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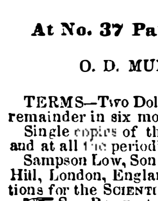
MAGNETS AND MAGNETIC ATTRACTION.



HERE is much relating to magnets and magnetism that is still veiled in mystery. The power which they possess of attracting bodies to them has led many persons to believe that magnetism and gravity are but different names for the same thing, and that our earth is a huge loadstone. This may be true or it may not; at present we have not accumulated sufficient data to establish such a theory. There are many facts, however, regarding magnetism which are well-known, and these have been so arranged as to constitute a science. One of these facts is, that permanent magnets do not possess power, or as some have named it *coercitive force*, in proportion to their size. Their power depends mostly on the particular kind and temper of the steel of which they are made. Hard steel receives magnetism with difficulty, but retains it most permanently; on the other hand, soft steel is easily magnetized, but parts with its magnetism as freely. At a blood-red heat the magnetic susceptibility of steel is greatest, while a white heat entirely destroys its magnetism.

The distribution of magnetism in steel is superficial; that is, it is mostly contained on or near the surface. A magnet is therefore powerful in proportion to its extent of surface, and one that is hollow has as much *coercitive force*, as a solid one of the same size and form. It is believed that a current of magnetism circulates in each magnet—that a positive current flows out of one pole, like a stream, and passes round into the other; hence an explanation is thus offered why the south pole of one repels the south pole of another, and *vice versa*. Two opposing streams of water meeting together repel one another, and so, it is said, two opposite currents of magnetism must exhibit similar action.

Any piece of hard, close-grained and well-tempered steel can be magnetized by rubbing it in one direction with either an artificial or a natural magnet. There are various other methods of making magnets of steel, but the most remarkable feature of them all is, that they afterwards retain this attractive force. The best method of making powerful magnets is that of Professor Henry, of the Smithsonian Institution. A steel bar is heated to redness, then plunged into a cylindrical vessel kept in cold water, around which a powerful galvanic current is passed through a helix of wire. The intense development of magnetism which takes place in the heated bar, becomes fixed by this operation.

Great care must be exercised to prevent good magnets losing their power. Filing, grinding, polishing with sand paper, or rough treatment of almost any kind is injurious to them. Vibration, the striking of magnets against any object, or allowing them to fall on the ground or to rust, impairs their power. All horse-shoe magnets should have short armatures, and bar magnets should also have their poles thus united, so as to form a rectangle.

A law relating to the amount and sphere of magnetic attraction is, that "the force is as the extent of opposed areas directly, and as the squares of the distance inversely." Thus two magnets of equal area—say one square inch—are of equal power; but this power of attraction is four times greater when they are one tenth than two tenths of an inch apart, according to the experiments of Professor Thomson, and the statements of Sir W. S. Harris in his work on electricity. The experiments which have been made on the force and sphere of magnetic attraction were measured by weight on a scale-beam electrometer, to determine the force, and with tenths of an inch as a unit for the distances apart. The whole of the attractive or magnetic force was supposed to be collected within two opposing points of two metal balls, and situated midway between the center and the circumference. When the distance between the two surfaces of the balls, was .5 of an inch the resistance to separate them was 6 on the scale beam; when they were removed to a distance of one inch apart, the power required to balance the beam was but 2.5; thus proving that the force of attraction was inversely as the square of the distance. When the space between them was increased to two inches, the resistance fell to .75. In estimating the power of a magnet, therefore, according to the distance, we may take the tenth of an inch as a unit already used in experiments, and safely calculate the sphere of attraction and the amount, commencing at this distance from the magnet. This will be sufficient for all practical purposes, and useful as a basis for those who may wish to construct electro-magnetic engines—small or large. A great extent of surfaces and a close proximity of the attractive surface are the main objects to consult in conserving the magnetic power.

STEREOSCOPES FOR AMATEURS—PROCESS OF PRODUCING STEREOSCOPIC PHOTOGRAPHS.

The remarkable success which has attended the introduction of stereoscopes affords a theme for reflection, both in reference to their inherent merit and the influence they are destined to exert in molding the artistic mind of our nation. The warm reception given to them shows the existence of an innate sense of *the beautiful* in the minds of our citizens, which needs but the time and the occasion to develop itself into a true artistic judgment. The imputation that Americans are a people entirely devoted to providing for the practical necessities of life—educating their children to be sharp, narrow and shrewd, rather than broad, genial, philosophical and appreciating—is rapidly giving place to respect for a people whose history has shown them practical when their physical wants demanded it, but devoted to the finer arts when their means afford them the time necessary to devote to such studies. We have only to look at the manufactured articles of merchandise, daily offered for sale in our stores, to discover this innate appreciation of *the beautiful* in our people. A mere machine, in order to sell in the American market, must not only be effective but it must be well proportioned and arranged with an eye to please. Our sailing vessels, so far as beauty of construction is concerned, are certainly good specimens of mechanical art. The vessels that line our wharfs would hardly be recognized as the descendants of the broad-bottomed crafts that floated the Dutch founders of this city from the old Amsterdam to *New* Amsterdam. Good Governor Wouter Van Twiller could scarce set himself down upon the narrow deck of one of our modern clippers; and in this narrowness of vessels we have not only gained utility of speed, but beauty of construction. We, therefore, think that we have some reason for believing that there has been a new element engrafted in the constitution of our people, resulting from their emigration to this new world, and which we can only explain by attributing it to the peculiar features of our social and political institutions.

The stereoscope is one of the means destined to advance our national taste for art. It affords amusement and instruction to children and pleasure to old age. Its cost is so little that we can calculate on its penetrating the homes of the humblest men, who, with but very little money and time, can themselves take the pictures, and thus keep a new and varied stock of photographs. With a pile of pictures by their side, which cost almost nothing, they can make the European tour of celebrated places, and not leave the warm precincts of their own firesides. Such views are generally photographed upon paper and seen in the stereoscope by reflected light. The process of photographing for stereoscopes is somewhat intereresting, and we will therefore give a brief description of it.

Strictly speaking, photography is an artistic application of chemistry; and the photographer soon becomes—to a greater or less extent—a practical chemist. Nitrate of silver is the first chemical which comes under his notice, and it is the most important of all the compounds which he uses. A strong solution of this salt, brushed over a piece of white paper and dried in the dark, assumes, when exposed to sunlight, a gray, and finally a brown color; and if any opaque substance be placed on a part of the paper during the time of exposure, it will be observed that such part being protected from the action of the light, a photographic outline copy of the opaque substance will be obtained. The principle involved in this fact—the reduction or decomposition of the nitrate of silver—regulates and determines the action of nearly all the various photographic processes. Thus, in the collodion process, a fine kind of transparent paper is formed on a plate of glass, by pouring upon it an ethereal solution of gun-cotton and iodine; the ether evaporates and leaves a thin film on the glass, which is plunged into a vessel containing a solution of nitrate of silver; the nitrate immediately produces a surface similar to, but more sensitive than that of the prepared paper first spoken-of. The sensitive film, still adhering to the glass plate, is then placed in the focus of a camera obscura, and an image or shadow of some object thrown on its surface. The light reflected from this object rapidly causes a surprising but invisible change—the image in the camera has impressed itself on the sensitive surface of the collodion film, but the impression, being latent, requires development, and this is effected by pouring a chemical solution over the surface of the impressed film; the image very soon makes its appearance, and only requires to be "fixed" or secured from the further action of the light, when the photograph is finished.

A picture produced as above stated, when held over a dark object and seen in the ordinary manner by reflected light, has its lights and shadows properly disposed, and is a perfect copy, except in color, of the image formed in the camera obscura; but when viewed as a transparency, the lights and shadows are reversed. Supposing a portrait of a gentleman to be taken, the collodion photograph, seen by reflected light, would show a white shirt-front and a black coat, this would be a positive photograph;" but the same glass held up to transmitted light would present the appearance of a black or opaque shirt-front and a white or transparent coat, this would be a "negative." In practice it is found that the best negative by transmitted light makes the worst by reflected light, and *vice versa*.

If the picture is intended for a positive, black varnish or velvet is placed on the back of the glass, and its slight negative character is destroyed; on the other hand, if the picture be negative, its value lies not in itself, but in its power of producing an unlimited number of positives on paper, by a process called "printing." This paper is prepared in the dark with chloride and nitrate of silver, made exceedingly sensitive to the action of light; and when dry, the negative is placed on a sheet of this paper, fixed in a glazed frame, and then exposed to daylight. The rays, passing easily through the most transparent parts of the negative, blacken those portions of the paper immediately under them, and form the shades of the photograph, while the lights are preserved by the opaque parts of the negative. When properly printed, the paper photograph is taken from the printing frame and fixed by removing the unaltered and now unnecessary chemicals from the surface of the paper. The process can be repeated *ad infinitum* on other papers with the same negative. For pictures to be used in Sir David Brewster's lenticular stereoscope, it is necessary to have a pair of pictures identical in subject, and differing only in one respect—the visual angle. One of them should faithfully represent the object as seen with the right eye, and the other the same object as seen with the left eye. The optical arrangement of the stereoscope combines these two one-eyed views, and gives the marvelous effect of a perfectly solid reproduction of the original—a single picture of the object as viewed with both eyes at once.

A RAILROAD IN A COURT-ROOM.—On the morning of the 21st ult., the Supreme Court-room (this city) was crowded with various counsels representing the 325 defendants in the suit of the New Haven Railroad Company *vs.* Robert Schuyler *et al.* Mr. Daniel Lord opened for the defense and called witnesses. It is understood that the other counsel will proceed in the alphabetical order of their names. A large amount of testimony is to be offered, and it is probable that the case will not be closed in several weeks. It has reference to the over-issue of a very large amount of stock (amounting $1,700,000) by Robert Schuyler, while he held the office of president of the above company.