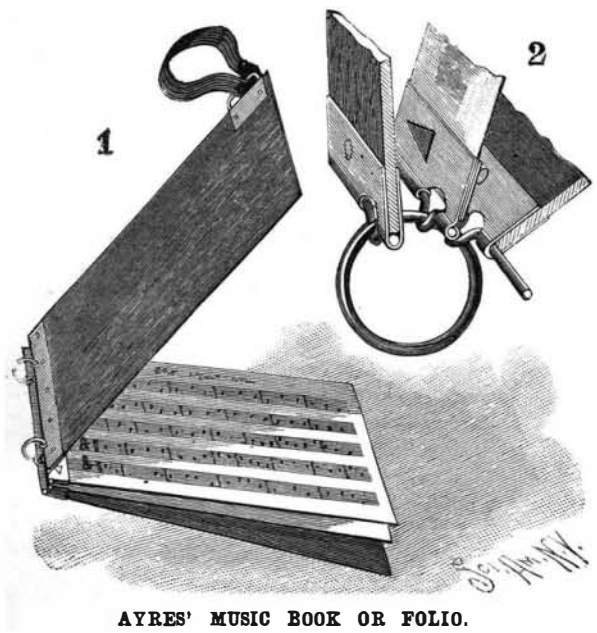
A MUSIC BOOK OR FOLIO.

The illustration represents a strong and cheap book or folio, made without the use of mucilage or glue. the covers of which are adapted to be folded back to back, and in which any desired number of sheets may be quickly and strongly fastened in place. The improvement has been patented by Mr. William H. Ayres, of Sackett's Harbor, N. Y. The covers are of board, having at their meeting ends strips of metallic binding, each strip being doubled over the edge of the board, while near opposite ends are eyes formed of wires, held in the loops of the strips. These eyes engage split rings, similar to the common key rings, and which serve as hinges for the covers; also serving as a means of attachment for the sheets of music held between the covers. The sheets are held at their ends between metallic strips, one of which has prods struck up from the body of the metal, to be passed through the sheets and through slots in an opposite strip, being then bent down upon the strip. One of the strips is adapted to hold in place a wire forming eyes adapted to engage



AYRES' MUSIC BOOK OR FOLIO.

the rings, as shown in the sectional view, Fig. 2, any number of the binding strips, holding sheets of music, being placed between the covers until the rings are full. On one of the covers, near its outer end, is a metallic strip carrying a keeper with an elastic band, which may be adjusted to fit over the end portions of the sheets and not obscure the music. The placing of music sheets in or the removing of them from this folio is readily effected.

THE MYSTERIOUS TRUNK.

A trick known by the name of the Indian Trunk, the Mysterious Trunk, the Packer's Surprise, etc., formerly had much success in theaters of prestidigitation. This trick, which may be presented in several ways, is consequently executed by different means, one of which we shall describe.

The following is in what the experiment consists: The prestidigitator has a trunk brought to him, which he allows the spectators to examine. When every one is certain that it contains no mechanism, a person comes upon the stage and enters the trunk. It is found that he fills it entirely, and the cover is shut down. A spectator locks the trunk and guards the padlock.

The trunk is afterward wound in all directions with rope, the intersections of the latter are sealed, and the whole is introduced into a bag provided with leather straps, and which may in its turn be sealed at each of its buckles. When the operation is finished, the spectators who have aided in the packing remain on the spot to see that nothing makes its exit from the trunk, which has been placed upon two wooden horses. The prestidigitator then fires a pistol over the trunk, which, when divested of its covering, ropes, and unbroken seals, is found to be entirely empty.

By what means has a human body been able to disappear without being perceived by the spectators who were constantly looking at the trunk, and, better still, by those who were handling it an instant before, and who still surround it?

The whole credit of the trick is due to the cabinet maker who constructed the trunk. The latter, in the first place, is exactly like an ordinary trunk, and the closest examination reveals nothing out of the way about it. Yet one of the ends, instead of being nailed, is mounted upon a pivot on the two long sides, so that it can swing. The swinging motion is arrested by a spring plate bolt. When the person in the interior presses upon a point corresponding to this bolt, the pivot becomes free and the end of the trunk swings.

The following is the way that the operation is performed in order that the spectators may not perceive the opening of the trunk. The operator's assistant takes his place in the trunk, which is closed and locked and the padlock sealed. Some obliging spectators then aid in tying the trunk, around which the rope is passed twice lengthwise, beginning at the side opposite the opening part. The rope is then passed over this part and runs in the axis of the pivots. Then the trunk, for the convenience of tying, is tilted upon the end where the rope passes. It is then that the assistant inclosed in the interior presses the bolt. The end of the trunk then has a tendency to open, and as the prestidigitator has taken care to tilt the trunk at a carefully marked point of the stage floor, the movable end meets in the latter with an exactly similar trap that opens at the same time, and it is through these two traps that the invisible vanishing takes place.

As soon as the assistant has passed through the trap, he pushes up the latter, and consequently the movable end of the trunk, which closes upon its spring plate bolt.

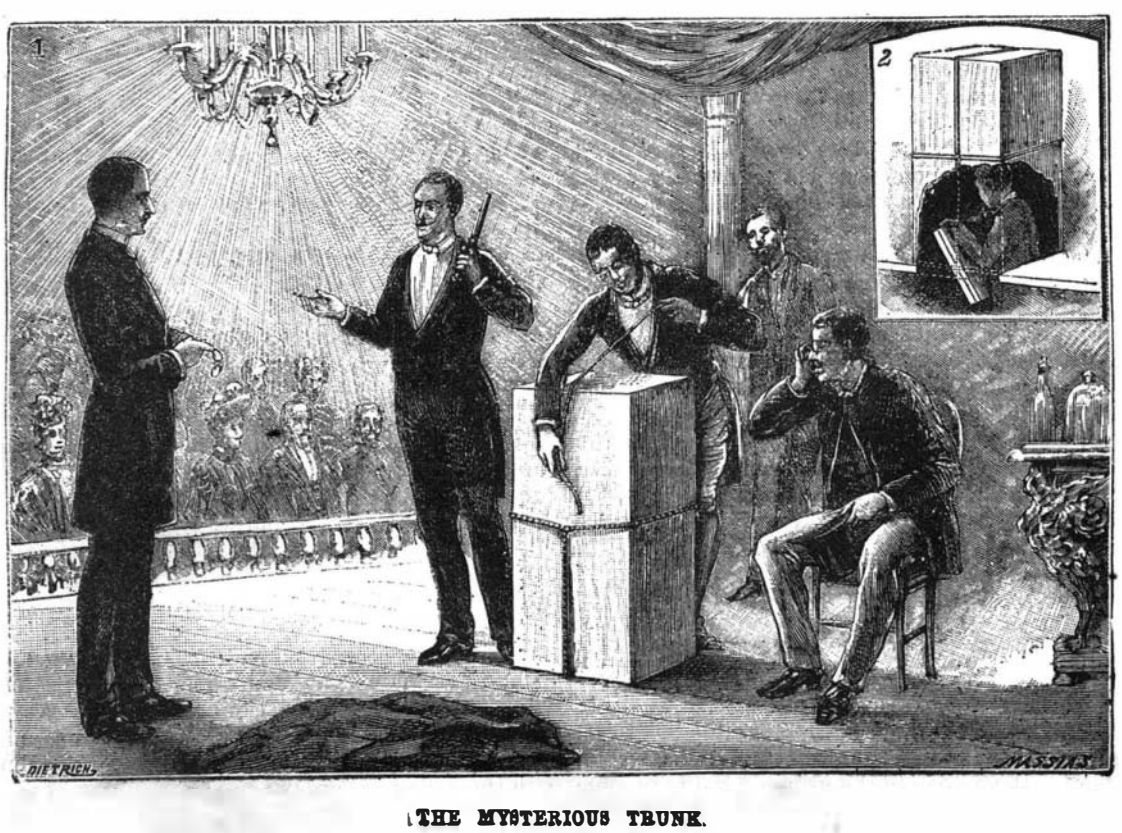
The time that it takes the man to pass through the trap is insignificant, and while the ropes are being crossed the operation might be performed several times. Afterward, there is nothing to be done but to proceed with the experiment as we have said, care being taken, however, not to abuse the complaisance of the spectators, and not to allow them to try the weight of the trunk.

When the vanished person descends beneath the stage, he is supported by some other individual if the theater is not well appointed, and by a trap with a counterpoise if the construction of the stage admits of it. This trap permits of expediting things in certain cases of the reappearance of the confederate, but is useless in the process described above.

Such is one of the artifices employed. Whatever be the process, the presentation of it is often complicated by causing the person who has vanished to reappear in a second trunk that has previously been ascertained to be empty and that has been sealed and enveloped under the eyes of the spectators. It will be easily comprehended that the operation here is inverse to that of the first, and that the confederate beneath the stage awaits the proper moment to be lifted into the interior of the second trunk, whose movable end is opened outwardly by the prestidigitator at the desired moment.

Boxes with glass sides also have been constructed. The management is the same, but, as the person inclosed is visible up to the last moment, care must be taken to so pass the ropes as not to interfere with the trap of the trunk, which then consists of one of the sides, and which operates at the moment when the trunk, bound with ropes, sealed and laid upon this side, is about to be wrapped up.

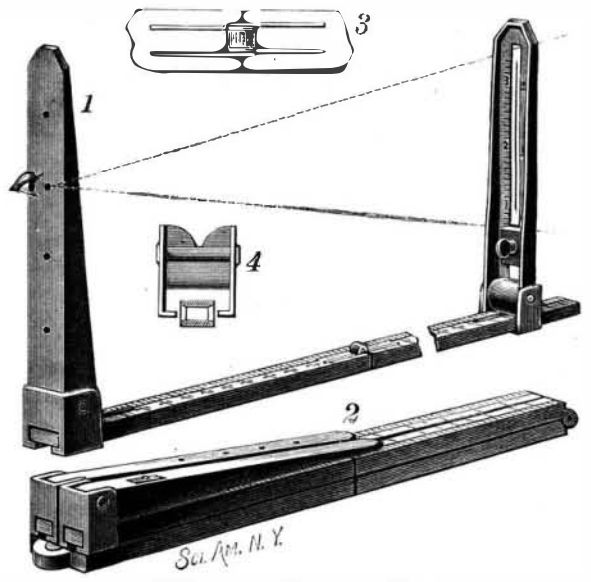
This presentation has still more effect upon the spectators than the preceding, and seems to present greater difficulties.—*La Nature.*



THE MYSTERIOUS TRUNK.

AN INSTRUMENT FOR MEASURING DISTANCES.

This compactly folding instrument for measuring linear distances and vertical heights is styled by the inventor a "metroscope." It has been patented by

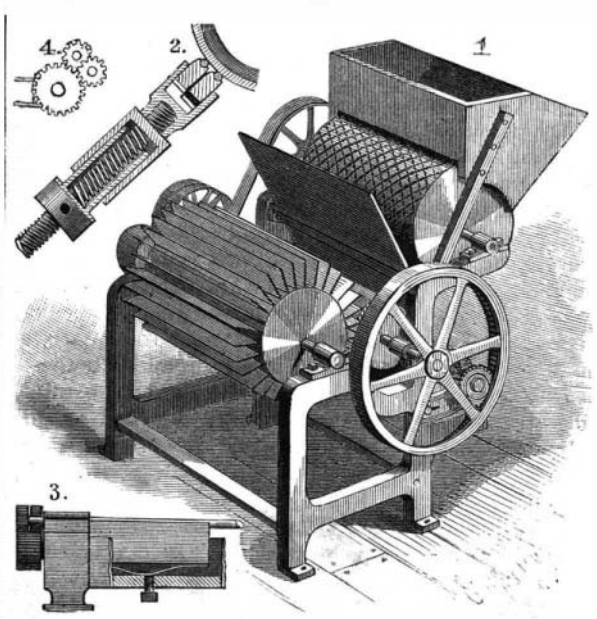


BAILLIE'S "METROSCOPE."

Mr. James L. Baillie, of Shawnee, Ohio, and is also adapted for use in drawing or painting, enabling the artist to produce the principal objects in exact proportional sizes. Fig. 1 shows the manner in which the instrument is used, Fig. 2 showing it folded, and Figs. 3 and 4 illustrating the construction of the hinge. A rule of the usual kind is employed, preferably an ordinary pocket rule, to afford a base or support for the height and distance measuring devices. Besides the usual middle hinge, it has other hinges to enable the members to be folded at right angles, these hinges being made narrow, occupying only the middle portion of the members, and permitting the slide to pass by them. A slide whose back supports uprights is mounted on each end of the rule, one of the slides carrying a vertical scale having a central longitudinal slot at one side of which the marks represent hundredths, while on the other side they represent inches and tenths of inches, showing the distance when using a ten foot pole. The other slide carries a sight plate having peep holes in the vertical plane of the slot in the first upright, the operator peeping through one of the holes and through the slot to the object sighted. A slide held to move on the scale may be fixed in any desired position by a set screw.

AN IMPROVED ROLLER COTTON GIN.

This machine is designed to quickly and thoroughly strip the seed from the lint of any grade cotton without danger of tearing or pulling the fibers apart. It has been patented by Mr. Frederick L. Montgomery, of No. 390 Eleventh Avenue, New York City. The



MONTGOMERY'S ROLLER COTTON GIN.

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feed drum beneath the hopper has the usual roughened surface, as may be seen in the perspective view, Fig. 1, and opposite the drum is a transverse feed table guiding the cotton down to the ginning roller, there being a second feed table, at an opposite angle, below the feed drum. The ginning roller, on the main driving shaft, is covered with leather or other elastic material, and on its periphery are held two rollers, one a knife roller to separate the seed from the lint, and the other to press the lint to the drum while the seed is being removed. The rollers are small shafts extending the entire width of the ginning roller, Fig. 2 being a central transverse sectional view, and Fig. 3 a front view of the rollers and their bearings, Fig. 4 showing the gearing by which they are driven. Each section of the bearing is pressed on at its underside by a spring, whose tension may be regulated by a set screw, to hold the rollers in proper contact with the ginning roller. Both rollers are so supported by their bearings that they will be prevented from spreading, and will be held uniformly against the surface of the ginning roller throughout their entire length, while the yieldingly mounted boxes carrying the rollers permit a heavier or lighter bunch of cotton to pass through, while preventing any seed from passing the same way. The knife roller revolves in the same direction as the ginning roller, but it is geared to revolve at a much higher rate of speed, and in front of it, directly below the lower feed table, is a discharge table, over which the seed separated from the lint is delivered to one side of the machine. The lint adhering to the covering of the ginning roller, after passing the small rollers, is removed by a stripper cylinder which acts as a brush.

SURFACE TENSION.*

The existence of surface tension is shown by the following simple experiments: (1) Two round pencils, made of light wood, and not more than ¼ inch in diameter, are placed in contact one on the other in a horizontal position. Place between the two pencils several drops of pure water, so that all of the line of contact is well moistened. In a little time, a quantity of water will adhere to both pencils, which will take a concave, curved shape, a cross section of which is shown in Fig. 1. The lower pencil, in consequence of the tension of the concave surfaces, *a* and *b*, on opposite sides of the line of contact, will be suspended from the other pencil. The adhesion is strong enough to admit of moving the pencils about. (2) Clean a copper ring made of wire about $\frac{1}{32}$ inch in diameter and having a diameter of 2½ or 3 inches. Lay the ring carefully upon the surface of very pure water, contained in a well-washed glass vessel, as shown in Fig. 2. The ring will float in spite of its specific weight. Needles, quicksilver globules, thin rings of platinum, etc., may also be made to float upon the water. (3) Take a sheet of light but not glossy paper, about 5 or 6 inches long and 3 inches broad, and turn down upon all four sides a margin about 1 inch broad. Then lift up these edges and form a box 1 inch high as shown in Fig. 3. Place the box upon a table, and moisten by means of a brush all the inner surface, then pour water in to a depth of ¼ inch. The tension of the surface of the fluid will cause the opposite long sides of the box to approach each other, and the little paper box will close on itself. (4) Take a cylindrical cork having a diameter of ⅜ inch and a length of ⅝ inch, and in the middle of one end of the cork insert a fine iron wire, from 2 to 2½ inches in length, provided with a hook, on which is placed a little basket to receive the ballast. Upon the other end of the cork is fastened a frame, which consists of a fine iron wire ring 3 inches in diameter, and two pieces of the same wire are inserted in the cork so as to support the ring perpendicular to the axis of the cork and concentric with it. Plunge this little instrument in water contained in a vessel of sufficient depth. If the weight in the vessel is suitable the cork will be held in a vertical position, and only project a short distance above the surface of the water. If the whole apparatus be pressed down vertically in the water until the ring is submerged, as shown in Fig. 4, the ring will not leave the water, being held by the surface tension of the water, but will rise a little above the water level, and the water will take the form of a concave meniscus. To liberate the ring so that it will rise up out of the water apparently by a free impulse, and allow the system to regain its first position of equilibrium, let fall a drop of ether upon the water. This will decrease the surface tension, when the buoyancy of the cork will lift the ring above the water. (5) Dissolve 1¼ oz. of Castile soap and 1¼ oz. of crystalline sugar in a quart of water. In this plunge a square bent from small slender iron wire, and draw it out again. It will be filled with a thin film of the liquid. Lay upon this film a loop of silk thread, as shown in Fig. 5. It will form an irregular outline. If the film be perforated within the silk loop, the thread will suddenly form a complete circle.

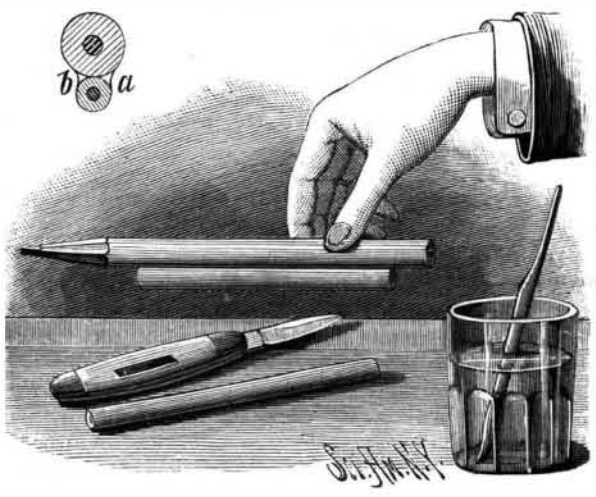

Fig. 1.—EXAMPLE OF SURFACE TENSION.

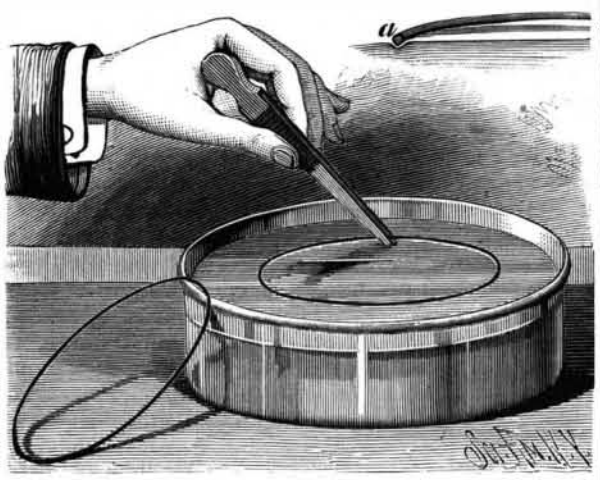

Fig. 2.—FLOATING RING.

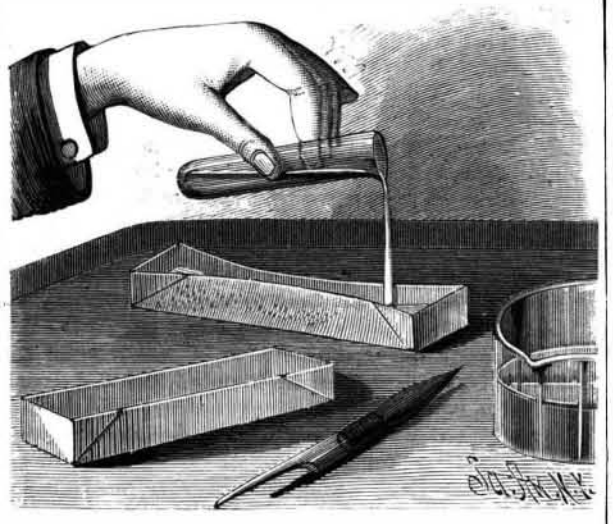

Fig. 3.—DISTORTION BY SURFACE TENSION.

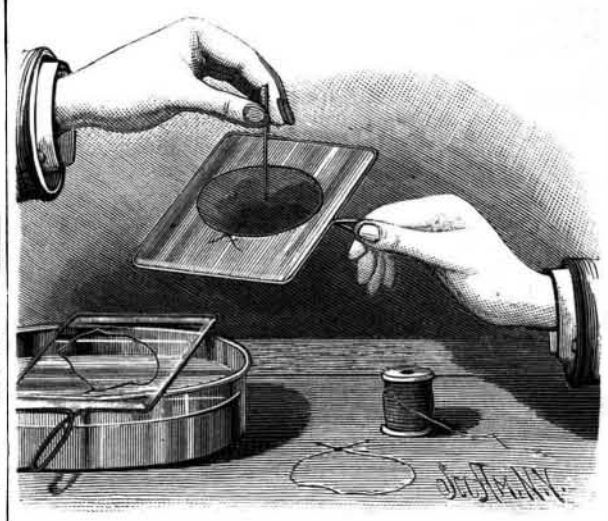

Fig. 5.—TENSION OF SOAP FILM.

* From the German translation of "Experimental Science."

Horse Power of Windmills.

According to observations of the United States Signal Service, the average velocity of the wind within the range of its record is nine miles per hour for the year along the North Atlantic border and Northwestern States, ten miles on the plains of the West and six miles in the Gulf States. It is a well-known fact that the pressure of the wind increases as the square of the velocity, and from observations a ten-mile breeze has a pressure of 0·492 pound per square foot of surface exposed to its force, a fifteen-mile breeze equals 1·107 pounds and a twenty-mile (brisk wind) has 1·968 pounds pressure per square foot.

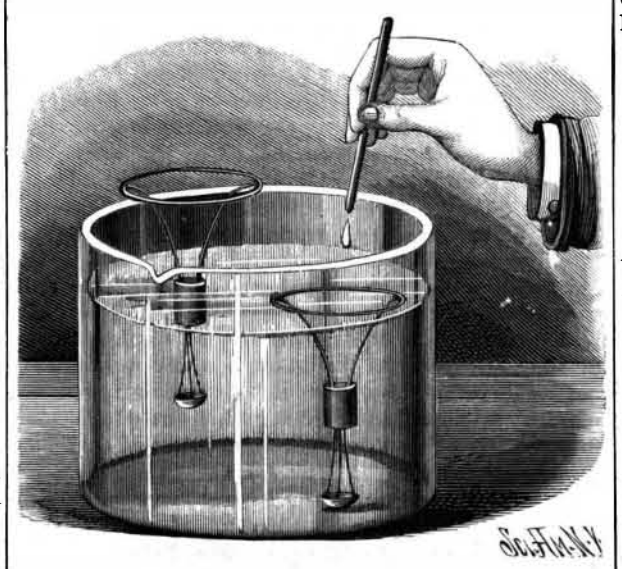

Fig. 4.—FLOATING AND SUBMERGED RINGS.

The horse power of windmills of the best construction is as the proportional squares of their diameters and inversely as their velocities; for example, a ten-foot mill in a sixteen-mile breeze will develop 0·15 horse power at sixty-five revolutions per minute. A twenty-foot mill with the same breeze and at forty revolutions per minute will develop one horse power; a twenty-five-foot mill, thirty-five revolutions, one and three-fourths horse power; a thirty-foot mill, twenty-eight revolutions, three and one-half horse power; a forty-foot mill, twenty-two revolutions, seven and one-half horse power; a fifty-foot mill, eighteen revolutions, twelve horse power.

The increase in power from increase in velocity of the wind is equal to the square of its proportional velocity, as, for example, the twenty-five-foot mill rated above for a sixteen-mile wind will with a thirty-two-mile wind have its horse power increased by $\frac{32^2}{16^2}=2^2=4\times1\frac{3}{4}=7$ horse power; a forty-foot mill in a thirty-two-mile wind will run up to thirty horse power, and a fifty-foot mill to forty-eight horse power, with a small deduction for increased friction of air on the wheel and the machinery.

The modern mill of medium and large size will run and produce work in a four-mile breeze, becoming very efficient in an eight to sixteen mile breeze, and increase its power with safety to the running gear up to a gale of forty-five miles per hour.

It has been often asserted that one of the great drawbacks to the general use of windmills for other than the exclusive pumping of water is the fact that when most needed the wind is at fault. This may be ever so true, but the fact that they have been so used for centuries and are largely now in use for milling purposes does not make them of less value in the view of the storage of twenty-four hours' work of the wind for a six to ten hours' output of power at the required time.

For mechanical work that can be carried on only during the ordinary ten-hour day this becomes a serious inconvenience; but as such power is always available from five to eight hours and often twelve hours in the twenty-four, a means of storage and transmission of power at any time to the time and distance required for use should be the proper recourse for rescuing an intermitting power from this difficulty, and thus make possible a uniform power of ten hours for an intermitting power of twenty-four hours.—*Iron Age.*

Cement for Rubber and Leather.

No. 1.

Carbon bisulphide	4	ounces.
India rubber in fine shreds	1	ounce.
Isinglass	2	drachms.
Gutta-percha	½	ounce.

Put a thin coating of the solution on the parts, allow to dry, heat to melting, place the parts in close contact, and hammer out all air bubbles.

No. 2.

Gutta-percha	16 ounces.
India rubber	4 ounces.
Pitch	2 ounces.
Shellac	1 ounce.
Linseed oil	2 ounces.

Mix together and melt by a gentle heat.

Cleanliness the First Law of Health.

The following words of the late Dr. Richardson should be ever kept in mind: "Cleanliness covers the whole field of sanitary labor. Cleanliness, that is purity of air; cleanliness, that is purity of water; cleanliness in and around the house; cleanliness of persons; cleanliness of dress; cleanliness of food and feeding; cleanliness in work; cleanliness in habits of the individual man and woman; cleanliness of life and conversation; purity of life, temperance, all these are in man's power."

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