bering how effectually my people extirpate vermin from the house, I took my fishing rod, with a rag of the bulk of an egg tied upon the tip, and attacked them. I saturated the rag two or three times, and used it as many, touching under and upon the nests wherever I could, and not very thoroughly either. The leaves that had been attacked by the worms died and dried up; this was evidence of cessation of their work. In a week new leaves appeared under the still standing web, but there were no more signs of worms. A second crop, being another batch, appeared in a month or six weeks, and were as easily disposed of, and none have since appeared. I believe this to be a thorough and good remedy. Those worms that it touches I know it kills, and such as get a smell of it leave at once, perhaps die.

R. H. A.

Baltimore, Sept. 9, 1865.

An Electric Circuit.

MESSRS. EDITORS:—In a late number of the SCIENTIFIC AMERICAN there appears an article stating the manner in which the defect in the Atlantic cable was located. From the language used it appeared that the current sent out on the wire from Valentia passed off at the bit of wire, and the ocean then served as a conductor to carry the current back to the coast of Ireland—forming what electricians term a "circuit." Do I understand that, to form a circuit, the current must return to the same point from which it started? and, if so, why would not the current that passed off the wire at the place the bit of wire ran through the outside covering of the cable, as likely cut across through the ocean to the American coast as to return to the coast of Ireland? Or, in other words, explain the word "circuit" as employed by electricians. SUBSCRIBER.

Paterson, N. J., Sept. 13, 1865.

[If you pour some dilute sulphuric acid into a glass cup, and place a plate of copper in the cup on one side, and a plate of zinc on the other, so long as the metal plates are not brought in contact or connection no action takes place; but if a metal wire or other conductor of electricity is stretched from the copper to the zinc outside of the liquid, a current of electricity immediately starts from the zinc, passes through the liquid to the copper, and from the copper along the wire to the zinc, thus flowing in a perpetual circuit. Instead of leading the wire directly from the zinc to the copper, it may be led from the zinc into the earth, and from the copper into the earth, when the current will flow the same as through a direct connection. The reason why the current should go to Valentia was, that the cable was connected with one plate of the battery, and the other plate was connected with the ground at Valentia. The mode of connecting the wire with the ground is by soldering it to a broad copper plate, and burying the plate in moist earth. In cities an easier and more effectual method is to connect the wire with gas or water pipes. At some of the stations on the line of the California telegraph, in the Great American Desert, the ground is so dry that it acts as an insulator, and no conducting connection with the earth can be made. It was at first supposed that the ground acted precisely the same as the portion of wire which it displaced, and that the current of electricity darted along through water, gravel and rocks from the end of the wire connected with the copper plate to the end of that connected with the zinc plate; but it is now regarded as settled that the earth is a great reservoir of electricity, into which the current flows from the end of the one wire and from which it is drawn into the end of the other.—EDS.

Action and Reaction.

MESSRS. EDITORS:—There is, I believe, an important law of mechanics, never, as yet, definitely announced, and, so far as I am aware, lying unknown, because a current form of words, true in their application to a different case, is supposed to cover vastly more than their author ever intended. In this I allude to action and reaction in a mechanical sense, as distinct from the same when considered as an element of statics. Since Newton announced as a law of statics that action and reaction were equal and in opposite directions, the law has, with unquestioning credulity, been extended to another science as different from that of which this simple law forms the chief part as two sciences in the least akin can ever be. Statics, as is well understood, treats of pressures alone, or of the intensity of forces, which is the same thing, while the science of mechanics considers forces with reference to their quantities. The law of statics referred to can, therefore, only mean that from every exertion of power the pressures produced in opposite directions are equal. But when we come to speak of mechanical action and reaction the question is what is the *quantity* of force consumed respectively by action and reaction. A mechanical force being always estimated by multiplying its intensity into the distance through which it moves, and, the intensity being always equal in opposite directions, it follows that the quantities of force expended in each of the two ways are to each other exactly as the distances acted through in the different directions; or, in other words, as the respective lengths of the forces. Assuming this as probably clear to every one, we have now but to inquire for the law which governs the distances moved through by different bodies in the same time when acted on by equal pressures. But it is a matter of every-day observation that this is proportionate to the intensity of resistance which they offer. The deduction from this is so clear that it might be made by any one, viz—that, in a mechanical sense, action and reaction are in opposite directions, and in quantity inversely as the intensity of the resistance in their respective directions. And this is a law verified by so large a number of instances that none can have failed to observe them, rendering a present induction of facts unnecessary. ISAAC E. CRAIG.

Cleveland, Ohio, Sept. 16, 1865.

[Prof. Treadwell has published a pamphlet discussing this problem at length and coming to the same conclusion as our correspondent.—EDS.

To Preserve the Eyesight.

MESSRS. EDITORS:—It may be well known, perhaps, by many of your readers, if not all, that, as a person grows old, the eye loses its convexity or the pupil becomes flattened. For this reason near-sighted people, whose eyes are too convex, often experience an improvement in their eyesight as they grow old, for the reason mentioned above. If all persons who are not near-sighted should, every time they wash their faces, press their eyes outward, or try to make them as round as they can, taking care not to press or flatten the pupil of the eye, their eyesight would be improved. In this manner I have improved my eyesight, which showed signs of decay. Another theory, almost as important—avoid rubbing the eye when it itches, for in this way the eye is not only inflamed but often flattened. When the eye feels tired wet your finger with spittle and rub it around the lids, this will cure inflammation; and, next, avoid coming from the dark to light, or light to dark; and never read much in a cloudy day or look long sideways. C.

[Many years ago we heard this same direction for preserving the eyesight, and, being then very young, we accepted it without questioning; but every year of our observation of men brings some new evidence to strengthen our distrust of human testimony—not from the disposition of people to tell falsehoods, but from their carelessness of observation. When the French tourist saw a Dutchman recover from a fever after eating boiled cabbage, he entered in his journal: "Boiled cabbage will cure fever;" when, however, he saw the same remedy followed by death in the case of one of his own countrymen, he modified his conclusion, and made a new entry in his journal: "Boiled cabbage will cure a Dutchman of a fever and kill a Frenchman."

Men recover from disease without using any remedy; they doubtless frequently recover in spite of injurious remedies employed. Many persons never have occasion to use spectacles, though they follow no special method in washing or rubbing their eyes. We know of no reason why the plan proposed by our correspondent should not be perfectly effectual; we only want satisfactory evidence to believe that it is so; but one or two cases, observed in the careless manner which is common with most people, and not compared with the numbers of cases in which the plan was not pursued, we should hardly regard as any evidence whatever.—EDS.

UP IN A BALLOON.

At the junction of Sixth avenue and Fifty-ninth street, in this city—just by the southern boundary of the Central Park—there is a vacant lot, which has been rented by the well-known aeronaut, T. F. C. Lowe, for the purpose of giving any person who may desire it, a balloon ascent to the hight of a thousand feet. The lot is inclosed by a board fence, and twenty-five cents is charged for admission, the sum of five dollars being charged for each ascent; the balloon carrying up two at a time, beside the aeronaut, who accompanies them—thus making the charge two and a half dollars for each person. The balloon is held by a rope an inch in diameter and 1,200 feet in length, which is passed under a pulley and wound around a large drum, 16 feet in diameter. During the ascent the revolutions of the drum are held in check by two men with levers acting as brakes. The balloon is drawn down after an ascent, by turning the drum—a horse being at present employed for this service, though it is designed to use a steam engine. As a measure of precaution, a second rope is attached to the balloon, and this is let out and drawn in by hand. The balloon is about 40 feet in diameter, and holds about 25,000 cubic feet of gas. Its buoyant power is estimated at about 1,500 pounds, though it is the practice to take up only two persons at a time beside the aeronaut.

In the still bright forenoon of September 20th, two of "us" took our seats in the basket, some bags of sand were lifted out, the stout rope that fastened the balloon to the earth was unhooked, the word "All right!" was given, and we were lifted easily and swiftly upward into the air. In accounts of balloon ascensions it is usually stated that the sensation is that the balloon remains stationary while the earth sinks away beneath it; but this is not the case in this kind of attached ascent. The earth seems to stand as firm as ever, while we are the movable things that feel ourselves borne gently upward to a hight in the air, compared with which the climbing of Trinity church spire, or Bunker Hill Monument, is contemptible. Though both extremely sensitive in this respect, no giddiness was experienced—the stout rope netting around the basket making a tumble-out manifestly impossible. We were, therefore, able to enjoy the novel experience with unalloyed satisfaction and pleasure.

There is, perhaps, no spot on the earth better fitted for such ascents than the one selected by Mr. Lowe. On one hand is the Central Park, with its serpentine roads, green lawns, and bright lakes and reservoirs; and on the other, the great city, with its long parallel avenues and cross streets, with its cars and omnibuses looking like crawling turtles, and its Liliputian men and horses moving about so far beneath us. The geography of the city and its environs is displayed with remarkable distinctness; the North and East rivers, the islands of the harbor, the towns and villages all about, with embracing woods beyond—are shown in the double clearness of a combined map and landscape view. After gazing our fill upon the scene from our airy hight, we inform our attendant aeronaut that we are ready to descend, he blows a shrill whistle, the horse commences his circling journeys around the whim, and we are drawn quite rapidly down to the surface of the earth again. The descent occupies about five minutes; the ascent a little less.

The whole thing is admirably managed, and nothing could be more agreeable and satisfactory in every respect. Mr. Lowe informs us that more ladies than gentlemen have improved this extraordinary opportunity to make a short aerial journey.

Submarine Cables.

In Europe, Asia, Africa, and Australia there are 52 submarine cables, which are of the aggregate length of 5,625 miles, and the insulated wires of which measure 9,783 miles. The longest of these is 1,550 fathoms, and the shortest $1\frac{1}{2}$ fathom. There are 95 submarine cables in the United States and British North America, which measure 68 miles, and their insulate wires 133 miles. The overland telegraph line between New York and the west coast of Ireland, through British Columbia, Northern Asia, and Russia, will be 20,479 miles long, 12,740 miles of which are complete. It has at length been resolved that this line shall cross from America to Asia at the sothern point of Norton

Sound, on the American side, to St. Lawrence Island, and from thence to Cape Thadeus, on the Asiatic continent. Two submarine cables will be required for thi , one 135 miles long, and the other 250 miles long. Cape Thadeus is 1,700 miles from the mouth of the Amoor River.

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week; the claims may be found in the official list:—

Device for Sifting Flour and Other Substances.—This invention relates to a new and improved device for sifting flour and other substances for domestic use. The invention consists in the employment or use of a semi-spherical sieve, in connection with an oscillating frame provided with spheres or balls, all being arranged in such a manner as to insure the flour being sieved in a thorough manner, with the least possible labor, and without pulverizing, and forcing through foreign substances, as is frequently the case with other devices of this kind. It is a very economical and ornamental affair, and will, doubtless, be extensively used. James Myers, New York City, is the inventor.

Loom.—The object of this invention is a hand loom, in which both the motion of the harness and the shuttle motion depend upon the motion of the lay or batten. The harness motion is effected by an arm extending from the batten and connected by a pivot with a lever catch that acts upon a lantern-shaped cam, mounted on the treadle shaft, in combination with suitable arms or tappets inserted in said treadle shaft, in such a manner that for each stroke of the batten a quarter revolution, more or less, is imparted to the treadle shaft, and the harness is changed by the action of the tappets on the treadles. The shuttle motion is effected by means of sliding blocks secured in each end of the batten, and operated each by a spring lever or driver, which is set automatically by the combined action of square disks, hook catches and cams, in such a manner that on each forward stroke of the batten a partial revolution is imparted to each of the square disks, and the driver on one end of the batten is set while that on the other end (having been set on the previous stroke) is liberated, and, by its action on the sliding block, connected to it, the shuttle is propelled to the opposite end of the batten. John Seaman and Wm. G. Henderson, Andover, N. Y., are the inventors.

Decarbonizing Retorts.—This invention consists in the employment of a current of air, either mixed with steam or without the same, for the purpose of decarbonizing retorts, particularly clay retorts, such as generally used for manufacturing illuminating gas, and for other purposes. Such retorts are liable to absorb a quantity of carbon, and a large quantity of carbon or soot adheres to their inner surface, particularly toward the back. If this soot or carbon is not removed, the retort becomes useless after a short time. Patented in the United States and Europe, through the Scientific American Patent Agency, by G. W. Edge, Jersey City, N. J.

Machine for Drilling Rocks, Etc.—This invention consists in the employment or use of a spiral lifter, in combination with a tappet extending from a sleeve fitted in the drill or drill rod, and with an arm extending from said sleeve in the cam slot, in such a manner that, by the action of the cam slot and arm, the tappet is held in contact with the thread of the feeder until it arrives at the end of the stroke, when the same, by a curve in the cam slot, is thrown out of contact with the feed screw, and the drill is allowed to drop, and, while being thrown out of gear with the feed screw, it is turned, causing it to strike a different spot on each stroke. By this arrangement two or more drills can be operated by means of the same lifter and by the same driving power. Robert Hood, Dayton Ohio, is the inventor.

Balanced Slide Valve.—This invention consists in a balanced slide valve for steam engines. The valve is placed in a cylindrical steam chest, which has two steam pipes, one near either end, each encircling about two-thirds of the steam chest, said pipes being in communication with the steam ports which lead into the opposite ends of the cylinder. Steam is admitted into the chest at one end, and, the valve or piston being hollow, it is allowed to pass through it into the other end, thereby providing for an equilibrium of pressure on both ends of the valve. C. W. Tremain, Memphis, Tenn , is the inventor.

Umbrella and Parasol.—The object of this invention is to connect the stick of an umbrella or parasol to the ribs and their co-operative parts in such a way that the said parts shall be free to rotate on the stick instead of being fixed thereto, so that when the umbrella is extended and in use the part composing the cover will yield when it meets an opposing object, and will take a rotary motion on the stick, thereby relieving the hand and also the umbrella from strain. Wm. Damerel, Brooklyn, N. Y., is the inventor.

Gaiter Boot and Shoe.—This invention relates to a new and useful improvement in the lacing up arrangement of a gaiter boot or shoe, whereby the same is rendered water-proof from the bottom to the top; or, in other words, no seam or joint is allowed at the lacing for water to pass through, and the gaiter or shoe at the same time rendered capable of being applied to, and taken from, the foot, as readily as those of ordinary construction. Thomas Powell, Richland, Ind., is the inventor.

Machine for Dressing Minerals.—This invention relates more particularly to a machine especially adapted to the dressing of kaolin clay, so extensively used in the manufacture of porcelain ware, and also paper, and it principally consists in submitting the clay to the action of a current or currents of water within a series of one or more drags provided with flood gates, arranged so as to be opened and closed at pleasure, whereby the passage of the water with the clay through the drags can be regulated as may be necessary, and thus the separation or removal of all gritty substances from the clay accomplished—the pure kaolin being deposited by the water current in any suitable receiver or tank, from which it can be removed in any proper manner. By this machine the dressing of the clay is accomplished in a most satisfactory and expeditious manner, and, by duplicating some of the parts of the machine, a continuous operation can be maintained—an advantage of much importance. Thomas Moore is the inventor, and has assigned his right to John Ellerby, of No. 63 Pearl street, New York City.

Chair for Barbers, Dentists, Etc.—This invention consists in a novel construction of chair for the use of barbers and dentists; it comprises a stool and mirror, and the body of the chair is provided with receptacles for a supply of hot and cold water, implements of trade, washing apparatus, money drawer and other closets. The legs of the chair body are hinged so that they can be folded up, and the sides of the stool can be separated from each other and folded up, so that the whole apparatus can be packed in a small compass for transportation. Henry Remick, Portsmouth, N. H., is the inventor.

Alarm Lock.—This invention relates to an alarm attachment for locks, and also to a key-hole guard for the same, whereby it is believed that a very simple and efficient means is provided against burglary, and also for giving an alarm whenever the slide latch of the lock is operated and a person opens the door. Jacob Euteneur, of Peoria, Ill., is the inventor.

Wind Wheel.—This invention relates to an improved device for obtaining power from the wind, and it consists in the use of a wind wheel provided with a vane and shield, and with oblique fans or buckets, and arranged with a gate in such a manner that the speed of the wheel may be regulated as desired, and the wind made to act efficiently upon it. The invention also consists in a novel means for operating the gate and for stopping the wind wheel when required. John A. Hubbard, of West Houlton, Maine, is the inventor.

THE NAVAL ENGINES.

Since the article on page 216 was written we have obtained some additional particulars. Without giving a detailed statement of the log of the two vessels, which we have not room to publish at this late hour, suffice it to say that the *Algonquin*, at 8 o'clock on Sunday evening, had made 44,741 revolutions, burning 1,600 pounds of coal per hour, and carrying 70 pounds of steam, while the *Winooski* had made 44,718 revolutions on an average of 17 pounds of steam. The friends of the *Algonquin* are very confident of success. The naval engineers complain that the draft is very poor, and that it is hard to make steam. At 10 A.M., the 25th inst , the *Algonquin* was lying idle at the dock, while her opponent, the *Winooski*, was paddling away vigorously. The *Algonquin* stopped in consequence of a bursted feed pipe, and will resume as soon as her repairs are completed. It is impossible to avoid noticing the fact that the *Algonquin*—Mr. Dickerson's boat—has broken down several times in the course of the trial; as also, that the engine, when in operation, performed poorly in comparison with the vessel opposite. On two occasions the engine stopped, when hooked on, without the slightest warning, when the boilers had 70 lbs. of steam on and heavy fires in; the tubes have collapsed, and several minor casualties of less note have occurred. The *Winooski's* engines work beautifully, and between the times of the exhaust the clock can be heard ticking in the engine room. At the time when the *Algonquin* ceased to work, the *Winooski*, as reported by the naval engineers, was 330 revolutions ahead of her.

A Locomotive Using Petroleum.

Mr. P. Hayes, of the Victorian Chemical Works, Footscray, Australia, has made another successful trial of his new invention for generating steam, from Williamstown to Melbourne. It was intended to have made a final test of his novel scheme by running a train a considerable distance on the Victorian line, for the purpose of ascertaining its carrying powers with loaded wagons, but his plans were thwarted by some unforeseen mismanagement on the part of the authorities. Mr. Hayes's discovery is the result of two years' close study, and is a new means of raising steam by oil in lieu of coal, which, if carried to a successful issue, will be attended with great economical and other advantages. The nature of the new process is to convey a hydro-carbon oil through heated retorts, to enable the gas to come in contact with hydrogen. This produces a large volume of smokeless flame, extremely pure and brilliant. It is unattended by anything of an explosive nature, and the heat therefrom is sufficient to produce steam as fast as coal or coke in an ordinary furnace. The only alteration made in the locomotive is the fixture, in that part of the tender in which the coal is usually deposited, of an iron cistern or tank, constructed to contain about 250 gallons of hydro-carbon oil. In order to permit of oscillation between the engine and tender, a small pipe, with a strong leathern joint, is carried from the tank to the bottom of the fire-box, where three small retorts are fastened in place of the ordinary bars. The oil runs into these, heat is applied underneath, and directly the gas begins to form, hydrogen is thrown in, by very simple means, and the contact creates the flame above alluded to, which, on passing through the tubes of the boiler, generates steam with surprising rapidity; and, instead of occupying two hours, as is customary by the old system, Mr. Hayes can, by his new process, get up steam in a locomotive with cold water, high pressure of 110 pounds, in the short space of three-quarters of an hour. The engine, as on previous occasions, was brought from Williamstown to Melbourne by Mr. Haughton, foreman engineer of the Government workshops at Williamstown, steam being on this occasion at 110 pounds. The gentleman speaks in very high terms of the new principle, and his opinion is supported by many of the railway officials. Mr. Hayes declares that his patent is applicable to any ordinary steam-engine boiler. Presuming the affair to turn out a success, the saving to the locomotive in many respects would be great, seeing that the oil is inexpensive, and can be obtained in large quantities; and, as applied to marine engines, the invention is most valuable from economy of space. Another great advantage is, that the money which at the present time has to be transmitted to New South Wales for coals would be kept in Victoria, the ingredients with which steam is produced being derived from a mineral product which is found in inexhaustible quantities in this colony.—*Melbourne Age.*

[Instead of "hydrogen," it is probably either oxygen, or atmospheric air, that is thrown in to burn the vapor of petroleum. There is no difficulty in making steam with petroleum; the only objection is the expense. If, in Melbourne, a pound of petroleum does not cost more than a pound and a half of coal, it may be an economical fuel.—Eds. Sci. Am.