jam will not stir before it is lifted by the freshets of next spring. There are, however, several dams up stream, which it is intended soon to open, in hopes that the artificial flood thus produced may have some effect. Thousands of visitors are attracted to the locality, the universal expression being that it is the most wonderful spectacle of the kind ever seen.

Since the above was written, a narrow passageway has been made through the center of the jam, and it is expected the work of opening the river will be accomplished in the course of a year.

Cold Hammering of Iron.

It either is or ought to be known to all practical men concerned in the working of wrought iron that if a piece of the very best and toughest iron is hammered in the process of forging until it ceases to be red hot, the effect of such cold hammering, as I may term it, is to cause the iron to become so brittle that it will in many cases break across in the process; or if it does not at that time, this process of cold hammering has so removed and destroyed its tenacity as to render it capable of being broken with the slightest blow. What renders the knowledge of the effects of such a process the more important is that in most cases we shall find that, in order to give the pieces of forged work the requisite finish and fine surface as they come from the hands of our workmen in that department, this very cold hammering and swaging, as it is termed, is required, the more so as it is by such a process that iron forgings are so finished from the hammer as to require the least possible labor after; and as every good workman in that department is anxious to turn his work out of hand with the very best surface on it, which this cold hammering enables him to do, it is not a very easy matter, and not at all desirable, to require them to discontinue the practice, which many have endeavored to do from want of a full knowledge of the subject.

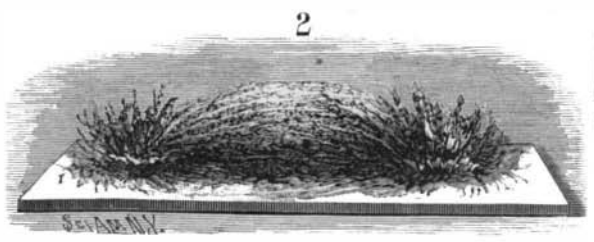
There is nothing inherently wrong in this practice of cold hammering—far otherwise; the evil rests with the applying such a cold hammered piece of forge work to its purpose without having been passed through the curative process, which is simply this, namely, to heat the piece of forged work in question to a dull red heat, and lay it down to cool at its leisure. By subjecting wrought iron to the most violent hammering or compression at a low temperature, and then submitting the iron work so treated to the simple process of heating red hot and slow cooling, we enhance its tenacity or shock-sustaining qualities at least twenty times.—*J. Nasmyth, in the Architect.*

The Microscope.

It is often a matter of question with the beginner what objects shall be examined with the microscope.

The answer, roughly speaking, would be *everything;* for whatever is not already small enough, can by proper treatment be reduced to the proper dimensions. For this purpose Nature has a great storehouse of hidden treasures, which she is ever ready to render up to the diligent seeker. Field and woodland, hill and valley, earth and water, are ever at hand, teeming with wonders, many of which, too minute for the eye of man, only reveal their beauties to the microscope—the king of the invisible.

If you understand taxidermy, you will find that the birds and mammals which you handle will afford abundant material for your microscope.



MAGNETIC CURVES IN RELIEF.

Observe specimens of the feathers, hair, bones, and internal organs; the fresh fluids of the body (blood), the many parasites which may be found *on* and *in* all living creatures.

Sediments from various liquids may be examined, by placing a drop on a clean slide and covering.

Conical wine glasses are those best adapted for collecting sediments.

In this way the settlings of stagnant rain water, pools, etc., may be studied.

Very interesting material may often be collected in a little muslin bag tied to a faucet, through which the water is allowed to run slowly for an hour or two.

The common articles of food furnish exceedingly interesting specimens. Adulterations may thus be exposed after a little practice. The microscopic examination of drinking fluids often determines whether they are fit for use or not, by revealing the animal or vegetable matter which they may contain.

The insect world offers a delicate and beautiful anatomy for study. Observe the 7,000 divisions in the compound eye of the house fly; the delicate scales from the wings of moths and butterflies; the trachea, or breathing tubes; the suckers on a fly's foot; and hundreds of other parts.

Wonderful things are open to us in the world of plants. The structure, growth, and development of vegetable life are alone enough to keep one busy for years.

Thin scales of minerals may also be examined, thus adding much to the interest of that branch of science.

But these things are not always at hand or to be had, therefore specimens whenever obtained should be preserved for future use. Prepare during the summer for the winter's work. "Take time by the forelock," and whenever you see anything which you think may be of interest, label and preserve it.

Animals and birds, if small, may be placed whole in a seventy per cent solution of alcohol, first making an opening into the abdominal cavity, to allow the fluid ready access to the internal parts. Hair, feathers, and the like may be placed in envelopes properly labeled. Parasites, small insects, etc., may be placed in spirits in homœopathic pill bottles. Intestinal parasites from birds and small mammals may be obtained by slitting the intestine open in a dish of water.

The above are a few examples of materials easily within the reach of one possessing a microscope. With patience and perseverance the beginner will soon acquire a knowledge of the microscope and microscopic technique that will always prove a source of pleasure and profit.

In this busy life we cannot spend too much time observing Nature and learning her ways. "People grow better," says Daudet, "for listening to Nature, and those who love her do not lose their interest in men."

Whatever brings us closer to Nature's heart, brings us nearer to that Supreme Being who has created all things.—*W. P. Manton.*

The Size of the Spider's Thread.

I have often compared the size of the thread spun by full grown spiders with a hair of my beard. For this purpose I placed the thickest part of the hair before the microscope, and from the most accurate judgment I could form, more than a hundred of such threads placed side by side could not equal the diameter of one such hair. If, then, we suppose such a hair to be of a round form, it follows that ten thousand of the threads spun by the full grown spider, when taken together, will not be equal in substance to the size of a single hair.

To this if we add that four hundred young spiders, at the time when they begin to spin their webs, are not larger than a full grown one, and that each of these minute spiders possesses the same organs as the larger ones, it follows that the exceedingly small threads spun by these little creatures must be still four hundred times slenderer, and consequently that four millions of these minute spiders' threads cannot equal in substance the size of a single hair. And if we further consider of how many filaments or parts each of these threads consists, to compose the size we have been computing, we are compelled to cry out, O what incredible minuteness is here, and how little do we know of the works of Nature!—*Leuwenhoek, in* 1685.

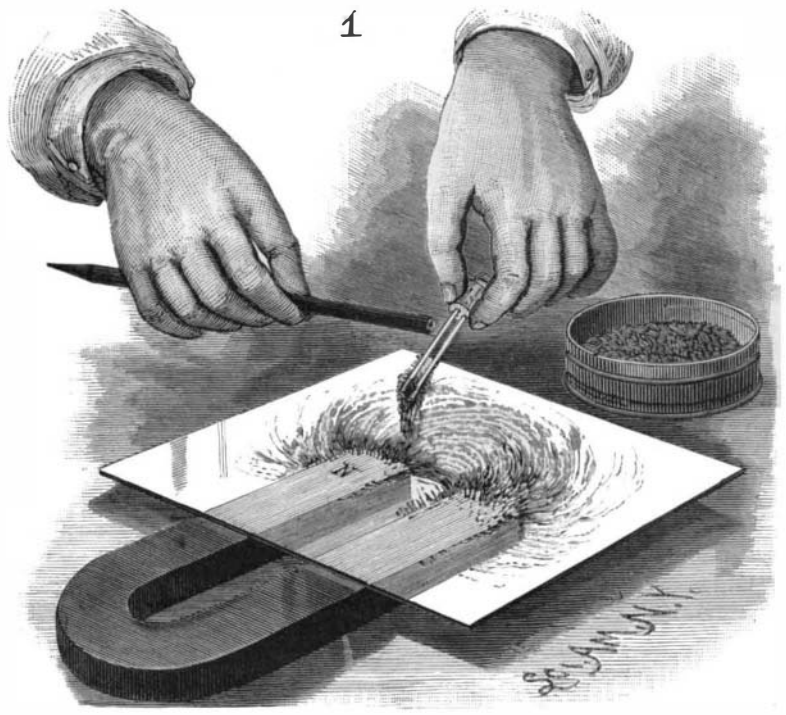
THE FORMATION AND FIXATION OF MAGNETIC CURVES.

BY GEO. M. HOPKINS.

A great deal may be learned about the properties of magnets by causing them to delineate their own characteristics. The common method of doing this is to form magnetic curves by dusting iron filings on a glass plate, then jarring the plate to cause the particles to arrange themselves parallel with the lines of force extending from the magnetic poles. The figures thus formed are not, of course, entirely autographic; and as they tend to develop in lines, they convey the erroneous idea that the lines of force, as spoken of in connection with magnets, are really separate lines or streams of force.

There is no way of exactly representing the magnetic field of force by forms or figures; but the annexed engravings serve to illustrate a method of forming and fixing curves which has some advantages over the method referred to above. The magnetic particles fall in the position in which they are to remain, and no jarring is required.

To make a flat plate for lantern projection or individual use, a plate of glass flowed with spirit varnish is laid upon the magnet, and iron dust reduced from the sulphate, or fine filings, or dust from a lathe or planer, is applied by means of a small magnet in the manner indicated in Fig. 1. The small magnet in this case consists of two magnetized carpet needles inserted in a cork, with unlike projecting poles arranged about one-quarter inch apart. A little of the iron dust is taken up on the small magnet, and the slightly adhering particles are shaken off. The remaining portion is then disengaged from the small magnet by rapping the magnet with a pencil, the small magnet being held above the poles of the larger one. The particles having been polarized by the small magnet, arrange themselves in the proper position while falling. Several applications of the iron dust will be required to complete the figure. Of course the iron must be applied before the varnish dries, and the plate should be allowed to remain on the magnet until dry.

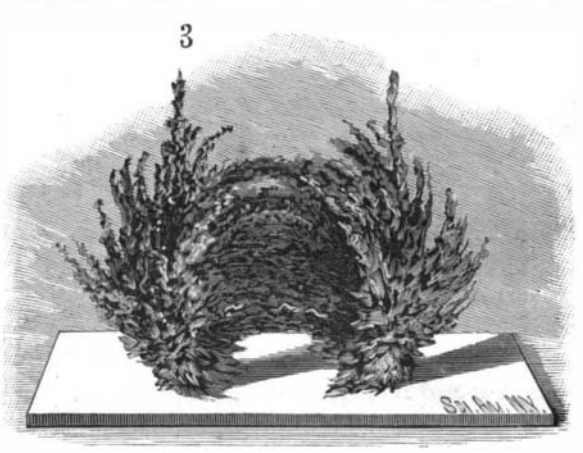


THE FORMATION OF MAGNETIC CURVES.

To make the curves in relief, as shown in Fig. 2, a slightly different method is employed. The glass plate is warmed, coated with paraffine, and allowed to cool. It is then placed on the magnet, and proceeded with as in the other case. With care the curves can be built up high, especially if the larger magnet be a strong one. Iron filings or turnings of medium fineness are required in this case.

When the curves have assumed the desired proportions, a few very fine shreds of paraffine, scraped from a paraffine block or candle, are deposited very gently on the curves, and melted by holding above them a hot shovel. More shreds are then added and the hot shovel is again applied, and so on until the mass of iron filings is saturated with paraffine, when it is allowed to cool. The plate to which the filings are now attached may be removed from the magnet after having applied the armature, if it be a permanent magnet, or after interrupting the current, if it be an electro-magnet, when the curves will retain their position.

The arborescent figures shown in Fig. 3 are built upon a cap, or perhaps, more properly, on a double-crowned hat of brass, which incloses the poles of the magnet separately. The magnet in this case is arranged with its poles downward. The fixing of these curves is somewhat difficult, on account of being obliged to work under the rim of the hat, but it can be accomplished by proceeding in the manner described. Instead of the hot shovel, an alcohol lamp or Bunsen burner may be used in this case, but considerable care is required to prevent the iron dust from burning. The figure after cooling may be removed from the magnet, and preserved.



ARBORESCENT MAGNETIC FIGURES.

DOMESTICATION softens the whole organic structure. In the feathered species the feathering is not as dense nor as hard as on the wild fowl.