N. J., has invented an improvement in the construction of the cake machines for which letters patent, Nos. 174,244 and 188,366, were granted, February 29, 1876, and March 13, 1877, respectively, to the same inventor. The object of this invention is to make the machines more convenient in use and more reliable and effective in operation.

Mr. Jackson M. Rose, of Abingdon, Va., has patented an improvement in the class of beds or bodies of farm wagons which are made in sections to adapt them for extension longitudinally.

Mr. Frank W. Devine, of Carrollton, Mo., has patented an improved chain pump and curb, which consists in constructing the curb or casing above the ground in a portable shape, and in combining the suspended chain with a pipe or tube terminating at one end in a discharge spout and at the other end in a bent neck having a funnel-shaped mouth, the bend being made larger than

the other portion of the pipe and provided wtih an opening for admitting the water.

Mr Joseph Baker, of Lebanon, O., has invented an implement for cutting the wire bands with which sheaves of grain are bound. It consists of a blade with a hook at one end, and at the other a stock and bent lever connecting with one end of a rod on top of the blade, the other end of which has a right angular forked projection fitting over the blade, to which it is connected by pivots working in V-shaped slots in the fork. On one side of the fork is a cutting bit, and on the other a clamping edge opposite a lug attached to the end of the blade. The wire being caught by the open hook, the forked projection is thrown forward, severing the wire, one end of which is caught between the clamping edge and the lug, and thus drawn from the sheaf.

Correspondence.

Protection from Lightning.—A Note from Professor Macomber.

To the Editor of the Scientific American:

Your criticism of my use of the word "practical" in the SCIENTIFIC AMERICAN of November 1, is, to a certain extent, proper. In the amount of space accorded me for reply to a correspondent it was impossible to consider the matter fully. Fearing, however, that your criticism may lead readers to deem me an advocate of the "Chambers" lightning rod, I desire to call your attention to the fact that I have denounced that rod in language which cannot be mistaken, and the company has actually commenced a suit against me for $50,000 damages in the United States Court of this State.

J. K. MACOMBER.

Phys. Laboratory, Iowa Agricultural College,
Ames, Iowa, October 27, 1879.

Iron as a Fertilizer for Pear Trees.

To the Editor of the Scientific American:

It is conjectured that New Haven County, State of Connecticut, has a larger supply of choice pear trees than any other county in the United States. In the city of New Haven alone, their number increases to thousands. As the city is renowned for its noble elms and unsurpassed shade, likewise is it noted for its neat cottages and fine residences, about which are yards and gardens abounding with ornamental and fruitful vines and trees. Every owner of a lot seems to have devoted a portion to the culture of fruit. Of the large variety represented, the pear tree and grapevine are the most prominent. One gentleman has over two hundred varieties of pears growing on two separate plots of ground, embracing hardly more than 300 feet square. This number may appear to the owner of a single variety like a marvelous amount, but when placed in connection with the multitudinous number in existence, it dwindles through the comparison. It is stated that the celebrated pomologist of Europe, Dr. Van Mons, has fruited over eighty thousand varieties, which is only a small portion of the whole number produced by different individuals. This may seem incredible to those who are not acquainted with the culture of this fruit; and to those familiar with the peculiarities and capricious nature of the pear, it becomes a matter of no little surprise.

The climate as well as soil of New Haven appears to be peculiarly adapted to the culture of pears; but when the soil is examined closely it is found to be composed mainly of sand with a small proportion of iron, which is a needed requisite for stimulating the growth of the tree and fruit. When we take this fact into consideration, we are led to expressions of surprise at the success met with in this particular branch of pomology. There are bounds, however, to the successful culture of pears, as varieties have failed, in nearly all instances, of proving profitable. Of this number the most prominent is the Flemish Beauty and White D'Oyene. The latter, however, is now hardly known in this section, although it flourishes well, it is said, in the West; while the former, on account of the poor success attending the ripening of its fruit, is looked upon with disfavor. None were able to give any cause for this failure, and it was therefore with no very great hopes of ascertaining the cause and finding a remedy that I early in the season commenced making this variety something of a study.

In pursuing the study I have considered the manner of cultivation and nature of the fertilizers used, also position of the trees, and have selected three or four upon which to remark. The first to be mentioned is a standard, some fifteen feet in height and between twenty-five and thirty years of age, growing near a farmhouse a short distance from the city. The tree is sheltered upon the west, north, and south, but not upon the east. The ground is turfed and receives no fertilizer. This tree blossomed and set full, but the pears commenced early to crack, and none ripened. The second tree is a dwarf, notwithstanding the nature of the Flemish Beauty is a standard, growing in the western portion of the city. It is some twenty years old and not over ten feet high. It stands within eight feet of a high close board fence, and about it on the other sides stand trees of different varieties that produce excellent fruit. The ground about the tree is cultivated and fertilized from a compost heap. The tree blossomed full last spring, and the indications were promising for a superior crop until the pear had reached the size of an average Sickle, when they commenced cracking. At that time there was a sufficient quantity on the tree, had they matured, to make about two bushels of pears; but in place of gathering that amount but one ripe Flemish Beauty was plucked from the tree. All of the others had cracked, a very few had prematurely ripened and dropped off, in all furnishing not a dozen good ripe pears.

The third tree is one belonging to Henry Hale (Henry Hale & Co, carriage builders), and growing near Mr Hale's house, situated in the lower or eastern portion of the city. The tree is a standard of a very thrifty growth, about twenty five years old, and as many feet in height It is protected on the south by his dwelling, the north by standards of different variety and the carriage factory; east and west by adjoining gardens. The ground is turfed save a circle about four feet in diameter around the tree. Within this space the earth is kept loose and free from weeds or other vegetation. For a fertilizer Mr Hale has for many years used one of a peculiar nature, it being composed of the sweepings of the smith shop and the shavings, dust, and dirt from the room in which the woodwork is made, all being burned in one heap, and the residue used as a fertilizer, it being well mixed with the earth about the trees The sweepings of the smith shop is comprised of many particles of iron varying in size from an iron filing to that of a half ounce in weight. The trees treated in this manner, and the Flemish Beauty in particular, are remarkable for their healthy appearance This tree produces pears of great and unusual size, which mature well, and, as Mr. Hale states, have never been known to crack. His knowledge of cracked pears was acquired by his attention being called to samples shown him by his neighbors, who were unsuccessful in raising Flemish Beauties. This season the tree bore the extraordinary crop of between six and seven bushels, the largest weighing from ten to twelve ounces, a fair average being nine ounces.

At the county fair held in this city there was a collection of two hundred and seventy-five plates, of which number Mr. Charles Dickerman, of this city, represented sixty-four varieties. The largest pears exhibited were a half dozen Napoleons; next came the Dutchess. The Flemish Beauty was represented by only three or four plates, of which Mr. Hale took the first premium; the nearest approaching his in size being very much smaller.

The conclusion I have reached regarding the cause of failure in crops of Flemish Beauty is to attribute it to the lack of iron in the soil. This is based upon the success met with by Mr. Hale in the culture of his trees, representing quite a variety, all of which excel in size and quantity of fruit. It cannot be ascribed to the virtue of the ashes, as the residue from each burning remains as an accumulation to the pile, gradually increasing its size for several months before a sufficient quantity to warrant its removal has been heaped together. The ashes are meantime leached by rains, and their strength is exhausted. The particles of iron do not so readily waste their strength, but when corroding enter into the ashes, enriching them with its changed form and becoming a suitable ingredient for nourishing the roots and trees. This conclusion is strengthened by considering, in connection with this tree, one growing upon the opposite side of the street from Mr. Hale's ground. It has the advantage of the same soil and similar location, but not the same fertilizer. The fruit of this last tree cracked badly. Is not therefore the suggestion of fertilizing with iron worthy of a trial? It would cost nothing but the trouble to procure some iron filings or drillings and occasionally mix them with the soil about the roots of the tree. Filings or drillings corrode the most readily, and would prove the speediest manner of producing the desired effect. One year's trial may produce no decided improvement; several may prove no better; yet we consider it worthy of a trial.

There is another indication in the fruit of the Flemish Beauty of an unhealthy state of the tree, consisting in the pears becoming covered with small black spots; and a lack of vitality by the leaves turning and falling early. Neither the spots nor blotches are found upon Mr. Hale's fruit, nor do the leaves prematurely fall from the tree. The fruit on this tree is possessed with a dark green skin, marked with streaks or blotches of rust, and in ripening the green changes to yellow, the rust is more strongly defined, and the scarlet tint, so much admired by pomologists, deepens.

GEORGE A. HUBBARD.

New Haven, Conn., October, 1879.

The Blake Transmitter.

To the Editor of the Scientific American:

It is somewhat remarkable that the friends and admirers of Mr. Edison take such great pains to prove to the world that he is the inventor of every electrical instrument and contrivance which turns out to be of value.

Not satisfied with the signal defeat which Mr. Edison sustained in the great microphone controversy in Europe, where the leading scientists, without exception, supported the claim of Professor Hughes, that the microphonic action is totally different from the principle which Mr. Edison has always claimed as the basis of his carbon telephone, viz., "the property possessed by some substances of moderate conductivity of having this power modified by pressure," although even this cannot be regarded as his exclusive property, as it was discovered as early as 1856 by the Count Du Moncel, and described by him in his "Exposé des Applications de l'Electricité," and also used by M. Clerac in 1865—not satisfied with this, I repeat, an attempt is now made to induce the public to believe that Mr. Edison is also the inventor of the only really successful microphonic transmitter ever produced. I allude to that invented by Mr. Francis Blake, of Newton Lower Falls, Mass., and described in your issue under the date of November 1.

Wherein the similarity between the Blake and the Edison transmitters lies, it is difficult for one acquainted with both to say, save in the fact that both are used in combination with an induction coil, the secondary circuit of which is a part of the main line.

I have examined Mr. Prescott's account of Mr. Edison's inertia telephone, and find it totally different, both in action and principle, from any microphone.

It appears, however, from the article in question that Mr. Edison's latest transmitter, described also in the SCIENTIFIC AMERICAN a few weeks since, is also like the "old invention," in principle. If so, it is a query why the Western Union Company did not bring out this superior instrument instead of the carbon telephone, when the latter was beaten everywhere by the Blake transmitter. The fact really is that the Western Union tried to imitate the Blake transmitter at different times since its introduction, a year since, and could never make the imitations work, simply because the Blake transmitter has a few technical points on which its success depends, and which are only known to the electricians of the National Bell Telephone Company.

Mr. Prescott states in his book, and it is found to be true in practice, that although many substances may be used as a conducting medium for varying resistances in the Edison transmitter, lampblack is the best; per contra, lampblack is not used in the Blake transmitter at all, the substance used being invariably very hard gas carbon, besides which Mr. Edison himself states in his patent 203,016, that unmixed carbon is not adapted for use in his transmitter.

The article we have alluded to as in your last issue, in its second paragraph states that there is "nothing delicate or fine about the construction" of the Blake transmitter. In the third paragraph we find the words, "this casting supports two delicate springs, etc." One of the main features in this transmitter is the delicacy of the adjustment obtained by means of the casting, which is perpendicularly across the inside of the diaphragm, and the screw in its lower end. In conclusion, I desire to say that no caviling spirit dictates these remarks, but simply a desire for justice to the Blake transmitter, its inventor, and perfecters.

Boston, October 29, 1879. T. D. LOCKWOOD.

A String of Questions.

To the Editor of the Scientific American:

Please allow me a small space in your scientific journal (which assists to educate scientists as well as the mass of your readers) to propound a few questions for philosophical thinkers to elucidate and explain.

Is there such a thing as a vacuum in a molecule of matter?

If not, is there such a thing as a vacuum anywhere outside of a molecule of matter?

If not, where is the capacity of matter for elasticity?

If there are no vacuums, or no room for movement of molecules, how do they manage to change places?

If there are vacuums (which I claim) are they not necessarily perfect vacuums, either inside or outside of molecules?

Are molecules invariably spherical in form?

If so, what occupies the interstices?

Are molecules all of the same size?

If so, how do you account for the angularity of crystallizations?

If not of the same size and density, how do you account for the even flow of electricity along a good conductor?

If they are irregular in size, shape, and density (which I claim), can the phenomena exhibited in their movements be explained on any other ground than that there are perfect vacuums either inside or outside their organism.

Is heat or caloric a principle or a result?

If not a tangibility, can its phenomena of action be explained on any other ground than a result of activity of molecules by friction?

Is not the result of friction electricity?

Are not heat and electricity identical?

If not, explain the different results of the excitation of either as molecules of electricity or molecules of matter in the abstract?

If a cake of Northern lake ice will thaw or melt a portion of polar ice, by the activity of molecules adjusting the temperature, is the result heat or electrical activity?

If the force of heat or electrical activity can be measured, why does combustion produce such unequal results by same quantity in each different substance?

H. S. B.

A Small Steamboat.

To the Editor of the Scientific American:

I have been interested in several descriptions you have given of small steam yachts, and as I have lately built one which is (with one exception perhaps) the smallest recorded, I thought you might like to know of it, as there is now a general interest in the subject of small cheap steam pleasure boats. You will notice the results I get with a very small engine by having a light boat and high pressure.

The totall ength of boat is 15¼ feet; beam, 4¼ feet; depth 22 inches; built of $\frac{7}{16}$ inch cedar, lap joint on ¾x1¼ oak ribs, and sheathed inside. Total weight with flagpoles, awning, etc., about 400 pounds (without boiler, etc.).

The boiler is made of a piece of lap-welded boiler flue, and is 12 inches diameter and 34 inches high (upright), with 40