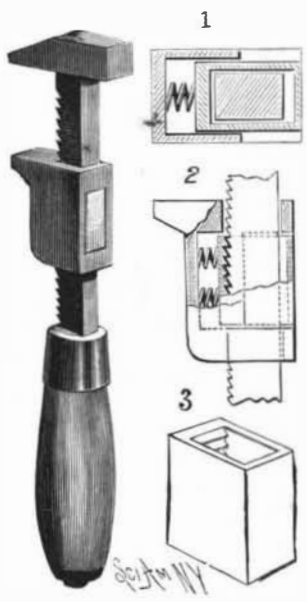
### AN IMPROVED WRENCH.

The wrench shown in the illustration is of simple and durable construction and comprises virtually but three parts. It has been patented by Mr. Frederick B. Wells, of No. 50 Crescent Street, Montreal, Canada. The shank, which carries the outer jaw, has on one face a series of teeth, and sliding on the shank is a frame integral with the inner jaw, as shown in section in Fig. 2, this frame carrying a locking sleeve, shown separately in Fig. 3. Fig. 1 is a horizontal section showing the frame and locking sleeve in position on the shank of the wrench. The locking sleeve is capable of lateral movement in the frame and has on its front inner face teeth adapted to engage the teeth on the shank, the two sets of teeth being normally held locked by springs. To move the inner jaw toward or from the outer one the thumb is pressed against the back of the locking sleeve, forcing it inward against the tension of the springs, thus unlocking the sleeve, the thumb at the same time being used to slide the frame and sleeve inward or outward on the shank to effect the desired adjustment of the jaws. As will be seen, the wrench may be operated with one hand, leaving the other hand free and permitting the use of the tool in places inaccessible to wrenches requiring the use of both hands of the operator.



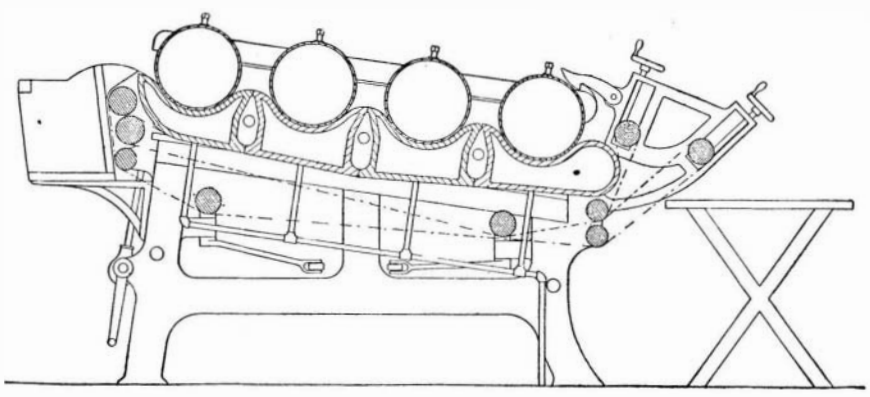

WELLS' WRENCH.

### AN IMPROVED MANGLE.

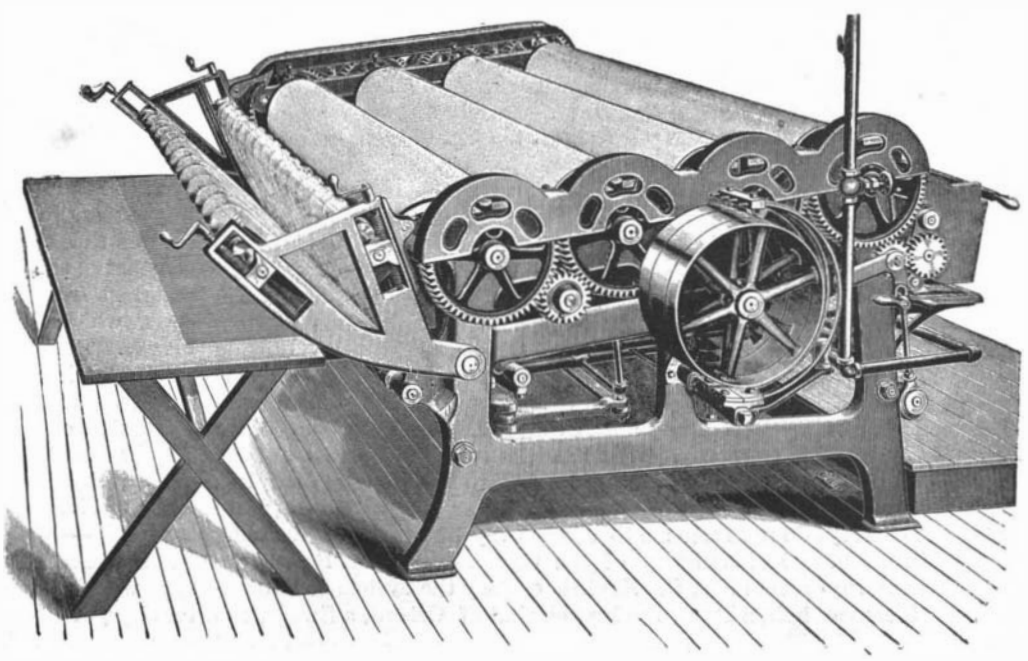
The demand made by large institutions and laundries for a mangle that will iron all kinds of flat work without having it first dried in a dry room has brought out several types of such machines. An illustration of this class of machinery appeared in the SCIENTIFIC AMERICAN of January 14. The one shown in the engravings, in perspective and sectional views, has been patented by A. T. Hagen & Co., Rochester, N. Y., manufacturers of modern laundry machinery, and is of very large capacity and gives an excellent finish to goods.

It consists of four steam chests placed parallel and close together, with their under sides planed straight and their upper sides concaved. Into each of these is placed a 12″ revolving roll. The goods to be ironed, after being wrung, are fed by an operator under the first roll and then carried by each to the succeeding roll. After being passed through the machine in this way, they are returned by means of an apron, tightly pressed against the under side of the steam chests and then carried back by another apron underneath the first one to the delivery side of the machine and deposited on a folding table.

The concaved surface of each steam chest measures about 11″ and the convex surface (or space between each roll) about 11″. Thus the goods, after being pressed against the heated chest under each roll, are exposed while passing to the next roll, allowing the steam to escape. After passing through the machine in this way, any dampness that may remain in the goods is taken out while on the moving aprons. One great advantage of this mangle is the small amount of floor space it takes up, considering its capacity; another, the absence of all stuffing boxes. This machine is provided with a device for changing the speeds to accommodate the different thicknesses of goods that it may be required to iron.



THE HAGEN MANGLE—SECTIONAL VIEW.



THE HAGEN MANGLE.

### Tanning by Electricity.

At Turin experiments are in progress, under the direction of R. Pinna, in which hides are subjected to the action of weak alternating currents while immersed in the tanning liquor. A non-soluble metallic conductor, of about the same superficial area as the skins, is placed in the bottom of the tan pit and the hides are spread out and piled one upon the other on this conductor. The liquor is run in until this pile is submerged completely.

The second electrode is carried on a wooden framework, and is situated above the pile, being equal in size to the lower electrode. These electrodes are varied to suit the required current density. At present the current used is 0·04—0·10 ampere per square decimeter, according as the skins are light or heavy. The voltage is 50, and the frequency of the alternations 5,000 per minute. A rheostat is used for governing the current density and the temperature is kept below 35° C. Experiments are also in progress with hides stretched vertically and kept separate from each other, while the other conditions are the same. It is stated that an exposure of from 100–400 hours, according to the quality of the skins, is sufficient to convert the raw material into leather.

### The Localization of the Perfumes of Flowers.

Mesnard's method of examining floral odors is applicable to a wide range of micro-chemical studies. A ring of glass is cemented to a suitable glass slide, and within this cell another smaller ring is glued, in such a manner as to leave between the two a clear annular space. In this space is placed pure chlorhydric acid. On a cover glass, large enough to cover the whole of the larger cell, is put a drop of pure glycerine containing a good deal of sugar, and in this reagent is deposited the section of petal to be studied. The cover glass is now to be inverted and applied to the outer ring. By the concurrent action of the vapor of the acid and the dehydrating activity of the glycerine, the essential or the fatty oil containing the perfume separates in minute drops.

A modification of the process directs that the central ring be covered by its own cover glass. On this the drop of glycerine is to be put, and this is to hold the sections.

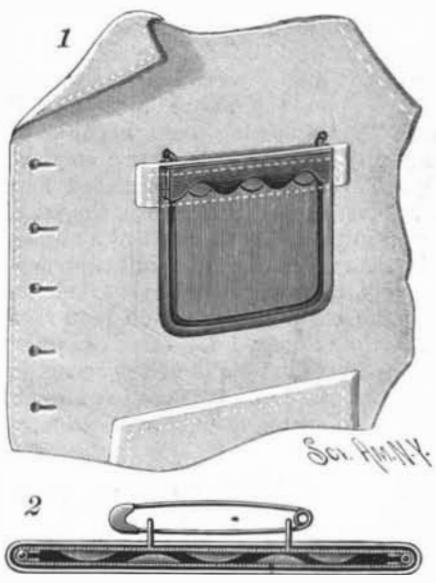
By this simple method, the localization of the perfume of the jasmine, rose, violet, and tuberose has been effected.—*G. L. G., American Journal of Science.*

### Photography on Marble.

Mr. Villion publishes the following process: Coat an unpolished plate of marble with the following solution: Benzine, 500 parts; spirits of turpentine, 500 parts; asphaltum, 50 parts; pure wax, 5 parts. When dry, expose under a negative, in sunshine, for about twenty minutes. Develop with spirits of turpentine or benzine and wash in plenty of water. Now cover the plate where it is intended to be left white with an alcholic solution of shellac and immerse the same in any dye which is soluble in water. After awhile, when enough of the coloring matter has entered the pores of the stone, it is taken out and polished. The effect is said to be very good.—*Photographisches Archiv.*

### A SIMPLE FORM OF SAFETY POCKET.

A safety pocket, more especially designed for carrying a watch, and which may be readily attached to or detached from a garment, is shown in the picture, and has been patented by Mr. Henry C. Diefenbach, of No. 124 Webster Avenue, Jersey City, N. J. A U-shaped wire frame has on its ends pintles for hinges connecting the ends of spring plates, having inwardly projecting teeth, as shown in Fig. 2, and this frame is placed in a separate pocket made of any suitable material, the spring plates forming the front and back edges of the pocket at its top. Fig. 1 shows such a pocket in position in a garment, to which it is secured by a safety pin passed through eyes extending inward from one of the plates. The upper ends of the wire frame have little knobs, and by pressing these toward each other with the thumb and one finger the spring plates open sufficiently to permit the convenient insertion or removal of the watch.




DIEFENBACH'S SAFETY POCKET.

### Electricity at the Opening of the Fair.

The *Electrical Engineer* says: The devices for starting the engine and pump were connected in series with the key, and twelve cells of Exeter dry battery supplied the current. President Cleveland, in closing the circuit, first pressed the key lever, and then closed the circuit breaker, in order to keep the circuit closed and allow the starting mechanism time to act. The installation was made by Mr. L. Ethridge, superintendent of the World's Fair fire alarm service, and Mr. L. J. Auerbacher, electrician for The E. S. Greeley & Co.

The conductors were run under the platform and thence through the subway to the Allis-Corliss engine in Machinery Hall. Thence another wire extended to the pump house at the east end of the hall, where the great Worthington pump is situated. The electric fountains were operated by separate circuits from the northeast tower of Machinery Hall and were started by a signal in multiple with the main circuit. There was not the slightest hitch in the proceedings and everything worked to the perfect satisfaction of those in charge and the intense delight of the multitude.

The device used for opening the throttle of the great Allis-Corliss engine in Machinery Hall is the invention of Mr. Frederick D. Taylor, of Hartford, Conn.

The operation is extremly simple. When the circuit is closed, the armature is drawn toward its magnet, thus releasing the outer end of the tumbler. The shipping lever, then being free to move, is thrown over by its spring and withdraws the pawl from the ratchet on the barrel, leaving the latter free to revolve under the action of the powerful coiled spring within; and this motion is communicated by means of the shaft, sprocket wheels, and drive chain to the throttle valve of the engine.

An arrangement is also provided for mechanically releasing the spring barrel if desired by simply pressing upon the outer end of a rod whose inner end engages the pawl and moves it away from the ratchet. The whole device is inclosed in a handsome hardwood case.

THE diamond drill is pointed with black diamonds.

### Application of Electric Propulsion by Accumulators to the Tramways of Paris.

The Company of Tramways of Paris and the Department of the Seine has, for a few months past, been operating its Saint Denis lines by means of electricity furnished by accumulators. This new application of electric propulsion by means of accumulators is more important than any of those that have preceded it. The installation of the Saint Denis depot was made in view of the exploitation of two lines, each about 9,250 meters in length. Both start from the crossroads of Picardie, at Saint Denis, one running to the Madeleine and the other to the Opera House.

The programme laid out for the constructors of the motors and the electric accumulators was as follows: To replace, upon the above mentioned lines, the horse cars by self-moving ones, capable of accommodating fifty passengers and two employes of the company. The mean speed demanded for a full car was 12 kilometers per hour, with the possibility of reaching 16 outside of Paris, and 6 at a minimum upon heavy gradients of from 38 to 40 millimeters per meter. The company, moreover, desired that it should be possible that the electric cars should haul another car. The daily trip estimated for each car was 135 kilometers. Finally, the weight of the accumulators, including all the accessories, was not to exceed 2,800 kilogrammes. All these conditions have been fully realized.

The body of the car rests, through the intermedium of rollers, upon two single-axled trucks, carrying bolster pins, and connected with each other by a spring coupling, that permits the axles to converge on curves and brings them back to parallelism on a straight line. Each axle is actuated by a dynamo-electric machine by means of two sets of gearings. The ratio of the angular velocities of the motor and axle is 12 to 1.

The electric motors are bipolar, of the Manchester type, with Gramme ring armatures. The brushes consist of four blocks of carbon placed at right angles with the surface of the collector. Each machine, at a velocity of 1,300 revolutions, is capable of developing a power of 10,000 watts under a difference of potential of 200 volts. Under such circumstances, the rendering between the terminals of the dynamo and the axle reaches 73 per cent.

The trucks are provided with the Lemoine winding brake.

The battery, which is placed under the seats of the car, consists of 108 elements of 11 plates, contained in ebonite troughs. The plates are 0·2 meter in length, 0·2 meter in width, and 0·006 meter in thickness. The total weight of the active material of each element is 17·5 kilogrammes. These 108 elements are distributed among 12 wooden boxes, 6 on each side of the car. The 9 elements of each box are grouped in tension, and the poles of the small batteries thus formed each ends at a strip of copper fixed to one of the lateral sides of the box. Plates of brass, connected with the circuits of the dynamos through a coupling commutator, are mounted by springs upon wooden supports in the car. The introduction of the boxes between these plates, upon which slide the strips of copper, establishes a connection between the elements of the battery automatically.

The charging of the batteries is done upon benches formed of tarred planks, supported by bricks, from which they are separated by glass insulators. These benches carry spring contacts, similar to those of the axles of the cars. The battery, placed upon the charging bench, has all its elements grouped in tension. The accumulator hall now comprises 24 battery benches, each of which is connected with the distributing board of the charging current by a special circuit containing an amperemeter and an indicator of the direction of the current, and, upon each pole, a circuit breaker and an interrupter. The transfer of the batteries from the benches to the cars is effected through trucks running upon tracks alongside of the benches and the side tracks. The platform of the truck is raised or lowered by means of a screw and winch, so as to bring it exactly to the level of the interior of the car or to that of the charging bench.

The current is furnished to the accumulators by three Desrozier dynamos, each actuated by a Corliss horizontal condensing engine of 125 horse power. These engines are supplied by three semi-tubular boilers. The dynamos, at a velocity of 600 revolutions, furnish a current of 230 amperes under an E. M. F. of 260 volts. They, as well as the circuits of the batteries, are grouped in quantity. The charge is made at a constant potential. The duration of the charging is six hours for a battery that has furnished its whole capacity, which is 230 ampere-hours. The rendering of the batteries in energy is 70 per cent.

The necessities of the exploitation require the possibility of running at various speeds. This desideratum is realized by modifying the coupling of the battery elements. The battery is divided in the car into four parts, or sub-batteries, each including three boxes, say 27 elements in tension, that correspond to a difference of potential, in closed circuit, of about 50 volts. By means of coupling commutator within reach of the motorman, three different couplings may be obtained. The speed of the car varies, in passing from one coupling to another, in the ratio of 1 to 2.

The motors of the cars are normally associated in series, but it is possible, through the commutator, to couple them in quantity so as to obtain a greater speed or to develop a greater stress. The commutator permits, also, of changing the direction of the car by reversing that of the current in the induction circuit of the motors, and, in case of damage, of suppressing one of the motors. A single motor is capable of continuing the service with a slight diminution of speed.

The service of each car is assured by two batteries, that permit of four or six trips being made without recharging. In the latter case, the battery furnishes a motive power for a trip of 55·5 kilometers. The duration of a trip, including stoppages, is 55 minutes. The weight of the car, complete, is 13,500 kilogrammes, 2,600 of which are for the battery and its accessories and 3,500 for the passengers. The mean tractive stress is 12 kilogrammes per ton.

### FALGUIERE'S STATUE "LA FRANCE" AT THE CHICAGO EXPOSITION.

The commissioners of the French section of the Chicago Exposition having decided upon the execution of a symbolic figure for the commercial section of the French exhibit, a statue of France was immediately thought of, and, in spite of the shortness of the time at their disposal, Mr. Roger Ballu, inspector of the

THE WORLD'S COLUMBIAN EXPOSITION—FALGUIERE'S STATUE "LA FRANCE."

*Beaux Arts*, asked the eminent sculptor, Falguiere, to undertake the task. Mr. Falguiere accepted, and in twenty days he had accomplished the work honorably. We give the original drawing, for which we are indebted to our contemporary *L'Illustration*.

France is represented seated and wearing a cuirass, the right arm being raised with a proud but pacific gesture. The left arm rests on a tablet bearing the inscription "*Droits de l'Homme*" (Rights of Man), while the left hand holds the national sword. The head, which is characterized by a calm and serene beauty, is ornamented with a diadem symbolical of liberty, equality and fraternity.

The statue is seven feet ten inches high, and will be erected on a pedestal nine feet ten inches high. It will ornament the French section, which is very remarkable as a whole and will attract much interest.

### The Thermometric Systems.

We learn, says *La Nature*, that the Prussian government has just rendered legal the centigrade thermometric system, or that of Celsius as it is called outside of France. Apropos of this, a word of history: It is to the celebrated meteorologist Dove that is due the remains of popularity that the Reaumur system enjoys in Germany. While recognizing the advantages of the centesimal system, he said to his young disciples: "After my death you may do as you wish, but please do not force me to change my habits, I am too old."

In his history of the thermometer, Mr. Renou observes that the English employ the system of Fahrenheit, a Dane, the French that of Celsius, a Swede, the Germans that of Reaumur. We shall complete this paradox by saying that the Fahrenheit system was defined by Hanow, that of Celsius perhaps by Christin, and, finally, that originally the Reaumur thermometers marked a point in the neighborhood of 100° and sometimes higher for the temperature of boiling water. In fact, Fahrenheit graduated his thermometers by making 0° at the lowest temperature of winter and 24° in exposing the instrument to the sun. Later on, his degrees were divided into four parts. In 1737, Hanow wrote: "According to the most important thermometers that Mr. Romer, at Dantzig, has had constructed, and of which Mr. Fahrenheit is the best manufacturer, water boils at 212° and freezes at 32°." Celsius, to whom the thermometer owes great improvements, published the processes of graduation of his instruments in 1742. At this epoch he designated the temperature of boiling water by 0°, and that of melting ice by 100°. It was not till later on that he reversed his scale. At the same epoch Christin, of the Lyons Academy of Fine Arts, published a series of articles upon the graduation of mercury thermometers. It was in July, 1743, that he publicly proposed the division into a hundred parts. On the 11th of September, 1743, he wrote: "If the public wishes to adopt the division into one hundred degrees, I think it will do well; but if, on the contrary, it does not, I shall not be offended. I shall always have the satisfaction of having done my best." It will be seen, then, that the present centesimal division was proposed by Christin independently of Celsius. Who was the first to employ it? We believe that this point of history is not yet decided.

As for Reaumur, he established his system in the following manner: Having found by experiment that a certain quantity of hydrated alcohol, occupying a volume of 1,000 at zero, assumed the volume of 1,080 in boiling water, he defined, as a degree of temperature, the elevation necessary to expand this alcohol by 1-1000 of its volume. He thought that he had thus divided the interval comprised between the congelation of water and its boiling point into 80 parts. This definition was preserved in the system of Reaumur, although he himself determined the higher point of the scale by the temperature of ebullition of a certain alcohol. In reality, he divided into 80 parts an interval corresponding to about 80 of our present degrees, so that, in following the practice of Reaumur, and not his definition, thermometers would have been constructed graduated nearly according to the centigrade system. It was by grafting a bad process upon a bad definition that was established the system that physicists are now having much trouble to extirpate. Although the Prussian government has just decided upon the system to be employed, the imperial government had taken the lead by specifying that medical thermometers should be constructed of a certain glass (the normal glass of Jena), and that they should be officially verified at the Physico-Technical Institute of the empire. The latter has thus found itself obliged to compare as many as 90,000 thermometers a year. In France the liberty of the thermometer is absolute, but in England, the country of every liberty, the same is not the case. True or false, the origin of the law as to thermometers, as it is told us, is worth remembering. Once, when the Prince of Wales was sick, the thermometer used throughout his illness gave readings that were erroneous by two degrees. He came near dying, but as soon as he got well he set about preventing a repetition of such errors. Since then, 5,000 medical thermometers have been annually verified at Kew.

### A Telegraph Decision.

A message filed with a telegraph company at a city in Texas, addressed to the sender's agent in California, read as follows: "Close the trade. I will come soon." On his arrival the sender discovered that the message had not been delivered, and that the deal had failed, thus requiring him to return to Texas. The court held that his expenses to and from California were proper items of damages against the telegraph company, but losses resulting from the sale of his property at a sacrifice before starting were not. The telegraph company having received full pay for transmission of the message to its destination, without any contract limiting its liability to its own line, was bound to deliver the message to the sender's agent, even though it had to be sent part of the way over the line of another company. The sender's testimony showed that the message was not written on a blank contract of the telegraph company, and that, when he returned from California, he examined the original copy, which was not then attached to one of such blanks. The company's agent testified that when he received the message he immediately attached it to a blank contract form, and that he was not authorized to receive or send a message unless on such blank. The testimony justified the court in finding that the message was not attached to a blank contract form when received by the agent.

A SUBSCRIBER suggests that there is a demand for a type writer for travelers, the machine to be of the better class, or two-handed, and not to weigh over eight or ten pounds. The type writer has become a necessity for many traveling men, and a light, portable machine would find many purchasers.