THE DE MERITENS MAGNETO-ELECTRIC MACHINE.

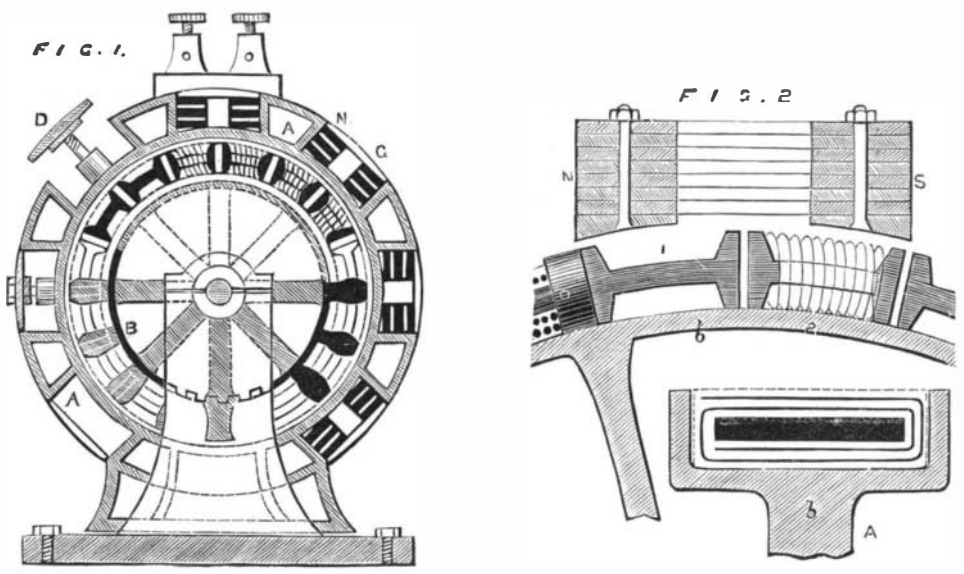
This machine, although not yet before the world in actual use, it is claimed, will effect a great reduction in the amount of engine power required to develop a given current.

Mr. J. T. Sprague, in the *English Mechanic*, says its construction is so simple, and its results so satisfactory, that it seems destined to play a part in the early future.

The machine is really a combination of the principles of the Alliance machine and the Gramme. Several Alliance machines have been converted into the new type.

Fig. 1 shows a front view of the Meritens machine, in which A A is a brass ring, containing recesses to carry compound horseshoe magnets, which are arranged, therefore, at right angles to the radii of the frames, two of which are required to support them. The way in which the magnets are retained in place is shown at *a*, a loose piece completing the arc of the frame being firmly screwed down on the magnets.

The rotating armature of the Gramme machine may be compared to a cart wheel, the tire of which is wound with a wire continuous in itself, but still separated into a series of segments, or arcs of the circle, by means of conducting wires led to a complex commutator on the shaft. The Meritens coil is similar to a Gramme armature, but it is divided itself into a series of segments, separated magnetically by brass pieces, and bound together by means of a brass frame, *b*, shown more fully in Fig 2, as also in section. In Fig. 1 this ring is shown dissected, and it is intentionally drawn a little too small as compared with the outer frame, in the machine, of course, the ring runs as close as possible under the concave ends of the permanent magnets, *n s*. In Fig 2 this is shown more completely, 1 being the iron core, and 2 the same with the wire wound on it, working under the magnet poles, N S. The cross section, A, shows the rim lying on the ring, *b*, by which it is rotated, and to which the segments are secured by lugs corresponding to the expanded ends or poles of the several segments, which are bolted through to these lugs.



THE DE MERITENS MAGNETO-ELECTRIC MACHINE.

The machines at present making have eight permanent magnets. They are arranged to work with three or four of the Jablochkoff candles, and it is claimed that running at 700 revolutions per minute, with three candles in operation, they require only one horse power to drive, all the others under such conditions absorbing three horse power.

One special feature of the machine is that it has no commutator. There are simply two springs, forming the terminations of the wires (being themselves connected to the binding screws) by means of two insulated rings in the shafts, which are connected to the wires; the alternating currents set up in the segments are thus passed direct into the circuit without any loss in sparks, or by the short circuits formed in the ordinary commutators. The construction of the rotating ring combines the actions of the ordinary magneto-electric machines with those of the Gramme. As the ring rotates under each single pole, a succession of molecular magnetic reversals takes place, and the spires of the wire are also traversing a magnetic field, both actions combining, as in the Gramme, to set up a current. As the ends of each segment come under the several pairs of magnet poles a powerful magnetism is induced in the core, which, immediately after, undergoes a sudden reversal, and these actions set up their proper electric currents as in the old-fashioned magnetic apparatus, and as in the Alliance machine. The wires of the different segments are so connected as to act either for quantity or tension, as desired, or could, of course, be collected separately for different circuits. The iron cores are built up out of a piece of sheet iron stamped to the required shape, both for readiness of making and to avoid induction currents in the core itself, and the wire can be wound on nearly as easily as on a common electro-magnet, so that the construction is very simple.

Various Uses of Paper.

The *Western Paper Trade* sums up the following list of articles manufactured of paper displayed at the recent Berlin exhibition: Animals, washbasins, water cans, carpeting, bonnets, a ship full rigged, lanterns, hats, masks, skirts, clothes, full suits, straps, handkerchiefs, napkins, bath tubs, buckets, bronzes, flowers, urns, window blinds, asphalt roofing, material for garden walks, coral, jewelry, window curtains, shirts, lace, belting, and a house made of pine, but with not only roof, ceiling, cornice, and interior walls of paper, but all the furniture, blinds, curtains, chandeliers, carpeting, ornamented doors, numerous mantel and table ornaments, and finally a stove of asbestos paper burning away cheerfully, and not consuming itself, as it evidently ought to do. All these things indicate some of the possibilities of the adaptation of paper. Who shall say where these possibilities end?

Tula Silver.

The article manufactured under that name in Tula, Russia, is at present manufactured on a large scale by Zacher & Co., in Berlin, who succeeded in lifting the vail of the secret of its manufacture. Tula silver is a composition of 9 parts of silver, 1 part of copper, 1 part of lead, and 1 part of bismuth. These metals are melted together in the given proportions, and worked with as much sulphur as they may be able to take up. Thus a composition of a peculiar blue color is obtained, which has on that account, in some places, been called blue steel.—*Der Bergmann.*

Wall Wash.

A new coating for walls has been invented, which consists of a spirituous solution of stearate of soda, prepared in the proportion of 50 grammes of stearate dissolved in 1,000 grammes of spirits of wine, and of a strength of 66 per cent. Other solutions of soap in spirits of wine of more or less strength may be used; but stearate of soda forms the hardest and most impermeable coating, though more expensive. For stables spirituous solutions of common brown soap or soft soap suffice, but the stronger the spirits the better. The solution may be colored with aniline colors, yellow ocher, or dragon's blood. It takes well on wood, lime, or cement. Zinc colors are suitably fixed beforehand, solution of chromate of alum being recommended.

IMPROVED CRUSHER AND GRINDING MILL.

The utilization of waste is an economy which is practiced more and more as the world grows older. The soil which yields up its constituents to vegetation must be replenished or re-enriched, for it has lost that which is more valuable than gold, and it will not continue to yield without compensation. Agriculturists have, in one way or another, attempted to keep up the standard of productiveness, but have, until a comparatively recent period, for lack of knowledge as to their value and for want of suitable machinery for reducing them to the proper state, neglected the bones, horns, hoofs, and other solid refuse, which have been only a burden and a nuisance, though in reality the best of fertilizers.

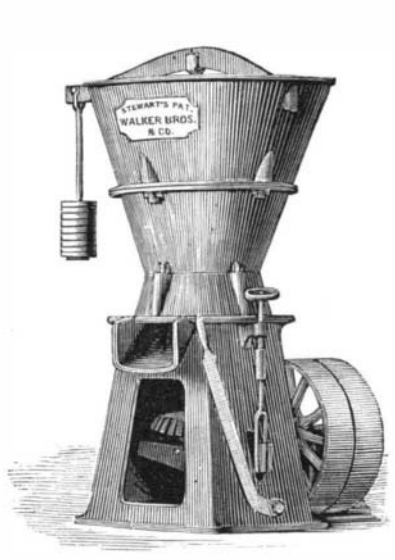


Fig. 1.—CRUSHER.

Fig. 2.—GRINDING MILL.

We give herewith engravings of two machines manufactured by Messrs. Walker Brothers, 23d and Wood streets, Philadelphia, for reducing these waste materials to a usable form, and for other industrial uses.

Fig. 1 is a perspective view of a mill for crushing bones, fire brick, clay, phosphates, and other similar substances. Fig. 2 represents a mill for grinding bones, hoofs, horns, phosphate clay, cement, and such like matters.

These machines are well made and, being wholly of iron, are substantial and durable. They are manufactured under Mr. Wm. Stewart's patents, and are well calculated to give good results.

New Inventions.

An improvement in Machines for Flaring and Crimping Lamp Chimneys, etc., has been patented by Mr. Charles H. W. Ruhe, of Pittsburgh, Pa. This is a simple and effective adjustable tool for widening the necks of glassware after the same has been formed by blowing in a mould or by hand, and for otherwise ornamenting the edge with grooves or corrugations, notches, or scallops.

Mr. John R. Davis, of Inland, Ohio, has devised an improved Block for the purpose of illustrating the extraction of roots of numbers to an indefinite number of places, and also the involution of any number to any power. The block also admits the demonstrating of roots and powers of proper or improper fractions, common or decimal, and admits in simple manner the explanation of the different steps in extracting roots or involving powers from numbers.

Mr. John J. Ougheltree, of Rondout, N. Y., has patented an improved Music Leaf Turner, of that class in which a number of swinging fingers or arms are placed between the leaves of the music, and successively tripped by the player, so as to quickly turn the leaves. It is provided with a number of pivoted arms or fingers that swing in a vertical plane and are tripped by key levers. The music is clamped to an upright center post of the base, so as to be retained while the leaves are turned.

Mr. Theodore W. Clark, of Oregon City, Oregon, has devised an Automatic Attachment to Fulling Machines, whereby the length of the goods can be ascertained while being fulled, and the amount of shrinkage in length determined without removing the goods from the machine.

A permanent Mould for Casting Sash Weights, which will be available for use at any time, and suited for various sized weights, has been patented by Messrs. Edgar P. Davis and Walter J. Godfrey, of Omaha, Neb. It consists in an iron or steel mould divided in two parts, and constructed so as to be adjustable in length. It is also made with lugs and pins to form the eye for the cord.

Messrs. Ashley W. Holland and Edgar N. McKimm, of Lathrop, Mo., have devised an Animal Trap which is provided with a cover having a grain jacket or chamber at the sides, the latter having a cover of wire gauze.

Messrs. Ole Johnson and John Johnson, of Cresco, Iowa, have patented an improved Car Coupling that couples the cars automatically without exposing the attendants to danger through their stepping in between the cars. The coupling is adapted for cars of all kinds and heights, and may be uncoupled from the side or top of the car.

Mr. William Hinchliffe, of Nashville, Tenn., has patented an improved Door Fastening, which is so constructed that it may be used to fasten the door when closed or when partly open.

Mr. Patrick Gallagher, of Eureka, Nevada, has patented an improved Bench Plane, in which the cutting iron lies flat and makes a smooth cut in the wood. It is more easily adjusted than in the old styles of planes, in which the iron is retained by a wedge piece.

An improved Ticket and Label Holder has been patented by Mr. John H. Mitchell, of Bloomfield, Iowa. This is called a druggist's label cabinet, and is more particularly intended for the use of druggists and apothecaries, for the purpose of keeping labels in order and in place ready for use; but it may be employed as a holder for labels, cards, or tickets for various other purposes.

An improvement in Lanterns has recently been patented by Mr. Eugene Tufts, of Malden, Mass. The object of this invention is to obviate the blowing out of the light by gusts of wind or by a swift movement of the lantern.

An improved Revolving Index for bookkeepers and others requiring the use of an index in their business has been patented by Mr. Lübbe Ulfers Albers, of Keokuk Junction, Ill.

An improvement in Machines for Stretching and Drying Cloth has been patented by Mr Darius Babcock, of Oswego, N. Y. In this invention there is combined with the narrow jointed bar link in common use a wider link, the lower edges of the narrow link resting on stationary pulleys, and the tendency to draw inward caused by the transverse strain placed on the chain while in use being guarded against, and the links guided in a proper vertical position by horizontal flanged pulleys, between the inner faces of which the upper and lower edges of the ordinary narrow link move, and on the adjoining sides or peripheries of which the wide links move, the joints of the links being offset, so as to leave the edges of the same with smooth and unbroken surfaces, against which the pulleys may revolve.

Mr. John Hoerr, or Denison, Texas, has patented a Compact Cooling Attachment for lager beer, ale, and other barrels, by which, with but a small expense for ice, the contents may be kept in a cool state for a long time.

Recent Engineering Inventions.

An improved Car Journal Box has been patented by Mr. Francis M. Alexander, of Marshall, Texas. This invention relates to oil boxes used upon journals of car axles, the object being to prevent the lid from shaking off of the oil box and getting lost, and to enable the oil stop or oil packing surrounding the axle to be removed and replaced by a new one without removing the box from the journal.

Mr. Peter Boisset, of New York City, has devised an improved Propeller, which consists of one or more feathering paddles, that are hinged to the lower ends of oscillating arms, operated by crank rod connections with an oscillating crank shaft. The paddles may be adjusted at any angle or direction. The supporting frames of the paddle arms may be raised or lowered, so as to give more or less dip to the paddles.

The Cultivation of the Common Nettle.

The common European nettle (*Urtica dioica*) was formerly held in much esteem on account of its long delicate fibers, which, being readily separable and easily bleached, were particularly adapted for the manufacture of fine tissues. Although the fibers of this plant possess all the qualifications necessary to constitute a good textile material, the introduction of flax culture from Asia drove the industrial use of the nettle out of the manufacturing world entirely. From the little information that we possess in regard to the matter, we are led to suppose that the plant was abandoned on account of the superiority of yield in the flax; for the nettle, in its wild state, furnishes only about one and a half per cent of the weight of the plant in pure textile fabrics—a yield greatly inferior to that of any other plant used for like purposes. The attention of the industrial world has been, however, directed anew to the qualities of the nettle by very beautiful specimens of papers exhibited at the Vienna Exhibition in 1873, and which were manufactured at Hermanetz, Hungary, from wild nettles collected in the woods of the latter country. Since that period to the present quite a number of experiments have been attempted, either to acclimate in Europe different species of Indian or Chinese nettles, or to cultivate the common European nettle. The exotic species, among which should be mentioned the China grass (*Bœhmeria ramie*), were unable to withstand the rigors of a European winter, and their yield, too, was found to be greatly inferior to what it was in their native country. Experiments in this direction, therefore, promising so little success, have been abandoned; not so, however, with the culture of species indigenous to Europe, for this, judging from what is said by recent foreign papers, would seem to have better prospects.

We learn from a German contemporary that serious trials are now in progress in a two acre field at Stralau, near Berlin, to determine whether the nettle can be cultivated with success, with the view of producing therefrom a textile fiber. The plant was sown last year, and acquired a height, last autumn, of three to four feet, but contained too many branches to make it useful for the production of fiber. The present year, however, the plant looks much better, has fewer branches, and is generally four, and in some cases five or more, feet high. The field in question has been neither manured nor weeded, but the nettle has shown its strength by itself suppressing all weeds. The fear that the nettle would escape into adjoining fields has proved groundless, and an adjoining cabbage field does not contain a single nettle plant. The plants are now in full bloom, and a trial was to be made to cut them at this stage, in order to obtain the fiber in its greatest degree of whiteness. Should this succeed, it will be possible to obtain two crops in one year, a point of very great advantage should the fiber ultimately become a marketable product.

If these interesting experiments and observations should prove the possibility of growing the plant, and obtaining therefrom, as in China, Japan, and India, a useful fiber, there are many at present unproductive fields in Europe, as well as in America, which could be turned to a profitable account. That this plant does produce a useful fiber is shown by its very name, for in German it is a term often applied to calico, thus indicating that cloth brought from the East had been manufactured from it.

The Economic Products of Sea Weed.

The Society of Arts, in 1862, awarded to Mr. E. C. C. Stanford their silver medal for a paper on the economic applications of sea weed. The principal use of these plants at that time was in the production of "kelp," which was afterwards used for making lye for soap boilers and in glass making; and the spent lyes of the former manufacture were used in the preparation of iodine. Mr. Stanford proved that the excessive heat employed in the manufacture of kelp dissipated in smoke more than half the iodine contained in the sea weed; and that at the same time the alkaline sulphates were reduced by the carbon to lower oxy-compounds, and at a subsequent operation required an amount of sulphuric acid to reconvert them, which cost $2.75 to $3.25 a ton of kelp—the whole cost of extracting the salts and iodine from the same quantity being only $6.25 to $7. These facts led to the destructive distillation of sea weed as a commercial undertaking, now carried on on a vast scale by the North British Chemical Company. The products which have a commercial value are, per 100 tons of dried sea weeds, volatile oil, 181 gallons; paraffin oil, 225 gallons; naphtha, 102 gallons; sulphate of ammonia, 63 cwt.; acetate of lime, 9 cwt.; charcoal, 17 tons 4 cwt.; gas, about 116,100 cubic feet; chloride of potassium, 7 tons 16 cwt.; chloride of sodium, 8½ tons; iodine, 326 lbs.; and other products. The gas obtained is used to light the works. The gas liquor yields ammonia and acetic acid. The charcoal left in the retorts yields, by washing, salts of potassium and sodium, with iodides and bromides, and the remaining charcoal (which resembles that prepared from bones) is a powerful deodorizer and decolorizer, and is the cheapest in the market. The collection of the sea weed affords employment to a large and indigent population in the Western Isles, far more remunerative than that of kelp, the burning of which it has largely replaced. The company has works in the shires of Dumbarton, Argyle, and Inverness, and in County Clare. The refining works at Whitecrook employ about 200 men, and are capable of producing annually 50,000 lbs. of iodine, 5,000 lbs. of bromine, 50,000 lbs. of iodide of potassium, 50,000 lbs. of bromide of potassium, 2,000 tons of caustic soda, 1,000 tons chloride of potassium, 100 tons chlorate of potassium, and sea weed charcoal in large quantities. Besides these, chloride of calcium is produced to a large extent in the manufacture of chlorate.

THE POISON IVY AND VIRGINIA CREEPER.

These are two vigorous climbing vines, common, and often found associated, in our woods and thickets, and which,

POISON IVY.

having to the unpracticed eye a general similarity of appearance, are frequently confounded, usually to the painful cost of the person who inadvertently comes in contact with the wrong one. These two plants, the leaves of which are represented in the accompanying engravings, are the poison ivy (*Rhus toxicodendron*), or, as it is also called, poison oak and mercury vine, and the Virginia creeper (*Ampelopsis quinquefolia*), or American ivy. The cases of poisoning resulting from contact with the noxious poison-ivy of so common occurrence during summer will probably prove still more numerous during the fall, when the brilliancy of the autumnal tints invite more than a usual number (of ladies and children especially) into the woods to gather autumn leaves. We have therefore thought we would be doing a service in figuring the plants, and giving such descriptions as would serve to enable any one to distinguish between the two. When the facts have been pointed out, the person destitute of the least idea

VIRGINIA CREEPER.

of botanical science will at once perceive that the points of resemblance between these two vines are really very few indeed; or, to speak absolutely correctly, that there are none at all.

There are two varieties of poison ivy, so marked that they have been considered distinct species. One of these, a small, weak, erect, or decumbent shrub, has leaves of three leaflets, which are ovate, and variously notched or lobed. This is the *Rhus toxicodendron*, and the variety figured in our engraving. The other form is distinguished by its climbing habit; the woody stem, covered with a grayish scaly bark, becomes one to four inches in thickness, and throws out throughout its whole length myriads of thread-like, densely aggregated rootlets, which serve to bind it closely to its support. It is extremely common, and may be seen embracing even fences, as well as infolding large trees, with its snaky branches. Like those of the erect variety, its leaves consist of three leaflets; but in the present case these are smooth and have entire margins.

Both varieties, when wounded, exude a milky juice, which becomes black on exposure to the air and upon fabrics forms an indelible stain. To most persons this plant is extremely poisonous; some indeed being so sensitive that they never fail to experience its noxious effects when they merely approach but do not touch it. The remedies which have been and are constantly being proposed for the painful inflammation, swellings, and itchings that follow from contact with the plant are innumerable; and the reputed beneficial effects of many of them are perhaps absolutely *nil*, the fact being overlooked that the disease ran its course and ended, taking no less time to do so than it would have done without the extraneous aid.

The Virginia creeper, for which the poison ivy is often mistaken, is a very graceful woody vine, climbing extensively, sometimes over fences and wall, but often up trees as high as fifty feet or more. Unlike the *Rhus*, it climbs by means of tendrils, the ends of which terminate in sucker-like disks. This alone constitutes a striking difference in the appearance of the trunks of the two vines; but the structure of the leaves forms one equally as noticeable. These, in the Virginia creeper, are palmately divided into five oblong toothed leaflets of a dark shining green, and with very prominent veins and ribs. The leaves of the Virginia creeper assume in autumn the richest shades of scarlet, crimson, and purple, and as the plants are seen climbing and intertwining among the foliage of some evergreen, or trailing over fences and walls, form one of the brightest ornaments of the season. The leaves of the poison ivy also become colored in autumn, but the tints are not so brilliant as those of the former plant; they are usually of various shades of yellow and dull red.

The Virginia creeper belongs to the grape family, and, indeed, was formerly placed in the same genus with the grape. It is hardly necessary to say that it is perfectly harmless. It may be well for those who do not pretend to any botanical knowledge to remember the following as a safe rule by which to be guided: No native American vine having five-parted leaves is poisonous.

The Japanese Wax Tree in California.

The most important article for illuminating purposes in Japan is the candle made from the fruit of the *Rhus succedanea*, a tree about the size and appearance of the common sumac of this country. It is grown more or less extensively in Japan, and especially in the Western Provinces. According to the San Francisco *Bulletin*, specimens of this tree have been imported to that city by Henry Loomis. The tree has a quick growth, and attains the diameter of a foot and a half and a height of twenty-five feet. They should be planted about seven feet apart, and shaded on the sunny side for the first season. The ground should be well stirred and kept free from weeds. They begin to yield berries the third year, but in California may bear the next year after planting.

The berries are the size of a small pea, of a white color, hanging in clusters, and contain the wax between the kernel and the outer skin. The full-grown tree averages fifty pounds of seeds annually, about one-half of which is wax. It is a hardy plant, growing on indifferent soil, and living for many years. In Japan they are planted by the roadside, on embankments, and out of the way places. The wax is obtained by the berries being crushed, steamed, and then placed in hemp bags and pressed in a wedge press. It is also obtained by boiling the bruised seeds and skimming the wax from the top. In ordinary candle making the unbleached wax is used. When washed and bleached in the sun and air it assumes a pure white color. When formed into candles it gives a fine, clear light.

The vegetable wax of commerce is the imported article from Japan. From experiments made, it is represented that it can be readily and profitably grown in California. The tree is highly ornamental. As the foliage changes it has the peculiar bright and attractive hues so remarkable in the autumn landscapes of the Eastern States. The wax is valuable for candles, making the gloss for linen, for waxing thread, and for other purposes for which the ordinary wax is used.

Piedra.

Under this name, according to the *Lancet*, a parasitic disease of the hair, supposed to be a previously known affection, has been described to the French Academy of Sciences by M. Desenne. It has been met with in Columbia in the natives of the province of Cauca. It consists in small nodosities visible to the naked eye, and as hard as stone, resisting and even turning the edge of the scalpel. The hair when properly prepared for microscopical examination presents, under an amplification of 140 diameters, the following appearance. The nodules are placed at a tolerably regular distance apart, without being arranged with any mathematical exactness. They are of two kinds, some surrounding the hair completely, like a fusiform ring; others incompletely, or forming nodules on one side. Under a higher power they are seen to consist of a cellular mass of polygonal elements ·012 to ·015 millimeter in diameter, and regularly arranged, a black line only indicating their intervals. Adjacent to one of these nodosities a network could be seen consisting