along the coast of Siberia, may frequently be made in a few weeks by a vessel specially adapted, and manned with experienced seamen, but that, so far as the conditions of the Siberian Polar Sea are at present known, the entire route can hardly have any practical importance for trading purposes.

2. That there are no obstacles to commercial traffic through the waters between the mouths of the Ob and the Yenisei and Europe.

3. That in all probability a sea passage between the Yenisei and Lena, and between the Lena and Europe, as a trade route, is also possible, providing the out and homeward voyages be not undertaken in one summer

4. That further researches are requisite before it can be decided whether the waters between the mouth of the Lena and the Pacific are available for mercantile navigation. The experience already collected shows, however, that steamships with heavy implements and other goods, not easily to be forwarded by land or sledges, may at any rate pass from the Pacific to the Lena.

### AMERICAN INDUSTRIES.—No. 25.

#### BRASS MANUFACTURE.

In the city of Waterbury, Conn., long before the days of railways and steamships, the manufacture of brass was begun by Mr. Abel Porter. This was in 1802, and the business was then confined almost wholly to the manufacture of brass buttons. The industry, which was established by Mr. Porter, and for a time conducted by Abel Porter & Co., proved very satisfactory. The style of the firm passed through a succession of changes until, in 1850, Messrs. J. M. L. & W. H. Scovill, the gentlemen then composing the firm, united with other gentlemen in organizing a joint stock corporation under the name of the Scovill Manufacturing Company. Their works in Waterbury front on Mill street, and present a continuous line of nearly one thousand feet; the buildings are substantially built of brick, and for the most part are three stories high and are of neat architecture. The present officers of the company are, F. J. Kingsbury, president; C. P. Goss, treasurer; M. L. Sperry, secretary. W. I. Adams is the New York agent, E. H. Patterson at Chicago, and Allen G. Lovell at Boston. The company employ a capital of nearly $1,250,000, and have in manufactured goods, and in process of manufacture, nearly $500,000. The first forty years of this company's business career was slow, and not until the year 1850 did they realize that the turning point had been gained and they were rapidly becoming the leaders of this industry in the State, if not of the United States. One important branch of their manufacture is button making. To this one of their largest buildings is devoted; one of the lower views on the first page represents one of the button making departments.

They make a specialty of military and naval buttons, such as are worn by militia companies, firemen, railroad men, schools, colleges, and societies throughout the country. They supply to a large extent the Cuban and the Spanish American governments with buttons for their troops. They also make a great variety of buttons for liveries, from designs and dies to order. A corps of designers and die sinkers is employed on work of this sort, and in getting up new styles of buttons for ladies' wear. The company's cabinet of samples consists of many varieties of every imaginable pattern—gilt, silver-plated, nickel-plated, bronzed, enameled, oxidized, silvered, stamped, chased, or brightly burnished; also buttons of glass and metal combined, or of metal and cloth-covered buttons, lasting, worsted, and brocade for men's wear, and silks and velvets of all shades for ladies' wear.

Another department of the works, represented in one of the upper views in the engraving, is devoted to the manufacture of wrought brass—butts and hinges. The machinery for making them works automatically, and is the invention of mechanics in the employ of the company. These products vary in sizes, and the cheaper ones are used for furniture, inside blinds to houses, etc. More expensive ones, of ornamental patterns, gilt, silver-plated, and engraved, are made for use on pianofortes. Very many are for use on shipboard, where iron is objectionable from its liability to rust.

The company manufactures furniture casters, made entirely from wrought metal, by a newly invented process. The peculiar merit of the casters consists in the introduction of small iron balls, acting as friction rollers, and thus causing the caster to turn more readily than the ordinary casters. Being of wrought metal they are much stronger than the common ones of cast metal.

A large department, shown in one of the middle views, is devoted to the manufacture of kerosene oil burners, lamps, and lamp trimmings. In this department the company has had marked success, and is noted for the perfection of its work. A very large variety of burners and lamps is made there. Thimbles are made here of silver-plated brass and of German silver. The better grades are made with the same care as the best silver thimbles, and are for practical purposes equally good.

The "drawing department" is the name given to that part of the works devoted to the manufacture of brass ferrules for handles of canes, fish rods, etc. Seamless tube, solid drawn, is also made here, being drawn up from sheet metal without the use of solder.

The rolling mill, shown in one of the lower views, is a building 200 feet long by 120 feet, and the casting shop, which is shown in one of the upper views, is 100 by 75 feet. This will produce annually about 2,000,000 pounds of sheet metal, oreide, German silver, etc. It is rolled of all thicknesses, down to that of the thinnest writing paper, and made of all qualities and tempers to suit all the requirements of manufacture, some of it being made tough and ductile for spinning and stamping into irregular shapes, and some highly tempered for springs or reeds for musical instruments.

Sheet brass is made in various widths, from a mere ribbon to sheets of 20 inches or more. The alloy is melted in crucibles, cast in large ingots, and reduced in thickness between heavy rolls. The sheet is then scraped on both sides to discover imperfection and to remove any scale that may exist on the surface. It is then rolled and rerolled until it is reduced to the required thickness. During the process of rolling the sheets are occasionally annealed, less frequently, however, for spring brass than for tough soft brass.

The brass for the inside works of all American watches is made here, as is also the nickel metal for the same purpose. The oreide is a close imitation of gold, and is much used by jewelers. The German silver, otherwise called albata, is used to some extent on show cases, for the ornamentation of steam fire engines, for cornets and other musical instruments; but by far the largest part of it is used for making silver plated spoons, forks, and other table ware. For this latter purpose thousands of pounds are consumed daily.

Another article made by the company is the novelty lockbox for post-offices. These boxes are made in three sizes, with brass or nickel plated fronts. Each lock is provided with keys of unique pattern, and no two locks are alike.

In the manufacture of most of the articles the company has introduced many original processes and perfected special machinery at a great cost, which enables it to produce a grade of goods superior to any formerly imported and unsurpassed by those of other domestic manufacturers.

The manufacture of photographic materials has become very extensive, and now embraces several distinct departments in this establishment, either of which is of sufficient magnitude to require separate and individual management.

It is impossible to describe in detail the great variety of articles made in this establishment. We have already intimated that the goods made by the Scovill Manufacturing Company are sent to all quarters of the globe, and enormous quantities are consumed in this country alone. The prosperity of this company is the direct result of cheapening production while improving the quality of the articles.

The Scovill Manufacturing Company have a large warehouse located at Nos. 419 and 421 Broome street, New York. They also have salesrooms at No. 183 Lake street, Chicago, and No. 177 Devonshire street, Boston.

## Correspondence.

### THE EDISON ELECTRICAL GENERATOR.

*To the Editor of the Scientific American:*

Your issue of November 15 contains a letter from Mr. Edison accompanied by a reply to the strictures contained in mine of the 1st November.

I feel confident that so far as the opinion of thoughtful electricians is concerned I might leave the matter as it now stands without detriment to my reputation; but I am not willing the general public should suppose I acquiesce in the statements made by Mr. Upton, or that my views are, to any great degree, modified by anything he advances.

Mr. Upton says I have "confounded the obtaining of a maximum current with the obtaining of a maximum of economical efficiency." Now I submit I have done no such thing. In my letter I have assumed that in dynamo-electric machines the electromotive force is a function of the external resistance, and decreases as the external resistance increases.

The article on page 242 says nothing about the electromotive force being constant. Mr. Upton, it is true, does say that this is the case with Mr. Edison's machine; but this is a mere assertion, the truth of which I do not only not concede, but positively deny.

I do not lose sight of the statements on page 242, that "although the current from the armature may be used to excite the field magnet, Mr. Edison finds it more economical to charge the field magnet by means of a separate machine." Then follows an intimation that such is his intention in the future.

Mr. Upton says, "according to the reasoning in the letter in question," it would be "mathematically absurd to connect a battery with a resistance nine times greater than itself," and it undoubtedly would be if, as was beyond all question claimed on page 242, that *simply by so doing it necessarily rendered that battery* twice or three times as efficient as *any other* battery, or if the electromotive force of the battery was a function of the external resistance, and decreased as the external resistance increased.

I now propose to re-examine some of the statements on page 242. I quote first: "The internal resistance of the armature is only ½ ohm, and Mr. Edison claims that he realizes 90 per cent of the power applied to this machine in effective external current." Second: "Now the energy converted is distributed over the whole resistance; hence, if the resistance of the machine be represented by 1, and the exterior circuit by 9, then of the total energy converted, 0·9 will be useful, as it is outside of the machine, and 0·1 lost in the resistance of the machine." Now, Mr. Upton, claiming for Mr. Edison's machine constant electromotive force, fully indorses both of the above statements, which I again pronounce mathematically absurd, and again assert that the statement, if true, proves beyond all doubt that Mr. Edison has discovered perpetual motion. For Mr. Edison and Mr. Upton both distinctly countenance the assertion that 0·9 of the power applied is available in effective external current, and concede that 0·1 is lost in the resistance of the machine. Consequently there is no escape from the conclusion that no power is required to overcome the inertia of the mass of metal comprising the armature, nor the friction of the journals, none is lost in the production of currents which are not available in the working circuit, and none in the production of spark and heat at the commutator, etc. etc. In other words, you have only to start the machine and it will continue to revolve for ever, and perpetual motion is an accomplished fact.

Now if, as Mr. Upton leaves us to infer, the electromotive force is constant and independent of the resistance of the external circuit, there is no escaping the conclusion that power has to be applied to excite the field magnet, and in the absence of any information other than is afforded by Mr. Edison and Mr. Upton, we are obliged to assume that this power is supplied by a machine which furnishes the current for this purpose and *runs itself*. Perpetual motion is more than possible.

The question to be considered is: Is it true that a machine, in which the resistance of the armature circuit is only ½ ohm and the external resistance 4½ ohms, *necessarily* more efficient than a machine in which the resistance of the internal and external circuit must be made equal in order to obtain the maximum efficiency? I answer, no; Mr. Upton says yes, and introduces the expression $E^2 (r+R)^{-2} R$ to prove his assertion and the efficiency of Mr. Edison's machine. It proves neither.

It is true that Mr. Upton's statement differs materially from anything first stated, in that it takes into consideration the electromotive force as an element of efficiency. But what does it prove? Nothing more than was proven years ago by Joule and Favre, and the reference to a *recent* number of *La Lumière Electrique* is not the best that can be made.

There have been numerous machines built in which the resistance of the armature of the working circuit was only a fraction of that of Mr. Edison's machine, and the difference between the internal and external circuit much greater. One instance out of many may suffice.

Professor Trowbridge, of Harvard University, made tests of three well known machines, the results of which are published in the *Philosophical Magazine* for March, 1879. The results obtained are given in the following table:

| Resistance of Circuit, in ohms. | Current, Webers per sec. | Speed of Mach. per min. | Metre-grammes, consumed per sec | Equiv. of Current in metre-gram's per sec | Efficiency. |
|---|---|---|---|---|---|
| WILDE MACHINE (Large Size). | | | | | |
| 0·594 | 62·33 | 548 | 350,658 | 235,480 | 67·1 |
| 0·733 | 61·76 | 508 | 392,403 | 285,293 | 72·7 |
| 0·857 | 43·82 | 532 | 283,107 | 167,907 | 59·4 |
| 0·907 | 60·25 | 500 | 453,123 | 335.966 | 74·1 |
| 1·039 | 39·28 | 520 | 298,356 | 163,682 | 54·9 |
| 1·120 | 43·44 | 548 | 343,827 | 215,660 | 62·7 |
| 1·241 | 50·43 | 504 | 542,685 | 322 047 | 59·3 |
| 1·453 | 44·94 | 520 | 553,311 | 309,658 | 56·0 |
| 1·593 | 47·51 | 536 | 633,765 | 366,910 | 57·9 |
| 2·305 | 32·86 | 528 | 643,632 | 253,968 | 39·4 |
| GRAMME MACHINE (Large Size). | | | | | |
| 0·675 | 86·0 | 432 | 589.743 | 509,418 | 86·3 |
| 0·760 | 75·6 | 462 | 534,336 | 442,211 | 82·7 |
| 0·781 | 75·6 | 452 | 607,200 | 455,377 | 74·9 |
| SIEMENS MACHINE (Large Size). | | | | | |
| 0·973 | 79·8 | 264 | 831,105 | 632,255 | 76·0 |
| 1·055 | 68·8 | 294·5 | 743,820 | 509,569 | 68·5 |
| 1·066 | 66·0 | 325 | 839,454 | 472,805 | 56·3 |

The resistance of the Gramme armature is 0·129 ohm; the resistance of the magnet, 0·212 ohm. The total resistance is therefore 0·341 ohm.

The total resistance of the Siemens machine is 0·586 ohm.

The Wilde machine differs essentially from the other two, the magnets not being included in the working circuit. The armature has two circuits, the one for exciting the magnet, and the other for working circuit. The resistance of the armature coils of the working circuit is 0·074 ohm. The resistance of the coils of the armature for exciting the magnets is 0·454 ohm. The coils of the field magnet have a resistance of 2·83 ohms.

In this machine the resistance of the coils of armature of the working circuit was about one-fifth the internal resistance of the Gramme machine, and the ratio of the resistance of the internal to the external circuit, when the maximum efficiency was obtained, was not far from that given by Mr. Edison for his generator on page 242. Yet the efficiency was much less than the Gramme, in which the internal and external resistance was about equal when the maximum efficiency was obtained. It is therefore evident that there is something more than the matter of resistance to be considered in the building of dynamo-electric machines.

Mr. Upton also gives two examples of the performance of Mr. Edison's machine, but they neither prove the efficiency of the machine as a generator nor as compared with other machines.

*The only proof of the efficiency of a machine is the ratio of the work done in the external circuit to the horse power expended in driving the machine,* and, *other things* being equal, it may safely be said that that is the best machine which has the highest electromotive force and the least internal resistance.

Now for Mr. Upton's examples.

In the first case we have "$\frac{130 \times 130}{1 \times 1} \times 5 \times \frac{44 \cdot 3}{33000} = 11$ H. P.," and in the second, "$\frac{130 \times 130}{5 \times 5} \times 4 \cdot 5 \times \frac{44 \cdot 3}{33000} = 4$ H. P."

If Mr. Edison's claims were just, why did not Mr. Upton give the H. P. used in each case? Had he so done the coefficient of efficiency could at once have been obtained. But in order to state the case properly and fairly, information should also have been given as to what power was applied to excite the field magnet.

On page 265 of your issue of October 25, we do find a statement as to power used, and we assume that the machine was then working under the conditions of so-called maximum efficiency, and, conceding Mr. Upton's examples, how will the results obtained compare with the claims made on page 242?

Since, according to Ohm's law $C = \frac{E}{R}$, and Mr. Upton says the electromotive force is 130 volts, we should have in the second example $\frac{130}{5} = 26$, or a current of 26 webers per second through a resistance of 5 ohms. Now, according to Joule's law, $H = C^2 Rt$, this multiplied by 0·73726542 (taking 1 H. P. = 746 voltohms) the equivalent in foot pounds of 1 weber per ohm per second, gives the number of foot pounds in the circuit (or if any one prefers he may take the equivalent in foot pounds of 1 weber per ohm per minute as 44·2359252), we shall then have $26^2 \times 5 \times 60 \times \frac{\cdot 73726542}{33000} = 4 \cdot 53$, or about $4\frac{1}{2}$ H. P. in the entire circuit, while in the external circuit we shall have $26^2 \times 4 \cdot 5 \times 60 \times \frac{\cdot 73726542}{33000} = 4 \cdot 077+$, or about 4 H. P., thus indicating a loss of 20 per cent of the power applied to the machine, without taking into consideration the power applied to excite the field magnet.

I think Mr. Upton, when he wrote the letter on page 308, did not have in mind the very remarkable passage on page 242, which is as follows, viz.: "While this generator in general principle is the same as in the best of the well known forms, still there is an all important difference, which is, that it will convert and deliver for useful work, nearly double the foot pounds of energy that any other machine will under like conditions," or he would not have appealed to a general law to prove so remarkable an exception; and I would very respectfully recommend to Mr. Upton the careful study and consideration of the causes of loss in dynamo-electric machines before he again uses the calculus to support such statements as are contained in the article on page 242.

In conclusion, I think I may say that I am possessed of sufficient "sense and science" to prevent my falling into such manifest absurdities as are contained in Mr. Edison's statements on page 242, or Mr. Upton's elucidation on page 308.

EDWARD WESTON.

Newark, N. J., Nov. 15, 1879.

### The Future Water Supply of Philadelphia.

*To the Editor of the Scientific American:*

In the SCIENTIFIC AMERICAN of November 15 there is an article under the above title, in which the following statement occurs: "The latest project—that of Mr. James F. Smith, C.E.—contemplates a gravity supply by aqueduct, to be drawn from the upper portion of the Perkiomen Creek and its tributaries." This is not a new project, but was presented to the City Councils of Philadelphia, in 1865, by Henry P. M. Birkinbine, then Chief Engineer of the Water Department. The plan, as presented to councils in 1865, was as follows: At a point on this stream, the largest tributary of the Schuylkill, 26½ miles from Broad and Market streets, the creek passes through a narrow chasm in a ridge of trap hills. Above this point the stream falls rapidly, and drains an area of 220 square miles of hilly and rocky country, some of the hills rising one thousand feet above tide. Most of the surface is still in forest, and a very small percentage is under cultivation. Perhaps there is no section of country within so short a distance of a great city that possesses all the requisites of desirable drainage area, or from which water of such good quality for all the purposes for which it is required can be drawn. The quantity collectable would be an average of over 200,000,000 gallons per day. This water could be brought to the city and delivered into a reservoir at an altitude of 170 feet above city datum. The project as presented was to construct a large impounding reservoir at the point above designated, covering from 1,700 to 2,000 acres, and having an available storage capacity of from 5,000,000,000 to 10,000,000,000 gallons, and conveying the water to the city by aqueduct, principally of masonry. Mr. Smith, in his paper (see Journal of the Franklin Institute for October, page 248), says: "I very cheerfully resign to Mr. H. P. M. Birkinbine the credit of pointing out the stream, and for myself only claim the plan of tapping it at a higher and more favorable point, and intercepting and utilizing the headwaters of its principal branches."

Mr. Smith's suggestion is simply to take one of the principal tributaries six miles further up stream than the original location, and by that means bring the water into the city at a greater elevation, adding other branches of the stream as the demands of the city make it necessary.

The objections to his plan are the increased length of aqueduct; complication by making it necessary to construct a number of impounding dams upon the tributaries, instead of the one large impounding reservoir suggested in the original plan; the increased expense of carrying the line of aqueduct at a great elevation; the loss of the water collected from six miles of the main stream. The greater elevation secured by Mr. Smith's plan would be of little practical value, as the pressure would be too great for the low-lying districts, and would be destruction to the entire old pipe system. The additional head secured by the new location would not increase the area which could be supplied by gravitation one per cent.

Mr. Birkinbine defended his location and plan in a paper read before the Franklin Institute at the monthly meeting on October 15.

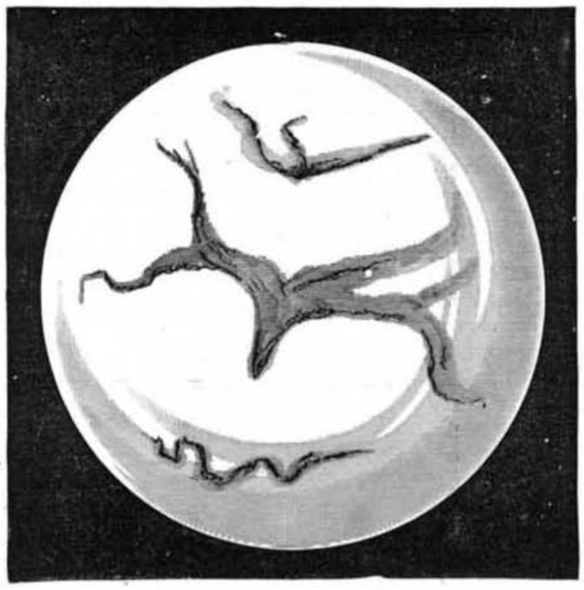
There is no doubt but Philadelphia will at some future day draw its supply from the Perkiomen by gravitation, and were it not for the traditional slowness of the city it would have done so before this time. The improvements in the supply of New York, by the construction of large impounding reservoirs in the Croton drainage; the addition to the supply of Boston, by the construction of the Sudbury aqueduct, and in Baltimore by the introduction of the water from the Gunpowder, may induce Philadelphia to some action in the near future. At present the city has an unsatisfactory and precarious supply, both as to quantity and quality, furnished by 8 pumping stations, 8 water wheels propelling 14 pumps, 16 steam engines and 28 boilers operating 25 pumps, and 16 reservoirs at various elevations, from 94 feet to 348 feet above city datum.

HARRIS.

### Astronomical Notes.

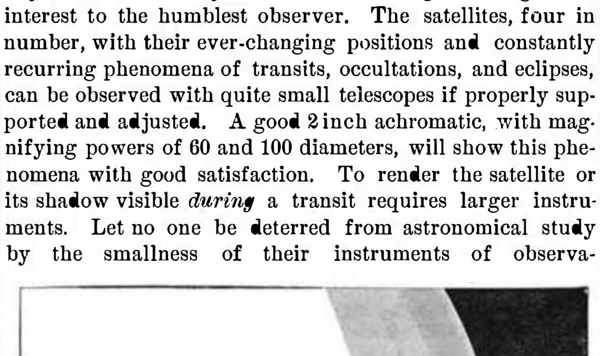
*To the Editor of the Scientific American:*

Three of the most conspicuous planets are now visible in the early evening. In the south shines the ever resplendent



MARS AS SEEN NOV. 11 1879.

Jupiter, not so bright as a month ago, but still a magnificent object to the naked eye, and in the telescope of the greatest interest to the humblest observer. The satellites, four in number, with their ever-changing positions and constantly recurring phenomena of transits, occultations, and eclipses, can be observed with quite small telescopes if properly supported and adjusted. A good 2 inch achromatic, with magnifying powers of 60 and 100 diameters, will show this phenomena with good satisfaction. To render the satellite or its shadow visible *during* a transit requires larger instruments. Let no one be deterred from astronomical study by the smallness of their instruments of observa-



JUPITER'S SPOT.

tion, for the lowest power will show much more than the unaided vision; and in the *attempt* to conquer these sublime visions with their present instruments, a taste and experience will be developed that will enable them to appreciate a larger telescope much more than they otherwise would, and at the same time have educated them, in hand and eye, to use it with greater efficiency.

The belts of Jupiter are very plainly visible this season. Also the *great red spot*, the present one first noticed in Europe about two years ago and now readily seen with moderate telescopic power. I append a sketch of it as seen a few evenings since in the 5 inch Newtonian reflector, just as it had fairly entered upon the face of the planet. In the southeast shines Saturn, not a very attractive object to the naked eye, but in the telescope the marvel of the heavens. Its stupendous multiple ring system—the despair of astronomers—may be seen with moderate telescopic aid. A 2 inch glass will show the main division of the ring, the space between the ring and planet, and one or two of the satellites. The rings will be more open next year than this. In February, 1877, they disappeared, or in the largest telescopes were seen only as a fine thread of light. Their thickness, which then only was seen, is estimated at one hundred miles. In the east sweeps up the heavens the ruddy-faced Mars in company with the gentle Pleiades. On the 12th inst. Mars was in opposition to the sun and at its brightest for this season. This planet presents to astronomers greater indications of being a habitable globe than any of the planets. It is clearly divided into two grand divisions of land and water. Some of its markings can now be seen in small telescopes, but large ones are necessary to bring out all the details. The annexed engraving shows Mars as seen on November 11, 1879, in the 5 inch reflector, at 10 P.M.

The two satellites of Mars can only be seen in the largest telescopes, and then appear as mere points of light. They were discovered by Asaph Hall with the great Washington telescope in the favorable opposition of 1877. It is reported that they were first seen this season in Europe with a three foot reflector.

WILLIAM R. BROOKS.

Red House Observatory, Phelps, N. Y., Nov. 15, 1879.

### How Ice Boats Sail Faster than the Wind that Drives Them.

*To the Editor of the Scientific American:*

I would thank you to allow me to make a few observations on a question which you spoke of in your last number, viz., "the speed of ice yachts."

I am convinced your opinion is the true one. You base it moreover on facts; no doubt this is the best proof. But it may also, I think, be proved theoretically according to the most elementary principles of mechanics.

It is demonstrated in mechanics that when a force acts continuously on a movable body the motion of this body increases every moment. Now, in the case under consideration the force is the wind, the movable body is the ice yacht. The force is continuous (we suppose the wind continues to blow); therefore the ice yacht should go faster and faster, and if it be a sufficient time in motion, its velocity will at a given moment exceed that of the wind.

In this reasoning I suppose the friction of the yacht on the ice to be sufficiently small not to entirely destroy the increase of speed which the wind tends to communicate to the boat.

It must be observed that the velocity of the wind may vary during its action, though this by no means weakens our proof. It is sufficient that it acts continuously. If the constant force vary in intensity, the increase of speed will be less each moment, but the velocity will, notwithstanding, increase, supposing always that it is not annulled by friction.

Let us observe, in fine, that it is quite possible for a boat to go faster than the wind which drives it. For this it suffices that during the whole time of its course the boat moves through air already put in motion by the same wind.

A. O.

Montreal, November, 1879.

### Energy in Foot Pounds.

*To the Editor of the Scientific American:*

In a communication on page 337, current volume (No. 22), Mr. Upton correctly states that: "Foot pounds are always measured by the square of the current, and the method of measuring is analogous to that employed for measuring the energy in a stream of water." His deduction is not quite right, "for if twice the amount of water flows from a given sized jet against a turbine, it will be able to do" *eight* "times the work" instead of "four" times as he has it. The reason is plain enough; for to double the velocity through the jet the pressure must be increased by four; therefore twice the quantity and four times the pressure (or head) equals eight times the power.

A. M. SWAIN.

North Chelmsford, Mass., Nov. 24, 1879.

### MECHANICAL INVENTIONS.

An improved lawn-edge mower, patented by Mr. Timothy Hanley, of Boston Highlands, Mass., consists in a cutter revolving in a vertical plane against a knife whose edge lies in a vertical plane.

Mr. William L. Longley, of Cumberland Mills, Westbrook, Maine, has patented an improved revolving screen for treating paper pulp, so constructed as to screen the pulp rapidly and thoroughly, and expel it promptly from the machine. It consists in the combination, with the interior surfaces of the screen plates, of corresponding bellows plates, the latter being so arranged and operated in connection with the screen plates that when the pulp screen revolves a motion will also be given to the bellows plates, whereby the pulp will be sucked through the screen plates, and an effective pulsation thereby imparted to the pulp.

Mr. George E. Passage, of Nunda Station, N. Y., has patented an improved device for adjusting the shoe to give any desired inclination to the sieve or screen, and which shall be so constructed that the said shoe may be adjusted while the machine is in motion, so that the operator can see the effect of the change, and can thus be able to adjust it so as to give the best effects.