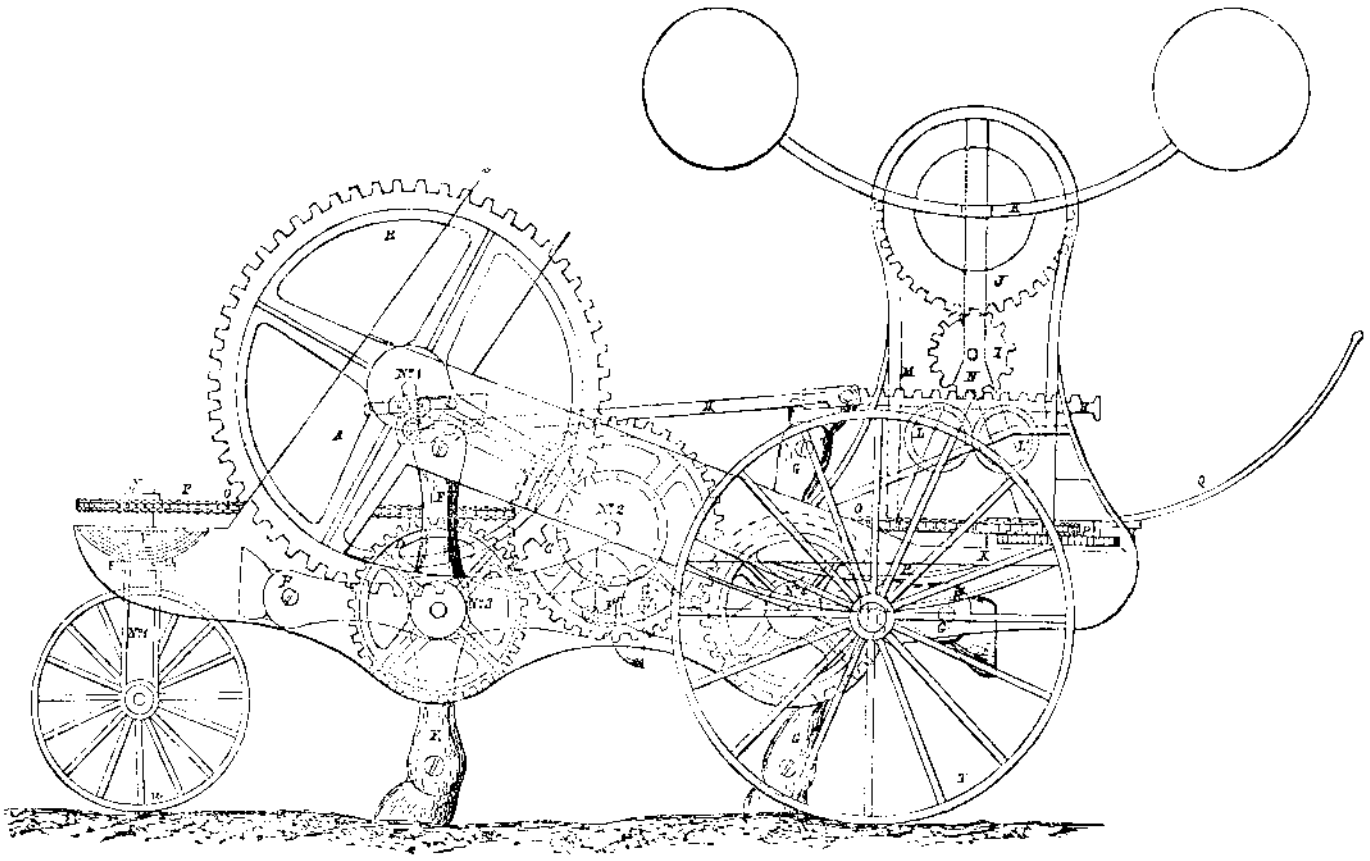
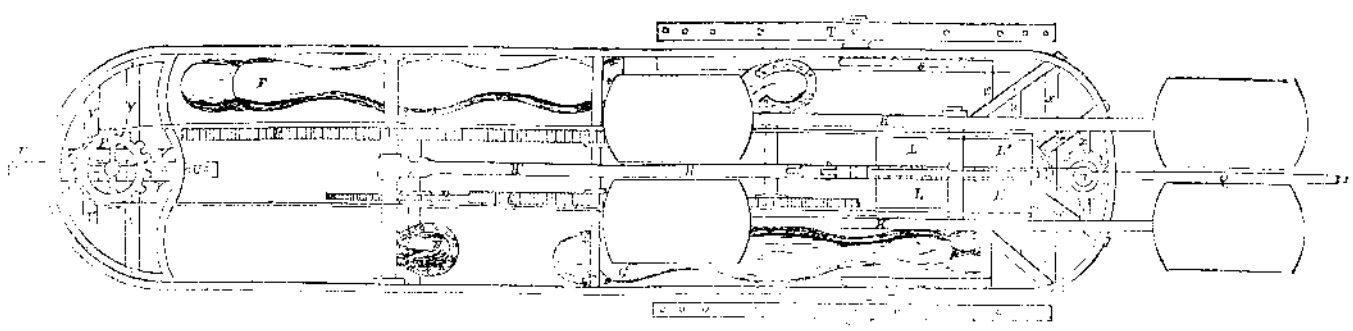
A MACHINE HORSE.

The annexed illustrations are reduced facsimiles of the drawings attached to the specification of a machine horse, recently patented in England, and with reference to which sundry paragraphs have appeared in many of our contemporaries on both sides of the Atlantic, and to which allusion was recently made in these columns. The invention will elicit a greater degree of interest for its oddity than for its practicability; in fact, we fail to perceive how the oscillation of a heavily weighted lever would be sufficient to develop power enough to give the machine the tractile force of a horse. If the inventor means that this oscillation is to be imparted by hand (and we see nothing to the contrary in the specification, nor anything mentioning the use of a superior force), then we fear that he has fallen into the too common error of supposing that machinery can generate power. However, the device is quite a curiosity, and hence we submit the drawings, with the following brief description, to the investigation of our readers.



BRET'S MECHANICAL HORSE.

Fig. 1 is a sectional elevation. Fig. 2 is a plan view from beneath. The shape of the frame, A, is that of an elongated triangle, and the materials are cast iron and wood. K is one of the two balance levers, each loaded at the ends with two iron balls which are filled with either mercury or lead. These levers are pivoted and are attached to the sector, J, which gears with the pinion, I, and this last engages with the rack, H. The rack rests and slides to and fro on fixed pulleys, L, and communicates with the connecting rod, H, giving the same, as the balls oscillate to and fro, a reciprocating motion, and thus, by the medium of a crank, rotating the gear wheel, B. The last meshes with the pinion, G', of the wheel, G, and thus rotates the cog wheels, D and E. These cog wheels are upon axles which are journaled in the frame, and which, on either side of the wheels—these being arranged in the center—carry a pair of legs. Consequently the forward axle, marked No. 3, actuates the fore legs, while the rear axle, No. 4, actuates the hind ones. There are, however, two pair of legs on each axle, each pair being in one, and the axle passing through the center, and the pairs on the same axle being set at right angles to each other. This will be understood by reference to the engraving, in which F F, full lines, show one pair, and F F, dotted lines, the other. Similarly at G G, in the rear axle. The disposition of the legs is such that two feet strike the ground at a time, and these are diagonally opposite each other: for instance, the left fore and right hind foot, and *vice versâ*. Pivoted hoofs are provided at the pedal extremities, which, it is claimed, afford a clinging purchase. Guiding is accomplished by manipulating the lever, Q, which, by suitable interposing gear wheels and chain bands, turns the steering wheel, U. The rear wheel, T, sustains the main portion of the weight of the machine.



BRET'S MECHANICAL HORSE—PLAN VIEW.

M. Charles Bret, captain in the French army, is the inventor, and he thinks that the machine, with the trotting feet uncoupled, might advantageously be used as a driving engine, an idea to which we must decline to agree, at least until some one convinces us of the utter fallacy of all generally accepted mechanical truths.

Railway Reflections.

Has not the railway affected, influenced, altered yea, directed, the drift—the direction, of human thought? We are all influenced by the circumstances that surround us. Who is there that is independent of the material or the social phenomena of his time? The mode, manner, and style of locomotion used by man influence his being, molding his character and affecting his habits of thought and action. The fashion of our motor power controls our feelings, and affects our emotions. To mount the horse is to partake of his nature—to sympathize with his spirit, bound, curvet, or caper, as his sportive mood may suggest. When we are seated in he railway carriage do we not mentally snort in accord with the iron steed—take pride in his speed, and glory in the force with which he devours distance? How different is the feeling of a man who is carried in a palanquin, or towed in a canal boat, from that of one who is whirled along in an express train, with a telegraph caution ticking in front, and a way train whistle screaming in the rear!

The railway has enforced habits of promptitude, illustrated the value of time, and shown the power of discipline. On the disk of our railway dial, no shadow is allowed to linger. Our time tables are as absolute as the laws of the Medes and Persians; the locomotive has employed our legislatures to devise new codes of laws for its government, and engaged our judges in interpreting its rights and privileges. Into every grade of modern society, the interest of the railway has extended.

The multitude of engineers, mechanics, workmen, clerks, and conductors who are kept employed in this service would be difficult to estimate; they constitute a large section of the population, a standing army of industry; and what an enormous supply of iron, timber, coal, oil, and other natural products the railway demands every year! In the manufacture of its necessary supplies, how many new trades have sprung up and are supported!

The property of our railways dominates the money market of the country. The capital of our time has run so largely into railways that every one who owns any surplus may be said to have an interest in railway property. It would be interesting to calculate the proportion of capital invested in railroads, as compared with banking, manufactures, insurance, or even agriculture.

As the overflow of the Nile enriched the plains of Egypt, so has the flood of railways over the land enhanced the value of the soil. The locomotive has virtually irrigated barren wastes, actually tempered the climate of inhospitable regions.

Probably no interest has been so largely promoted by the railway as that of real estate. Every farm has felt its influence. It has brought a market place to the farm of every husbandman; a customer to the workshop of every mechanic. Families are reunited; friendships maintained; intercourse established by the facility of railway travel. We eat, drink, sleep, live on the railway.—*The Railway World*

The Production of Arsenic in Copper Mines.

In 1873, 5,449 tuns of arsenic were produced in England. More than a third of it came from the Devon Great Consols mine. Sometimes 200 tuns a month are sold from this mine, a quantity of white arsenic sufficient to destroy the lives of more than 500,000,000 of human beings. The Commissioners of Mines saw, stored in the warehouses of the mine, ready packed for sale, a quantity of white arsenic probably sufficient to destroy every living animal upon the face of the earth. The Commissioners consider that, in the case of mines in which arsenic is actually manufactured, it is only reasonable that the manufacture of a poison so virulent should be subject to special state supervision; and they submit that an officer should be empowered to require that the best practicable means be taken not only to prevent the poisoning of the air by the volatilization of the arsenic, but also to hinder the access of the poison to running water.

The Art of Thinking and the Habit of Observation.

We have frequently directed the attention of parents and instructors to the importance of teaching children to think, and we now quote, from the Philadelphia *Ledger*, some apposite remarks on the subject.

"In very early life, the perceptive faculties are the principal channels through which we can reach the mind. Closely connected with this subject is the cultivation of the thinking powers. The two are indeed so intimately blended that neither can be effectually improved without some increased development of the other. In learning to see and hear with delicate accuracy, we insensibly strengthen our powers of thought, and accustom them to work more effectively. Still the operation of thinking deserves a far more systematic training than it usually obtains.

"When we are striving for success or excellence in any special pursuit, we think to some purpose. Our will concentrates our thoughts to the point in question, dismisses summarily all irrelevant subjects, presents the matter in its various bearings, with some degree of logical sequence, and rarely allows the mind to drift away from it until some definite result has been obtained. There is a considerable portion of every one's time in which nothing but thinking can be done. There is time spent in cars, where even reading is injurious; and there are times of waiting, resting, and enforced inaction, when the mind has undisturbed opportunity for effective operation. Then, too, there are many employments so mechanical as to claim no portion of the mind's aid. When we have learned to do anything 'without thinking about it,' the thoughts necessarily run in other channels. Much manual labor is of this description. A distinguished prisoner of war, of large mental resources, being allowed to choose his employment while in confinement, selected one so simple as to require neither skill nor thought, assigning as a reason that, though his hands would be occupied by compulsion, his mind at least would continue his own and remain in freedom. We all have some of such work, and many have much. Now, if we had learned to employ this time in clear and consecutive thought—if our will could control our reflections, directing them in definite channels, and aiming to reach some well defined conclusions—we can hardly compute how great an effect would be produced in strengthening our mental powers, in maturing our judgment, in bringing us to the knowledge and appreciation of truth, and thus of increasing our solid happiness and our permanent value to the community.

"The best exercise of every faculty is the chief road to true enjoyment, and no one who has once tasted the pleasures of thinking to a purpose will ever willingly allow his mind to dissipate in wandering thoughts and day dreams. Neither is such discipline so difficult as some imagine. If begun in early life, by awakening the childish interest in what is seen and heard, alluring the mind to reflection by question and answer, and accompanying the thoughts to dwell for short periods, but intently, upon familiar subjects, it will become pleasant exercise, and gradually grow into the habitual tenor of the mind. What we truly will to do is already half accomplished; and the watch thus placed over the thoughts will, of itself, reduce to order and regularity much that is now chaos and confusion. It is by no means necessary that the subjects thus mentally discussed should be remote or abstract. On the contrary, let them be matters familiar to our minds and agreeable to our tastes. Let the memory please us with pictures of the past, and the imagination revel in beauty of scene or heroism of deed. Let the business man revolve the scheme which he longs to execute, and the philosopher meditate on the prin-

ciples of life. But whatever be the subject, let the thoughts pursue it with a consistent progress that shall eventuate in some real benefit to the mind."

Similar in nature and importance is the habit of rapid and accurate observation, the great value of which was the subject of an address to the Dairymen's Association, delivered by Hon. Horatio Seymour. In the course of his remarks, he said:

"It seems singular that some men pass through life without observing things which come before their eyes almost daily. An intelligent farmer once told me that he would not recognize any of the horses belonging to his neighbors, excepting those noticeable from some peculiarity of color. A Chicago merchant, who daily drove his own horse eight or ten miles, told us he had never noticed any difference in the movement of horses: did not notice the difference between trotting and pacing. A college president is said to have made the question 'in which way do the seeds lie in an apple?' a test of the habit of observation among his students. Our tests with this question would indicate that more than one half of the average men and women either don't know, or will answer incorrectly. We once received a well written essay on the value of observing closely, yet there was not a capital letter or a punctuation mark in the half dozen pages. Many such instances could be given, were it necessary.

"This matter is not one of slight importance. The carefully observant man will see things which will be of pecuniary importance to him, while his ill trained neighbor may lose by not seeing. The farmer with habits of observation will notice slight symptoms of illness in his animals or plants; will readily see the effect of this or that practice: will much more quickly discover countless little things which, if neglected, may result in serious loss.

"As in the case of habits generally, much can be done in childhood, and it certainly should be the duty of parents and other teachers to help children to learn to observe carefully, quickly, accurately. It is told by some one that in his childhood he practiced running past a shop window and then stopping to describe as many articles as he could recall, and in this way he acquired wonderful quickness of observation. There are hosts of points to which a farmer's boy should have his attention called at an early age. Suggestions as to the mode of growth of plants, the form of a leaf, growth of a fruit, or the pointing out of peculiarities of different classes of animals, may do him great good in developing this habit, and also have a marked effect in interesting him in his calling.

"This habit of observation should not be confined to the things we see alone, but should extend to the things we hear, and those we read as well. In this latter matter, there is great lack. Many read to little profit because they have not trained themselves to observe carefully.'"

Correspondence.

Notes from Washington, D. C.

To the Editor of the Scientific American;

In addition to the bill given in your issue for February 13, another has been introduced by Mr. Archer in the House, amending the acts relating to trade marks and labels, which provides for the registry of trade marks, labels, or stamps, for terms of thirty, ten, or five years, on payment of fees of $25, $10, or $6, according to the length of the time applied for; but only half of the two first sums has to be paid in advance. It also provides for reissues and appeals to the District Courts for such cases, in the same manner as in patent matters.

Another bill, introduced by Mr. Hoskins, provides for the patenting of any new and valuable fruit or plant, for the term of seventeen years, with the privilege of an extension for seven years more.

In the Senate, a bill has been passed enacting "that the act approved March 9, 1868, authorizing the issue of a patent for induction apparatus and circuit breakers shall not be construed as authorizing the issue of a patent for any invention applicable to telegraphic apparatus; and any issue, under color of said act, of letters patent for any such invention applicable to telegraphic apparatus, is hereby declared to be null and void, as contrary to the meaning and intention of said act of March 9, 1868." This has reference to the patent granted to C. G. Page for his induction apparatus and circuit breakers, so extensively used in telegraphing.

Mr. Storm has introduced a bill into the House, which enacts "that it shall not be lawful hereafter for any person who has been appointed, or who may hereafter be appointed, as an officer, clerk, or employee in the Patent Office, to act as counsel, attorney, or agent for prosecuting any application for a patent, or an extension thereof, which was pending in said Office while he was said officer, clerk, or employee, nor by any means to aid in the prosecution of any such application, within four years next after he shall have ceased to be such officer, clerk, or employee."

A resolution has been adopted by the House, on motion of Mr. Young, of Georgia, "directing the Commissioner of Patents to inform the House whether patents are now issued for chemical compounds; and if not, why not?"

From all appearances, it would seem that the sewing machine lobby would fare badly, the Senate committee having reported adversely on the Wilson extension; and the House committee have agreed to report the same way, though, I believe, they have not yet done so. The temper of the Senate in this matter of sewing machine extension was shown in the case of John W. Marsh's application for an extension for a patent on a trimming attachment to sewing machines, which came up on Monday last; and although no opposition was made, the bill was refused a third reading by the significant vote of ayes 13, noes 23—the fact that it had something to do with sewing machines being sufficient to kill it.

Notwithstanding this, it is possible that the Wilson extension may go through, as it is said that $250,000 have been raised to influence the right parties to work for its passage; and they will do all that can be done to put the case through. As "there's millions in it," those engineering the matter will do their best, and, by watching their chances, as they did with the Batchelder extension, may succeed in their nefarious endeavors.

The German Parliament has passed an act to protect trade marks, which takes effect May 1 next, and our Consul General at Berlin has sent to the Department of State a translation thereof. The leading features, so far as it relates to persons not residents of Germany, are as follows: "The trade marks of non-resident traders are not entitled to protection in Germany unless they are registered in the Court of Commerce at Leipsic, and unless German trade marks are in like manner protected in the country of the non-resident seeking protection in Germany. The non-resident is also required to file a declaration that he will submit to the jurisdiction of said Court of Commerce in all cases arising under the provisions of said acts, and to furnish proof that in his own country all the conditions are complied with under which the non-resident can claim protection for his trade marks. The right of non-residents to use a trade mark in Germany is limited to the same period of time as is allowed to them in their own country."

Those of your readers who are interested either in art matters or women's rights may like to know that Vinnie Ream has secured a contract to execute a bronze statue, of heroic size, of Admiral Farragut, for which she is to be paid $20,000. The bill authorizing this statue was passed some three years since, and a number of models were sent for inspection, in compliance with a general invitation given to artists to compete; but the committee in charge of the matter failed to agree, and at the last session the selection was referred to a commission, consisting of the Secretary of the Navy, General Sherman, and the admiral's widow, who awarded the contract to Miss Ream.

OCCASIONAL.

The American Institute Rotary Engine Tests.

To the Editor of the Scientific American:

It is an unfortunate trait in the genus *homo* that, as a rule he suffers defeat with a bad grace; and it appears to be an established fact that it is the American specimen which invariably takes the longest time to arrive at a knowledge of the fact that he is beaten in a contest. This peculiar feature of American human nature was quite felicitously illustrated in a conversation of the writer with one of the judges at the late Fair of the American Institute, who had served in that capacity for several successive years; he said, in effect, that when he essayed to judge of the merits of several competing exhibits, he always made up his mind, *a priori*, that, when his judgment was rendered, he would probably be named by all but one of the contestants in terms which, well, would not be appropriate in a religious, or even a scientific, journal. He, in that remark, illustrated very well the chief difficulty under which the American Institute and all similar bodies labor; and it appears to have been no better exemplified anywhere than in the case of the rotary engine tests at the late Fair.

After the results of these tests became known, two of the defeated contestants, and particularly the second best, made quite earnest attempts to bring discredit, by charges of unfairness, upon the writer; and now I see, by an editorial article in your issue of February 20, that, notwithstanding that the original recalcitrants were most irrefragably put to rest by the proper documentary evidence before the Board of Managers of the Institute, there yet remains another malcontent.

The article referred to ("Metaline, and the American Institute"), if not intended, is nevertheless calculated, to reflec upon me, notwithstanding the saving clause ("certainly in one acquainted with the gentleman will venture the assertion that he could be biased, even in prospect of a possible fat commission"); and I desire in reply to it, and in order to calm the troubled spirit of your protestant, or any one else who may be disposed to make themselves unhappy over the result of these rotary engine tests, to say a few words as to the method in which they were conducted, and the precautions taken against possible cavil. The reference to some supposed negotiations of stock, and subsequent business retations of mine with the proprietor of the successful rotary engine, strikes me as a very absurd kind of innuendo: something out of the line of the SCIENTIFIC AMERICAN, and altogether foreign to the usual good sense displayed in its editorial columns: I will, therefore, credit it to you in that view.

The writer, in the capacity of Superintendent of the Machinery Department of the American Institute, was directed by Professor R. H. Thurston, Chairman of the Committee of Judges, and by the Board of Managers, to test the competing rotary engines as to power and economy, and report the result to the Committee. In accordance therewith, I made all arrangements for and supervised personally every trial. I therefore hold myself responsible for any error or unfairness, if such can be shown. Professor Thurston, with his customary acumen and forethought, in consultation with myself, decided to send four of the graduating students of the Stevens Institute to attend each of these trials, in order, first that the results might not be questioned by the defeated contestants, and, additionally, to give the young men an opportunity to acquire a little practical information of a kind not so readily obtainable for them at the Hoboken Institute. As an additional precaution, one of the young men, at the conclusion of the trials, made copies of the log, and placed them in possession of Professor Thurston, where they now are. The original logs were left in my possession, from which to compute the results, and are now, with my official report, as a compendium of the report of the Committee of Judges, in possession of the American Institute.

The apparatus used was identical in every case, with the single exception of the brake, a different one being used with two of the defeated engines, in deference to the wishes of the exhibitors of them. When the engines had been run a sufficient time preceding the test to insure average conditions, the control of all instruments and apparatus, together with the recording of all data in the log, was turned over to the four young men above mentioned; and thence to the conclusion of the trial (five hours in each case) I had nothing more to do with it than to see that my instructions, and those of the Judges, were carried out.

Now unless the party from whom you "hear of a protest" intends to impugn the integrity of the young men (some 8 or 10 in all) who actually conducted the trials, as well as my own, he had better hold his peace; and he has every opportunity to check them for himself by consulting the copy of the logs in the possession of the Chairman of the Committee, if he is inclined to doubt the correctness of those at the American Institute.

In a word, I have to say to all (if there are any more) who may be inclined to feel discontented and uncomfortable on this subject that, if they will point out any irregularity or unfairness in these trials, or errors in the results obtained by me, I shall at all times be ready to answer any and all questions; and much desire that the "protest" you mention may make its appearance in some more tangible form than to be merely heard of.

New York city. JOHN T. HAWKINS,
late Supt. Mach. Amer. Inst. Fair.

Air Currents and Air Floats.

To the Editor of the Scientific American:

It is an ascertained scientific fact that the ocean and the atmosphere are correlative in their thermal values. The temperature of the water regulates the temperature of the air. It salts the air as well, and is of vast importance, in this regard, to the products of the soil and the constitution of the animals abounding adjacent to its direct influences.

Along our Atlantic sea board, we have a Gulf Stream pouring its equatorially heated water northeastward to the coast of Newfoundland, whence it is projected over the Atlantic to the coast of Ireland. It is a warm river, of several hundred miles in breadth, running across the Atlantic.

This river is as available for the floating of air ships from our sea board to England as was (and is yet) the Mississippi for floating flat boats from the Falls of St. Anthony to New Orleans.

A balloon, kedged in this stream, will necessarily float along its isothermal line, and it will float much faster than the stream, since the warm air correlated above it will flow in the direction of least resistance, which has an eastward tendency. Can we kedge the balloon in this ocean river? More easily than the water ship can be kedged to the channel of the winding river down which it floats.

With the device termed a droge, a conically shaped bucket float, open at its wide end, suspended at any desired distance from the balloon and fastened with two cords (one at the point, the other at the open end), it is easy to increase or lighten the burden of the balloon; in other words, to let her up or down without a discharge of ballast or gas. Professor Henry hints at the possible contigency of the interference of a cyclone in such an adventure. That is very thoughtful, but the same contingency holds with regard to sea ships as well. To the balloon, it would not be disastrous, as all the cyclones in this latitude are inevitably dragged eastward by the normal motion of the atmosphere, a meteoric fact too often witnessed with my own eyes while sailing in their vicinity, in their midst, or in their front. I know very well that they turn round on their common centers, and that they have innumerable vortices on their peripheries. The destructive vortices are caused by the interruptions on the surface, and would not, even if they extended to the hight of the balloon, be dangerous to it.

Where there is a will, there is a way. Is there not in the land sufficient meteorologic intelligence, coupled with bounteous generosity, to send an air-tossed veteran through this channel for exploration, or some other willing adventurer, more competent than your obedient fellow citizen?

Philadelphia, Pa. JOHN WISE.

Nitroglycerin as a Motor.

To the Editor of the Scientific American:

The idea (originating in a fertile French mind), of superseding steam by an explosive compound far more dangerous than gunpowder, may seem vague; and yet I can see but one obstacle to be overcome in order to make it a success.

The danger of untoward explosions may probably be avoided by keeping the components of the compound in separate tanks, and bringing them together in the cylinder, continuously, as required.

The wants of elasticity and the suddenness of expansion of this powerful substance will probably cause an unsteadiness of motion too violent to be overcome by ordinary machinery, and herein consists the great impediment to its use. And yet it may not be impossible to counteract this defect by employing heavy governors and fly wheels, and by also keeping the amount of the explosive (let into the cylinder at each stroke