NEW ELECTRIC DISENGAGING GEAR FOR KNITTING MACHINES.

We present herewith diagrams of a novel and ingenious application of electro-magnetism to the knitting machine, the object being to stop the loom instantly and automatically whenever a thread breaks, is injured, or is of abnormal thickness, or when a needle becomes bent.

The wheel, A, in Fig. 1, receives motion and transmits it by friction to the pulley, B, which, in turn, communicates, by means of a belt, with the driving pulley, D, of the machine. Pulley, B, is journaled on the rod, W, and the latter may be moved from right to left, or *vice versâ*, so as to throw said pulley into or out of gear with the wheel A. E E are jointed arms connecting with the rod, W, and also at their point of junction with another rod, F, G is a lever which oscillates about its center of figure, communicating, as shown, at one end with F, and at the other with a plate, Q. K is an electro-magnet, and L the armature. As represented by the dotted lines, the rock lever, G, is supported by the upper portion of the latter. If, therefore, a current be sen through the magnet, the armature is attracted and drawn away from under the lever. The latter, being overbalanced by the plate, falls so that the plate enters between the wheels, A and B. These, rotating in opposite directions, seize it and drag it violently between them, thus supplying, for an instant, sufficient power to draw the rod, W, to the left, through the intermediation of the lever, G, and rods, F and E, and thereby throw the wheel, B, out of gear.

In order to arrest the motien of the machine promptly, the last mentioned pulley takes against a block, shown to the left, which is cut out and lined with india rubber to form a brake shoe. The effect of the spring, represented at M, is to so hold the hinged piece, when the lever is located as shown in the dotted lines, that the contact of wheels, B and A, is close. When the lever is in the other position, the tendency of the spring is to force the wheel, B, against its shoe. The spring serves to regulate the pressure in both instances.

From the above we think the direct application of the current to the mechanism will be rendered clear. It now remains to examine how the action of the magnet is governed by the broken threads or bent needles. For the latter purpose there are two separate appliances, one relating to the needles, the other to the thread. The latter, Fig. 2, is extremely simple. Each of the four threads used in the knitting passes over a pair of little grooved pulleys, P, between which it is horizontally extended. Between the pulleys and riding the thread is a bit of bent wire, the ends of which enter cups containing mercury. To the latter the battery wires pass. So long as the thread is whole and even, the wire is held up above the mercury. If, however, it becomes broken or very thin, the wire is dropped into the quicksilver, establishes a circuit, and the operation already described takes place.

Fig. 3 shows the appliance which will stop the machine if a needle become bent. The needles are horizontal and radiate around the vertical axis of a circular frame. They pass between two small plates, V and V', placed in a vertical plane and pivoting around horizontal axes, *b b*, *c c*. If a needle gets out of line to the top or bottom, it catches against one of these plates, and, if the bottom one, swings it forward. In its movement the latter strikes an appendage, *m*, carried by the other plate, and thereby oscillates a hammer, M, attached to the upper of the pair which, falling between two mutually isolated springs, establishes a circuit.

In Fig. 4 is shown a side view of the same device, which is actuated in precisely the same manner by an abnormal thickness of the thread.

In a machine using four threads, there are, therefore, the mechanical disengaging apparatus shown in Fig. 1, four of the devices in Fig. 2 to show the breakage of a thread, one to show abnormal thickness, and one for bent or badly placed needles. Through this combination, the *Revue Industrielle* says, one man can easily attend to four looms. The apparatus, we learn, is in use in a large factory near Montargis, in France. A Gramme electric machine is here substituted for the battery, and supplies a current sufficient for 150 looms.

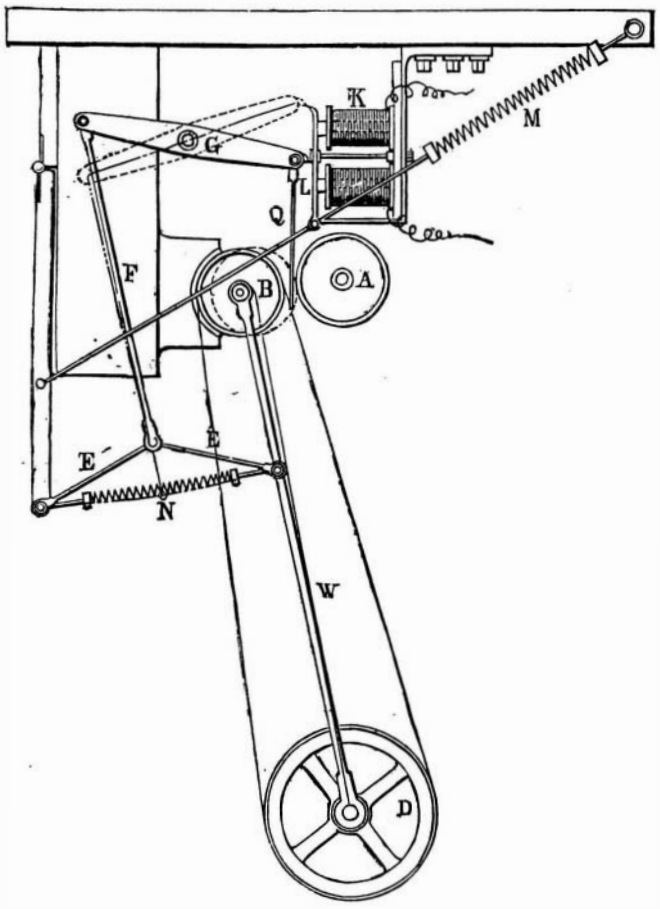


Fig. 1.—ELECTRIC KNITTING APPARATUS.

Fig. 2.

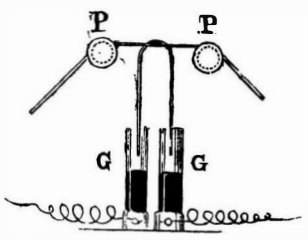


Fig. 3.

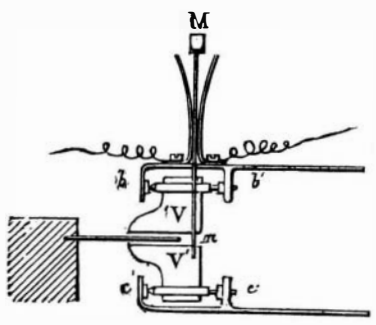
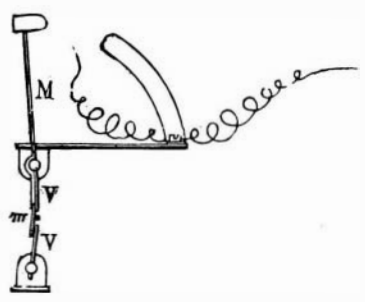


Fig 4.



Phosphate of Ammonia for Purifying Sugar.

Kuhlmann's process of neutralizing the alkalinity of sugar juice by means of phosphate of ammonia, discovered some twenty-four years ago, is now being largely applied in France, and, to meet the demands, a large factory for the production of the phosphate has been established at Asnières.

The rich mineral phosphates are reduced to powder, and dissolved in very dilute sulphuric acid (5° Baumé). The acid liquor, clarified by repose and having the excess of sulphuric acid removed from it by carbonate of baryta, is concentrated at 20° Baumé. and then neutralized by caustic ammonia. Finally, the resulting alkaline solution of phosphate, separated from the insoluble deposits of sulphate of lime, etc., is mixed with a fresh quantity of ammonia in order to produce a tribasic phosphate, which has the advantage of being little soluble. Water is removed by pressure, and the substance is immediately packed in barrels. The deposits of phosphates of lime, iron, aluminum, etc., dried, constitute an excellent fertilizer, readily assimilable.

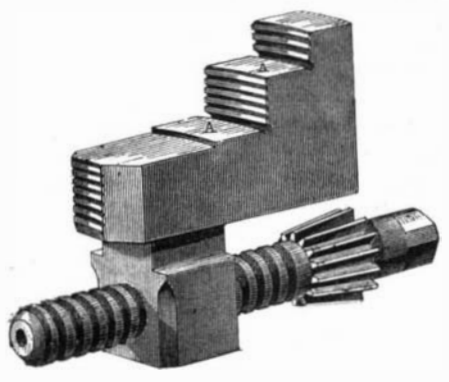
The Absorption of Chemical Rays by the Sun's Atmosphere.

The absorption, by the solar atmosphere, of chemical rays of high refrangibility, has recently been studied by M. Vogel. The method employed is that devised and described by Bunsen and Roscoe, in their photo-chemical researches, and is based on the principle that, between sufficiently extended limits, the equal products of the luminous intensity by the duration of the insolation correspond to equal darkenings on chloride of silver paper. As applied by M. Vogel, the investigation consisted in obtaining a scale of photographic tints, due to the same intensity, with differing durations of insolation, and then comparing with these tints those of a photographic image of the sun on the same chloride of silver paper.

Designating by I_0 and I_1 the intensities of the two points of the sun, t the duration of insolation, i the intensity of light acting on the scale, t_1 and t_2 the duration of insolations corresponding to the two tints on the scale found to be equal to those of the two points on the sun: according to the above principle, the formulas $I_0\, t = it$, and $I_1 t = it_2$, are derived, whence the ratio of the intensities, I_0 and I_1, is given by that of the duration, t_1 and t_2. Numerically, from these it is found that the ray, being 12, and the intensity at the center 100, at the distances 4, 8, 10, and 12, the intensities are 96, 77, 51, and 13,

HORTON'S IMPROVED CHUCK JAW.

It is a well known experience, in case-hardening jaws, that



the relative positions of the metallic particles change more or less, so that it is almost impossible, without grinding, to hold work perfectly true. To overcome this difficulty, the new patent jaw, herewith illustrated, has been devised, the principal peculiarity of which is a raised seat A, which is formed on the face of the jaw on which the work rests while turning. Grooves or recesses are cut at the corner of the bite and face of the jaw, rounding the said corner, and thus allowing of the use of a Tanite or other emery wheel, by which the raised seat may be accurately ground. The work, therefore, rests upon the seat, A, and the bite of the jaw only assumes, it is claimed, a perfectly true position thereon as an equal pressure is exerted on the same. Another advantage of the groove is that a grinding wheel without a perfect corner is enabled to work accurately, as the edge of the wheel projects beyond the raised part into the recess formed by the groove. The improved jaw is used in the Horton lathe chuck, and appears to be a useful and valuable device.

Patented August 20, 1873. For further particulars address the E. Horton & Son Company, Windsor Locks, Conn.

New Mode of Noting the Direction of the Wind at any Altitude.

M. Waldner, professor of mathematics at Osthofen, Germany, while engaged in examining the solar spots some years ago, had his attention attracted to an immense number of small white particles which suddenly came into view on a casual change in the position of his telescope. He at once began investigations, in order to discover their nature; and after continuing his researches for some three years, he found that the bodies appeared like snow flakes which floated, like the clouds, in aerial currents, and existed at differing altitudes. He finally determined them to be ice crystals which were driven by the winds at the same velocity as the cirrous clouds.

Mr. J. Francis Anderson has recently devoted his studies to this subject, and he explains the presence of the particles by the fact that the vapor of water tends to rise in the atmosphere. As it ascends it meets cold strata of air, condenses into water, and then freezes into solid bodies which are simply snow flakes. In the lower portions of our atmosphere, however, there are other luminous corpuscles which principally consist of organic material. These are easily observable by allowing a beam of sunlight to enter a darkened room, or may be seen out of doors by simply cutting off the disk of the sun with an opaque object. By means of these bodies in the inferior strata, and the snow crystals in the upper regions of air, Mr. Anderson considers that the direction of the wind may be determined at any altitude, even during a cloudless day. He proposes simply to adjust a telescope so as to give distinct vision at two, three, or more thousand feet, and to note the direction and rapidity of the particles, which will then be clearly seen as they cross the field of view. This will give the direction of the current which carries them along, and its approximate velocity for whatever altitude the instrument may be adjusted for.

Private Fish Culture.

A writer in the New York *Tribune* says that one of the principal causes why fish culture is not undertaken by persons of moderate means is the supposition that large ponds or rivers are necessary to a successful business. A farm, however, of fifteen or twenty acres, with a small pond or two, natural or artificial, supplied with water from a river or from perennial springs, would be all that could be desired. Many kinds of fish, and especially leeches, may be raised with considerable profit. Of leeches we now import nearly two millions annually from Europe, at a cost of about $100,000. One locality, especially well adapted by Nature for the business, is on the east side of the Passaic river, opposite the Newark water works, on land sloping to the river. Besides dwellings, outhouses, barns, orchards, etc., there are two ponds supplied with never-failing springs of sweet water, and the bottom is the right kind for trout, crayfish, or leeches. The Passaic river would furnish food in abundance for the young fish. A place having so many natural advantages will probably be utilized.

One reason for mentioning the subject of raising leeches is that the supply from all parts of Europe, except Brittany, is gradually failing because of the draining of the marshes of the Danube in Sclavonia and European Turkey, all native places of the leech.

Muscarin.

Muscarin is a poisonous alkaloid, extracted by alcohol from a species of mushroom (*amanita muscaria*). The most interesting feature of muscarin is its antagonism to atropin. These alkaloids neutralize each other's action on the system so perfectly that each can be used as an antidote in case of poisoning by the other. The pupil of the eye, enlarged by atropin, is contracted by muscarin. The depression of temperature caused by muscarin, injected beneath the skin, is counteracted by a similar application of atropin; and the heart of a frog, that has ceased to beat from half an hour to an hour, under the influence of muscarin, has been restored to activity by atropin. Possibly quinine sustains a similar relation to the poison inducing intermittent fever that atropin does to muscarin.