

IMPROVED MILITARY TELEGRAPH.

We extract from *La Nature* the annexed engravings relating to M. Trouve's new military telegraph, an apparatus of very ingenious construction. It is composed of a cable containing two wires, which is extended between the stations; and at each of the latter is a battery and instrument. The stations are simply the individuals who work the line, and instruments and batteries are secured to their persons. The officer on the right, in Fig. 1, is supposed to be establishing a line. Attached to his belt is a box containing the battery; and to this is connected the telegraph instrument, which is about as big as a watch, and which can easily be carried in the pocket or hooked to an epaulette. The soldier shown starting off with the line carries on his back, knapsack-fashion, an apparatus which is represented in detail in Fig. 2. On the upper part is a large coil of wire, and below is the battery in a box. The instrument during transportation is hooked, as shown in Fig. 1, to the frame of the apparatus.

As the soldier advances the cable unwinds. If, for example, he is a skirmisher sent out to reconnoitre, he can now transmit intelligence of his discovery of the enemy, since he has only to unhook his instrument and signal. Each coil carries about six tenths of a mile of wire. Signals can, however, be sent from any point within this distance. The cable is insulated, each conducting wire being covered with rubber, and both united being enveloped in the same substance. With this safeguard, the cable can be laid over moist earth or even through streams, without its electrical qualities becoming impaired. In laying the line, however, the soldier is required to select a course as much away from roads and open country as possible, and to extend his wire on trees, so that it will be out of the reach of injury. Two men may, of course, be sent out; so that, when the coil carried by one is exhausted, the other may attach his cable, and thus extend the line for several miles.

Fig. 3 represents the telegraph instrument at one half its natural size. It is simply a case of metal containing an electro-magnet which, when the current passes, attracts its

paid laborers, must be what Darwin would call an inversion—in this case an hereditary remnant of the original savage—or else a survival of slavery in the state. The facts which the author gives in support of the last view will surprise many, for it is not generally known, we believe, that actual slavery existed in Great Britain up to the beginning of the present century. In ancient times the Saxons were notorious slave dealers, and the Irish were their best customers. After the Norman conquest the Saxons became slaves themselves; and it was not until the commencement of the 15th century, in Henry IV.'s time, that Saxon mechanics were allowed to put their children to school.

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Queen Elizabeth emancipated the last serfs in England, but the Scottish serfs were not freed until 1799. Beforethen, colliers and salters belonged to the soil. They were bought and sold with it, and their masters simply provided them with the sustenance necessary to keep them in working condition. They never were required to save for any purpose, for they had no right to their own savings. The habit of improvidence was then formed among the colliers and iron workers, and it still continues.

Useful Recipes for the Shop, the Household, and the Farm.

A new cement for uniting metallic to non-metallic substances is composed of thin-made glue mixed to the consistency of thick varnish with wood ashes. The ashes should be added gradually to the glue during ebullition, with constant stirring, and the cement should be used hot.

A strong mucilage capable of fastening wood or porcelain and glass together is made of 8½ ozs. strong gum arabic solution, to which a solution of 30 grains sulphate of aluminum dissolved in ½ oz. water is added.

Carbolic acid paper, now largely used for packing fresh meats, in order to preserve them, is prepared by melting 5 parts stearin at a gentle heat and then stirring in 2 parts carbolic acid, and afterwards 5 parts melted paraffin. The mass is well stirred until cool, and is then applied with a brush to the paper.

Care should be exercised in handling carbolic acid, as in certain cases it is an active poison. A saturated solution of carbolic acid in alcohol, with an equal quantity of water, rubbed into a scratch on a cat's nose, has killed the animal almost as promptly as prussic acid would have done.

A method recommended for removing moths from carpets is to pour strong alum water on the floor to a distance of half a yard around the edges before tacking down. Then occasionally spread dry salt over the carpet before sweeping.

The best method of producing crystalline surfaces on tinned iron and other metals is to immerse the plates for not longer than 10 seconds in a mixture of 3 parts hydrochloric and 1 part nitric acid diluted with an equal bulk of water. Wash the plates in water after their immersion.

Artificial Tobacco.

Tobacco leaves for the manufacture of Havana cigars are now being produced in New York, thanks to the industry of some of her citizens, aided by the progress of chemical science. The material used is a kind of brown wrapping paper, made of straw especially for this purpose. The paper, after coming from the mill, is saturated with the juice pressed from tobacco stems and other offal; then the sheets are rolled through a machine, which gives them the perfect appearance of the tobacco leaf, and the peculiar spots are printed on them as on calico. The paper thus prepared is especially adapted for wrappers around the cigars, and is such an improvement on the natural tobacco leaf (being much stronger, more economical, and easier of manipulation) that the Havana cigar makers desire no other wrapping for cigars, and import it largely from New York; and no Havana steamer leaves here at present without taking out quantities of it. These figure up, according to some authorities, to 5,000 reams in one cargo, and occasionally as much as 30,000 reams of this artificial tobacco leaf has been exported.

It is stated that this tobacco-flavored straw paper makes also a filling superior to the genuine leaf; and it is impossible to detect the delicate film of paper interlapped with

some broken leaves of real tobacco in the finished cigar, which the paper so very neatly holds in form. Besides this, the paper leaves no residuum other than a pure light gray or nearly white ash, just like that of the best quality of tobacco.

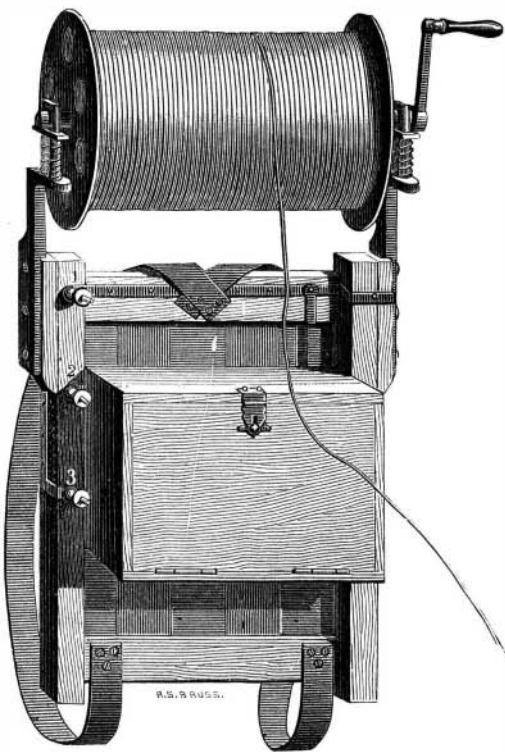
The Manufacture of Glucose.

As there is just now much inquiry as to the process of making glucose or grape sugar directly from starch or other vegetable matter, the following will be of interest:

Dilute sulphuric acid and the fecula of the potato are the active agents in the production of grape sugar from starch.

The principal processes are the following: The boiling of starch meal with dilute sulphuric acid is effected on a small scale in leaden pans; but in an extensive preparation, iron pans are employed. The requisite quantity of water is first heated to the boiling point, and to this is added the sulphuric acid diluted with 3 parts by weight of water. The starch is also brought, by the addition of water, to a milky consistence. The liquids so prepared are mixed, and the boiling continued until all the starch is converted into sugar. An intermediate stage, not usually noticed by the manufacturer, is the conversion of the starch into dextrin, which, in its turn, suffers conversion into sugar. The entire conversion of the dextrin into grape sugar cannot be with certainty ascertained by the iodine test, as sometimes a purple-red tint is produced, while in others there is no change. The most reliable test is that with al-

cohol, founded on the well known insolubility of dextrin in an alcoholic menstruum. If no precipitate is thrown down there is no dextrin remaining, and the conversion has been entire. The proportions of materials are, generally, to 200 lbs. of starch, 4 lbs. of ordinary sulphuric acid of 60° Baumé, and from 80 to 100 gallons of water. The conversion of the starch and grape sugar is hastened by the addition of a small quantity of nitric acid. The separation of the sulphuric acid from the sugar solution is a most important operation, for the color, purity, and flavor all depend upon success in this stage of the process. The acid is neutralized with baryta or lime, with either of which it forms an insoluble salt, deposited at the bottom of the neutralization vessels, and leaving

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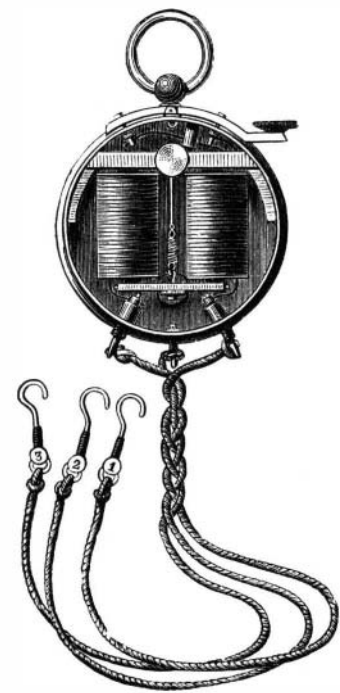
mature with an audible click. This amply suffices for sending sound signals. The key for transmitting messages merely closes circuit, and is arranged as shown at the upper part of the case.

The Fastest Cable Telegraphy.

On a recent occasion, when all the Atlantic cables were interrupted except the Direct, the entire business for two days was done on this one wire, and the average speed maintained for 48 successive hours was 104 words per minute. The highest speed attained was 18 words per minute. Length of cable, 2,500 nautical miles. This is the fastest ocean telegraphy ever executed on a cable of equal length.

A Relic of Slavery in England.

Mr. Samuel Smiles, in his recent excellent little work entitled "Thrift," devotes a chapter to the consideration of why it is that English workmen, earning, as many do, better wages than the average class of clerks, are unable to live thereon. After examining various probable causes, he comes to the conclusion that the reckless extravagance and indifference regarding the future, peculiar to many of the highest

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a clear supernatant sirup. The baryta can be employed as a carbonate (witherite), and is, without doubt, the better neutralizing agent, sulphate of baryta being very insoluble. Lime, although ordinarily used, forms with the sulphuric acid a sulphate (gypsum) that is not perfectly insoluble in water. It can be employed as marble dust, chalk, or caustic lime. The neutralization is completed in the boiling pan while the sirup is still hot. For every pound of sulphuric acid so much pulverized marble is required as the varying strength of the acid may demand, about pound to pound. After the addition of the marble powder, and when the effervescence has subsided, the liquid must be tested with litmus paper, or, better, with tincture of litmus; if the sugar solution be neutralized when at 26° Baumé density, the following evaporation will concentrate even the smallest quantity of sulphuric acid which may have remained, and render another neutralization necessary. To insure perfect neutralization, it is useful to add an excess of carbonate of baryta in the proportion of 5 to 10 ozs. to every 10 lbs. of sulphuric acid. The evaporation and purification are similar to those employed for other sugars.