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No. 139,
For the Week ending August 31, 1878.

THE RIGHTS OF INVESTIGATORS.

In the SCIENTIFIC AMERICAN SUPPLEMENT for July 20, 1878, there was published an article entitled "How to Build a Working Phonograph," with working drawings for the construction of a cheap and practical instrument. In the SCIENTIFIC AMERICAN of August 24 we described and figured "a simple phonograph," in such a manner that any clever boy could make therefrom an instrument that would illustrate perfectly the essential mechanism and action of that wonderful invention.

In so doing we have only carried out the wish of the inventor, as expressed to us, in helping to give the widest publicity to his invention. The company which has purchased the right to make the phonograph for commercial purposes, however, take a different view of the matter, and protest that it is not only inconsistent on our part so to encourage infringements, as they term it, but illegal on the part of our readers to follow the directions we have given for making phonographs for experimental purposes. In some instances, we are informed, such makers have been threatened with legal penalties for doing what they have a perfect right to do; and possibly some may be deterred from pursuing their investigations in this direction, through fear of offending the patent law, and so involving themselves in legal difficulties.

The law on this point is not obscure. Investigators have rights as well as patentees; and among these is the right to make any patented article for the purpose of ascertaining its sufficiency to produce the described effect; in other words, for testing its practical utility. It is only when the machine or other article is made for use or sale, with the intent to infringe the patent right and deprive the owner of his lawful reward, that the act becomes an offense against the law. When a machine is made for the "mere purpose of experimenting on the sufficiency of the specification," or—as was held in Jones *vs.* Pierce, Webs. Pat. Cas., 125, Patteson, J.—for the maker's "own amusement, or as a model," there is no infringement.

If this were not the case the progress of invention would be very seriously hindered: improvements would be next to impossible; and practical investigators and students—from whom most inventions come—would be grievously hampered at every stage of their progress. Unfortunately the purchasers of patents are too apt to construe their rights so as to make them cover pretty much the entire universe, and, if they could have their own way, would allow no one to move in any direction without their consent. This may be a natural outcome of human selfishness; but it is not at all in accordance with the spirit of the patent law.

As it appears to us, the parties controlling the phonograph, like the telegraph companies, have missed, or rather have refused to avail themselves of, a most profitable field of operation, in not meeting promptly the eager public demand for experimental instruments. Thousands of instruments could have been sold, at a price affording a large profit, though really low, to persons who would have been glad to buy them as curiosities, or for the purpose of studying their singular properties and effects; this without interfering in the least with the use of more costly and perfect instruments for business purposes. By refusing to meet this proper demand, they have simply compelled investigators to make their own models; and they have no right now to complain.

THE PLANET VULCAN.

After twenty years of dispute, complicated by many doubtful and conflicting observations, the intra-Mercurial planet discovered by the Parisian physician, Lescarbault, will probably now have to be admitted to full standing among the planets. The readers of the SCIENTIFIC AMERICAN will recall the numerous communications and articles with reference to this planet, printed in our issues for October, November and December, 1876, and the more recent article of May 25, 1878, when the belief was expressed that at the approaching eclipse the disputed planet would be found not far from the sun.

Ever since Le Verrier completed his demonstration of the existence of a disturbing body somewhere between Mercury and the sun, not a few astronomers have been convinced that only a favorable opportunity was necessary to verify by sight the evidence of mathematics.

Among these was Professor Watson, whose confidence was so strong that he went to Colorado determined to make the search for Vulcan his chief business. He said to a townsman on his return: "I was satisfied that there was a planet within the orbit of Mercury, just as I am satisfied that there is one outside the orbit of Neptune. The perturbations of those planets, and some other phenomena, cannot be explained on any other hypothesis. So when I went there I fixed on my plan and stuck to it. I determined to sweep south of the sun, and to keep within a small space We had but three and one half minutes, and the time was too short to try to get over too great a space I meant to search that much thoroughly, and so reduce the amount for future astronomers should I not succeed. It was on the fifth sweep that I saw the object."

In his report to Rear Admiral Rodgers, Superintendent of the United States Naval Observatory, Professor Watson says. "I have the honor to report that at the time of totality I observed a star of the four and a half magnitude in R. A. 8h. 26m. dec. 18° north, which is, I feel convinced, an intra-Mercurial planet. I observed with a power of forty-five, and did not have time to change the power so as to enlarge the disk. There is no known star in the position observed, and I did not see any elongation, such as ought to exist in the case of a comet very near the sun. I will hereafter report to you fully in regard to observations made. The appearance of the object observed was that of a ruddy star of the four and a half magnitude. The method which I adopted prevents the possibility of error from wrong circle readings; besides I had memorized the Washington chart of the region, and no such star was marked thereon. By comparison with the neighboring stars on Argelander's scale, the magnitude of the planet would be the fifth, although my direct estimate at the time of the observation was four and a half, as stated."

Speaking of the discovery, the English astronomer, Mr. Lockyer, said that he did not look for Vulcan and did not see it, though he believed in Le Verrier's prophecy that it would be found at some time. He added: "We may rely upon Professor Watson's statement that it is not a comet, and it is certainly not a star, therefore it must be a planet, and, from its position, an intra-Mercurial one."

Much to Professor Watson's delight his discovery was in a measure confirmed by that of Mr. Lewis Swift, of Rochester, who was at a neighboring station. Mr. Swift's observation seems to have been, in a sense, accidental, yet there is no reason to question its scientific value. In giving an account of his discovery to the Rochester *Democrat*, Mr. Swift says: "About one minute after totality two stars caught my eye about three degrees, by estimation, southwest of the sun. I saw them twice and attempted a third observation, but a small cloud obscured the locality. The stars were both of the fifth magnitude, and but one is on the chart of the heavens. This star I recognized as Theta in Cancer. The two stars were about eight minutes apart. There is no such configuration of stars in the constellation of Cancer. I have no doubt that the unknown star is an intra-Mercurial planet, and am also inclined to believe that there may be more than one such planet."

AMMONIA IN THE AIR.

Dr. R. Angus Smith, who has done so much for the chemistry of the air, lately read before the Manchester Literary and Philosophical Society a paper on the distribution of ammonia, in which he described the simplest method yet proposed for determining the amount of ammonia in the air. And since such ammonia may be taken as an index of the amount of decayed matter in any locality, the hygienic importance of an easy test for it is not small. The availability of the proposed test arises from the circumstance that ammonia is deposited from the air on every object exposed thereto. "If you pick up a stone in a city, and wash off the matter on its surface, you will find the water to contain ammonia. If you wash a chair or a table or anything in a room, you will find ammonia in the washing. If you wash your hands you will find the same, and your paper, your pen, your table cloth, and clothes all show ammonia, and even the glass cover to an ornament has retained some on its surface." In short ammonia sticks to everything, and can be readily washed off with pure water. Hence Dr. Smith inferred that he might save himself much of the trouble he had been taking in laborious washings of air to determine the presence of ammonia, and gain the desired end by testing the superficial deposit of ammonia which gathers on clean substances during ordinary exposure. Accordingly he suspended small glass flasks in various parts of his laboratory and examined them daily, washing the outer surfaces with pure water, and testing at once for ammonia with the Nessler solution. Subsequently a great many observations were made by means of glasses exposed to air in door and out, where the air was sweet and where it was foul. By using glasses of definite size it was easy to determine whether the ammonia in the air was or was not in excess. In his laboratory experiments ammonia was observed when the glasses had been exposed an hour and a half.

Of the practical working of the test Dr. Smith remarks that it must not be forgotten that the ammonia may be pure or it may be connected with organic matter; and consequently this mode of inquiry is better suited as a negative test to show that ammonia is absent than to show what is present. When ammonia is absent we may be sure that the air is not polluted by decaying matter; when it is present there is need of caution. Dr. Smith adds that he hopes to make this a ready popular test for air, a test for sewer gases, for overcrowding, for cleanliness of habitations, and even of furniture, as well as for smoke and all the sources of ammonia. Of course it must be used with consideration and the conclusions must not be drawn by an ignorant person. The entire paper will be found in the SCIENTIFIC AMERICAN SUPPLEMENT, No. 139.

SOFT VS. HARD IRON.

A series of most careful experiments recently undertaken by Mr. David Kirkaldy, to find out the relative merits of wrought iron plates manufactured by Krupp, of Essen, and those made in Yorkshire, demonstrated that, as regards the elastic limit, or the amount of load at which the elasticity becomes impaired, the result was in favor of the Yorkshire plates by 9·2 per cent, which is attributed to their greater hardness; but that the ultimate or breaking stress was in favor of the Essen plates by 5·5 per cent, the softness of the iron, as shown by the contraction at area of fracture, being also in favor of this latter.

To ascertain the reduction of tensile strength by drilled and punched holes, 42·5 per cent of the plates was removed by rivet holes made in their centers 2½ inches apart between