

New Type of Battery.

A somewhat remarkable form of storage battery, which may be also used as a primary element, has been recently patented by M. Ernst Jungner. The peculiarity of the system is that the electrolyte does not vary in composition, nor in its degree of concentration, but the water alone is decomposed. To bring about this action the inventor uses potassium or sodium hydrate, etc., whose metallic bases decompose water. To form the active material of the plates he uses metals whose hydroxyl combinations cannot exist in the presence of water, but are decomposed into oxide and water. The active matter is supported upon plates of metal, preferably nickel or copper, whose oxides are not soluble in alkali. As an example of an element constructed upon these principles, the positive plate is of nickel, pasted with peroxide of silver, mixed with cement to give consistence. The negative is a copper plate upon which has been compressed a layer of finely divided copper. These electrodes are placed together in an ebonite vessel; they are separated only by a layer of asbestos paper, an alkaline solution being used as the electrolyte. A current is formed which is accompanied by the following reactions:

1. $\text{Ag}_2\text{O}_2 + 2\text{KOH} + 2\text{Cu} = \text{Ag}_2\text{O} + 2\text{CuOH}$.
2. $\text{K}_2\text{O} + \text{H}_2\text{O} = 2\text{KOH}$.
3. $2\text{CuOH} = \text{Cu}_2\text{O} + \text{H}_2\text{O}$.

The electromotive force of an element of this kind is 0.93 volt. The element may also be used as a storage battery, as upon passing a current into it in the opposite sense the reaction is reversed, and it is ready to begin anew. A less expensive form of cell is obtained by using ferrous oxide at the negative plate and black oxide of manganese at the positive; the reaction then becomes:



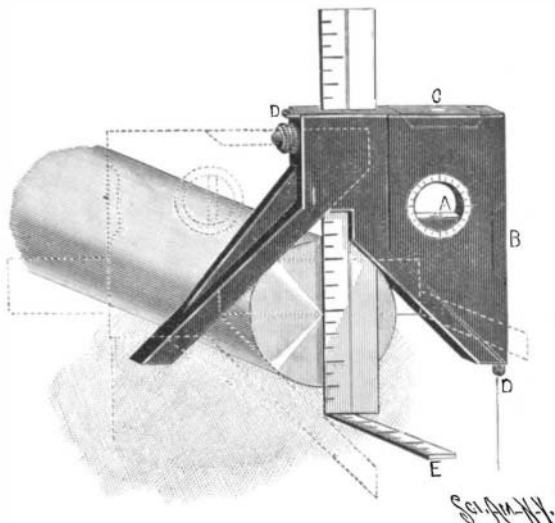
This form of cell is claimed to give a specific energy of 20 to 25 watt-hours per pound of total weight; the internal resistance of this element is very small, owing to the thin layer of electrolyte between the plates, and it is quite durable, owing to the small variation in the volume of active matter during the charge and discharge, as well as the freedom from secondary or local chemical actions. When used as an accumulator, it holds its charge a long time for these reasons, and does not seem to be affected by changes of temperature.

A SQUARE FOR MARKING SHAFT-KEYWAYS.

The illustration which we present herewith pictures a novel square which has been devised by Mr. Armand P. Dubus, of 634 Louisa Street, New Orleans, La., for the purpose of marking keyways on shafting.

The tool comprises a head having two straight edges at right angles to each other and two legs also at right angles to each other. The head is formed with a circular opening in which an adjustable spirit-level, *A*, is held. The straight edges of the head are also provided with levels, *B* and *C*, and with eyes, *D*, from which plumb-bobs can be hung if desired. Arranged to slide through the head so as to bisect the right angle formed by the legs is a 12-inch scale from which an extension, *E*, projects perpendicularly.

When the keyway is to be marked on the end of the shaft, the tool is placed astride the shaft with the spirit-level, *C*, perfectly horizontal. The line is then drawn along the edge of the scale. If it be desired to mark a keyway longitudinally on the shaft, the scale is moved up so as to lie with the extension, *E*, over the shaft.

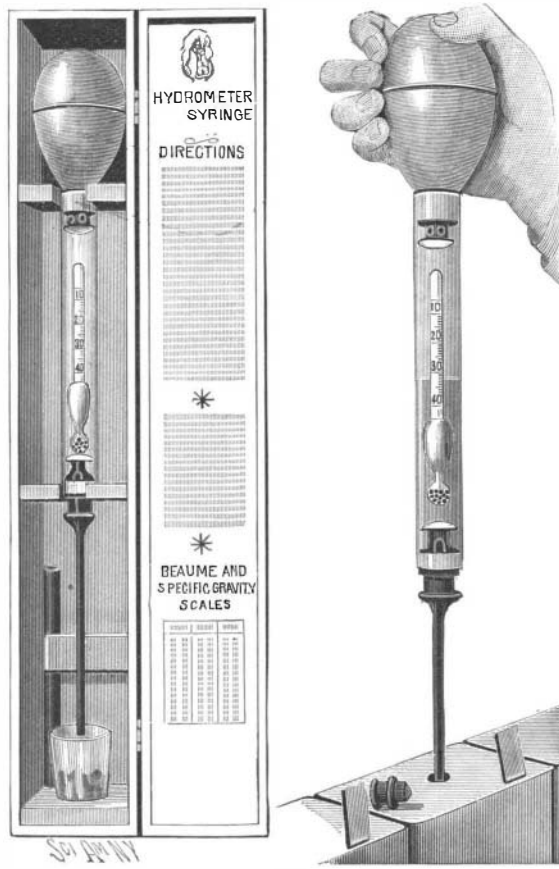
**A SCALE FOR MARKING KEYWAYS.**

Then, by reading from the level, *C*, the extension, *E*, can be made to indicate the proper line on the shaft. By turning the tool as shown by dotted lines, the reading edge of the scale is horizontally disposed and the horizontal center of the shaft determined as indicated.

A CURIOUS accident occurred recently in a feather bed factory in New York. The feathers got whirling so rapidly that the friction set them on fire.

THE HYDROMETER SYRINGE.

The need of this improvement arose from the fact that the removal of a portion of the fluid electrolyte from a storage battery cell, for the purpose of testing its specific gravity, has always been more or less annoying, disagreeable and unclean, since it has been customary to remove, by means of a syringe, a portion of the electrolyte and put it into a separate hydrometer tube to be tested by the hydrometer, or in the absence

**A COMBINED SYRINGE AND HYDROMETER.**

of a syringe the solution is poured out from the jar itself into the tube. The accompanying illustration shows a combined hydrometer and syringe which avoids the above described difficulties and provides in one instrument a convenient, cleanly method of adding or withdrawing fluid from the storage battery cells and at the same time, by means of the flotation of the hydrometer within the glass tube of the syringe, permits the specific gravity of the liquid to be quickly and accurately determined.

This is done by compressing the rubber bulb at the upper end (which expels a portion of the air), and inserting the long nozzle in the hole in the cover of the cell, then releasing the bulb, when the liquid rises and floats the hydrometer; the reading is then made, and the fluid returned to the jar by compressing the bulb. Each battery cell may be easily tested in this way and the specific gravity of several cells equalized when necessary by the addition or withdrawal of acid from one cell to another. The syringe, we are informed, has recently been introduced by the Storage Battery Supply Company, No. 239 East Twenty-seventh Street, this city, and is used by the electric vehicle companies.

By means of an additional nozzle having special perforations the filling of the cells with the electrolyte to their proper level above the battery plates is done by first filling the syringe from a supply vessel, then resting the nozzle on the top end of the plates and compressing and releasing the bulb two or three times. The excess above the proper depth is thus withdrawn by the syringe, which is equal to the distance between the perforations and the mouth of the nozzle. The interior bottom and top of the syringe tube is cushioned with rubber to prevent the accidental breakage of the hydrometer as the liquid is expelled.

The hydrometer is provided with the specific gravity and Baumé scale for storage battery use. It is obvious that it may be used for various purposes and with other liquids. When not in use the syringe is placed in a wood box, as shown, in which is a glass tumbler containing an absorbent which holds the surplus drainage of the acid solution. Lying on top of the jar may be seen the usual rubber plug for preventing the spilling of the solution when the jar is agitated. Suitable directions for testing storage battery electrolyte accompany each syringe.

It is a very convenient instrument and is particularly adapted for testing automobile storage batteries, since tests may be made with rapidity and facility.

Means of Discovering Living Tissue.

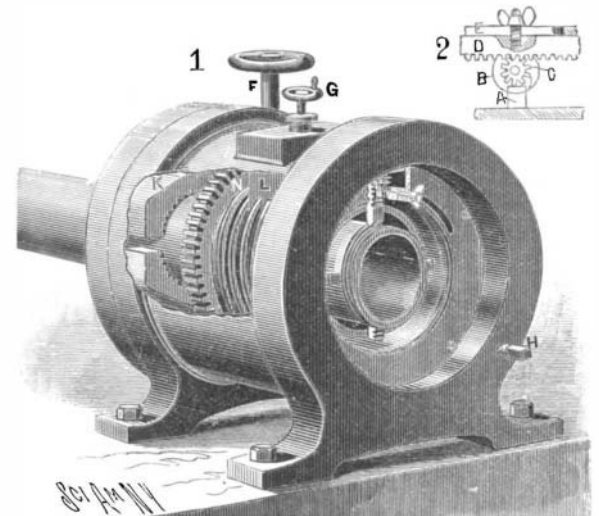
M. Augustus Waller has recently discovered a method of recognizing with certainty whether an organ or a tissue, either animal or vegetable, is living or dead. The action depends upon the following principle: Living matter responds to an electric excitation by a current in the same direction. The same matter, killed by an elevation of temperature, does not respond to

this excitation, or gives a contrary current of polarization. This reaction is, according to the experimenter, a positive proof that the matter acted upon is not inert; it is a general phenomenon, and is characteristic of living matter, as has been proved in the case of the muscles, nerves, retina, skin, etc., of animals, and upon leaves, flowers, fruits, etc. The arrangement for carrying out the experiments is quite simple, and may be found in every physiological laboratory. A sensitive galvanometer is necessary; the experimenter uses a reflecting Thomson galvanometer having a sensitiveness such that $1 \cdot 1^{-10}$ ampere gives a deflection of a spot of light equal to 0.1 inch on a scale placed two yards off. A pair of electrodes is connected to the object; any current arising from the object itself is compensated for while the galvanometer is in circuit, so that the latter may be connected or disconnected without producing any effect. The galvanometer is connected to the electrodes of the object and then short-circuited by a plug. The exciting circuit is also connected to the electrodes, and by depressing a key the current is sent into the object. This current is then interrupted and the galvanometer thrown in by removing its plug. If a current comes from the object, its presence is shown by the deflection of the galvanometer. The experiment is repeated with the exciting current in the opposite direction. If the galvanometer responds in one of these cases, the object is living, if not, it is dead. The importance of such a method need not be insisted upon; it may be easily verified by experiment, and the facility with which it may be carried out brings it within the reach of most experimenters.

A PORTABLE THREAD-CUTTING MACHINE.

In an improved portable hand-driven thread-cutting machine patented by Mr. D. Norwood Jerauld, of 26 Whitney Place, Buffalo, N. Y., a novel arrangement of parts has been devised which simplifies the construction ordinarily met with. In a casing a cylinder is mounted, having an exterior thread into engagement with which an adjustable feed-block, *L*, can be moved by means of a handwheel, *G*. To the rear of the cylinder a gear, *N*, is attached, with which an elongated pinion (not shown) meshes. The shaft of the pinion is extended, so that its outer end, *H*, can be engaged by a crank-handle or other suitable turning-tool. A die-carrier is attached to the forward end of the cylinder, which die-carrier consists of an outwardly-extended portion and inner and outer forwardly-extended portions. Dies are movable through openings in the interior flange. Worm-wheels, *B* (top sectional view, Fig. 2) engage the dies, *A*; and pinions, *C*, on the shafts of the worm-wheels engage a ring-shaped rack, *D*, mounted to rotate on the inner flange, previously mentioned. A stop-ring is attached to the outer flange, which stop-ring, as shown in Fig. 2, receives in an arc-shaped slot a pin extended from the rack-ring and provided with a thumb-nut, so as to hold the rack and consequently the dies in adjusted position. The pipe is rigidly held in place by clamping-jaws, *K*, operated by a handwheel, *F*.

When a pipe or rod is in position and the thread-cutting dies are in engagement with its outer surface, the cylinder is driven by the gear, *N*, and the elongated pinion whose shaft is seen at *H*. By its engagement with the feed-block, *L*, the cylinder is compelled to recede, thereby shifting the die-carrier and causing the dies to move longitudinally of the pipe while they are cutting the thread. When the thread is cut, the feed-block, *L*, is raised and the cylinder drawn forward, ready for new work without running back, by its thread

**THE JERAULD PORTABLE THREADING-MACHINE.**

connections. The jaws, *K*, are "self-centering" devices, since they hold the pipes rigidly in a proper, centered position.

A PIPE line, 142 miles long, has been built to carry Caspian petroleum to the Black Sea. The railroad was inadequate to handle the oil, and it was found more economical to lay the pipe line than to improve the road. At present, however, it must be carried by rail for 400 miles.