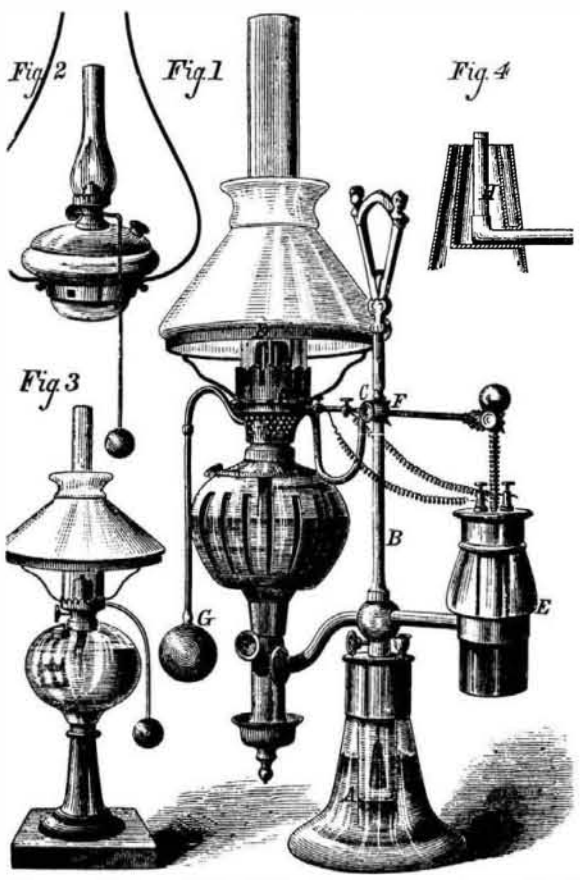
ZIMMERMAN'S HYDRO-ELECTRIC LAMP AND EXTINGUISHER.

We illustrate in the annexed engraving, Fig. 1, a curiously ingenious lamp, which has been recently invented by Professor Wm. H. Zimmerman, Vice President of Washington College, Chestertown, Md. The lamp is self-lighting, and this, although any form of burner, or wick, or any kind of illuminating fluid be used. To effect this, the inventor has arranged a combination of Professor Döbereiner's well known hydrogen lamp with a small galvanic battery, in a neat and even graceful design, so that the whole apparatus takes up no more room than the ordinary German student's lamp, which in fact, in exterior aspect, it somewhat resembles.

The Döbereiner lamp serves as the pedestal. A is the receptacle for the acid and water, and within is seen the inverted bell glass, in which the zinc is suspended. When the acidulated water attacks the zinc, hydrogen gas is evolved, which fills the interior bell glass, and forces out the water, until the latter, falling below the zinc, no longer acts upon it, and the evolution is arrested until, the gas being allowed to escape, the water again reaches its former level. This is the regular action of the hydrogen lamp, with which every student of chemistry is familiar, and regarding which nothing further need here be said. In the present instance the gas ascends the vertical tube, B, passes through the valve at C, when the same is opened, traverses a flexible tube, and finally escapes from a side orifice in the small vertical pipe, D, placed just beside the burner. Before leaving the hydrogen generator, it may be noted that the vertical tube is free to revolve in the metal cap which covers the glass pedestal, and may be secured, as desired, by the thumbscrew provided, also that said cap has a filling cup through which a fresh supply of acid and water may be poured into the pedestal. E is a small galvanic battery (bichromate of potash or otherwise), the zinc in which is attached to a vertical rod, a spiral spring on which keeps it raised, thus holding the metal out of the exciting fluid, and normally keeping the battery out of action. To the upper end of said rod is pivoted an arrow-shaped lever, F, which connects with the valve, C, in the hydrogen pipe, so that, when horizontal, or rather when its rod-supporting end is held up by the spiral spring above referred to, the valve, C, is shut. The conducting wires from the battery lead to binding screws on the chimney frame, and thence connect with two electrodes which stand vertically beside the hydrogen outlet, D. Between these electrodes is extended a fragment of fine platinum wire.

The automatic illumination of the lamp will now be readily understood. The operator simply pushes down the knob on the end of the battery rod. By so doing, he lowers the zincs, establishing a current which heats the platinum wire,



between the electrodes, red hot. As the rod descends the lever, F, tilts, and so opens the valve, C. A stream of hydrogen then escapes at D, strikes just above the incandescent wire, becomes inflamed, and so ignites the lamp wick toward which it is directed.

The inventor states that he has had the device in operation since last November, and that during this period he has renewed the solutions but once. The ignition, he states, is now instantaneous on touching the lever.

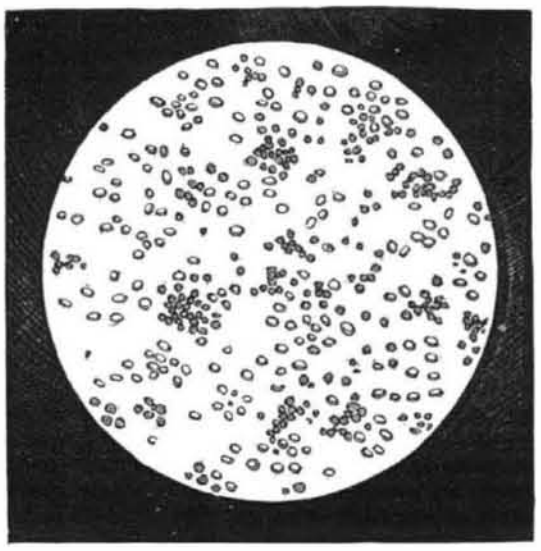
In connection with the apparatus described and applied to lamps of other patterns, in Figs. 2 and 3 we represent a novel device by the same inventor for extinguishing the light, the object being to avoid the danger resulting from the common habit of blowing down the chimney. A hollow rubber bulb, G, is connected by flexible piping to a metal tube, H, which passes up inside the burner, as shown in section in Fig. 4. Around the upper extremity of said tube are a number of small apertures, through which, when the bulb, G, is compressed, a number of radial jets of air are directed upon the burner, blowing the flame away from the wick and quickly causing its extinction. The lamps are provided with apertures for filling without necessitating the removal of the wick and chimney. As represented in Fig. 2, the device will prove particularly useful in lamps hung high and out of reach, as the flexible conducting tube may be of any length to render the bulb convenient to the hand.

These inventions were patented through the Scientific American Patent Agency, respectively March 9 and 16, 1875. For further particulars address the inventor as above.

THE DISEASES OF THE SILK WORM.

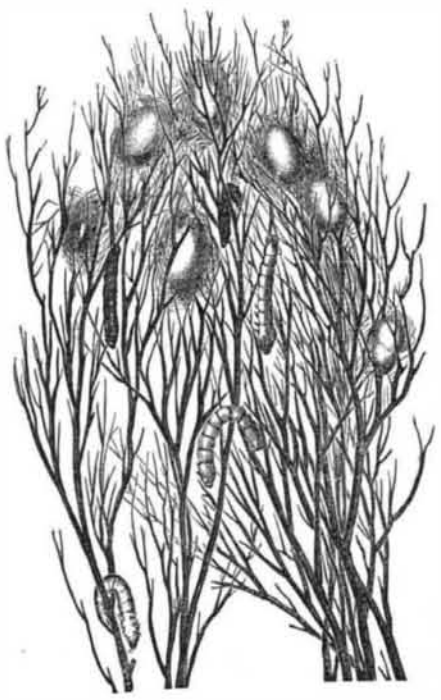
M. Pasteur, the distinguished French chemist, has recently published an exhaustive treatise on the above subject, the same being the results of his investigations conducted in the

Fig. 1.



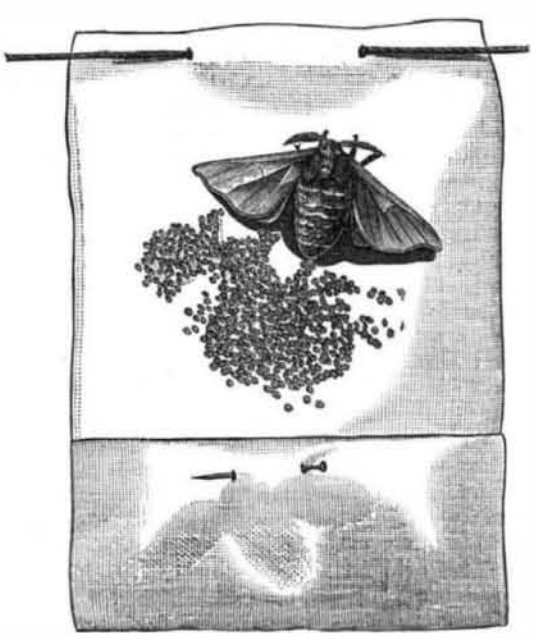
heart of the French silk-manufacturing district and under the auspices of the French Government. The enormous mortality which, during certain years, has happened among the silkworms, M. Pasteur ascribes to two diseases, each perfectly distinct. The first he terms *pébrine*, and it is characterized by the presence, in all the organs of the worm or but-

Fig. 2.



terfly, of small ovoid corpuscles, invisible except when magnified four or five hundred times, and then appearing under the microscope as represented in Fig. 1. The other disease, called *flachérie*, is an enfeeblement of the vital force of the

Fig. 3.



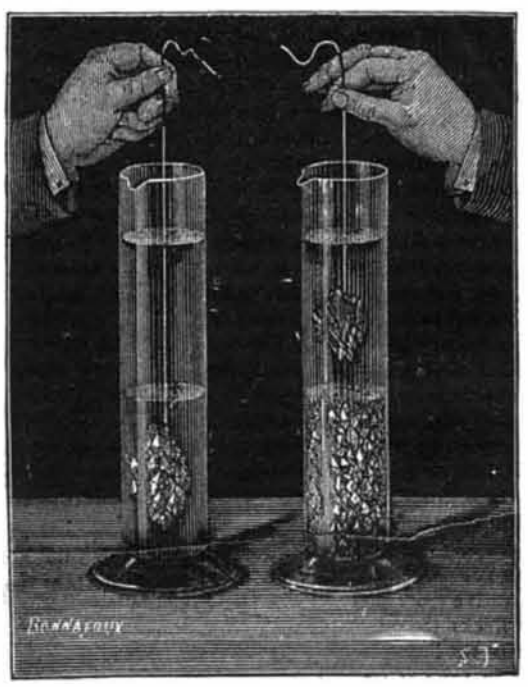
worm, and is recognized by the presence of a particular ferment in the digestive tube or stomach. The malady first mentioned attacks the worm at all ages, and is eminently hereditary and contagious. Its progress is very slow. The worm, born healthy but subsequently contracting the germ, generally has time to make its cocoon before falling a victim. The disease is, however, transmitted to the offspring, which perish prematurely. The way to avoid the trouble is to raise only such worms as come from eggs deposited by healthy butterflies. The cultivator, although by no means sure that the worms will not become diseased during their lives, is, however, secure in ultimately having cocoons which will remunerate his labor.

Flachérie is a disease more alarming than *pébrine*, because it attacks at the end of the fourth age, after the rearing is accomplished, and the cultivator expects soon to realize the fruits of his outlay of time and money. Within a few days every worm dies, leaving at the foot of the shrubs, which it had been hoped would be covered with cocoons, nothing but a mass of infected bodies. The effect of the disease is shown in Fig. 2. The malady is either accidental or hereditary, and may be caused by careless sanitary measures, in the conservation of the eggs, during the rearing, or more frequently by feeding on a leaf of bad quality. The heredita ry transmission is only to be guarded against by careful selection of the butterflies which are to furnish the eggs for the crop of the following year; and those attainted, after a little experience can easily be recognized by their lack of vigor and the slowness of their movements.

M. Pasteur gives the following instruction for obtaining eggs which are almost sure to yield a remunerative harvest In selecting the cocoons, preference should be given to those from a healthy stock, which are appear to be the finest. After the butterflies emerge, those which seem at all diseased should be carefully eliminated, and the others coupled and deposited on little squares of linen or calico suspended so that the insects cannot crawl from one to the other. As soon as the fecundation is terminated, the male is imprisoned by closing with a pin either one corner of the cloth or a little tuck previously made at the lower edge. (See Fig. 3.) After the deposition of the eggs, the female should be shut up in like manner, and the whole should be kept in a dry, well ventilated place, submitted to all the variations of the exterior temperature. Nothing remains further than to examine the butterflies for corpuscles, a proceeding to which the entire winter may be devoted, as it can be done just as well when the butterflies are dried. The examination is accomplished by grinding one or both of the insects on a cloth, in a mortar, with the quantity of water necessary to obtain a thick paste. A minute drop of this is placed beneath the microscope and examined rigidly. If any corpuscles characteristic of *pébrine* are recognized, the whole batch of eggs on that cloth are at once destroyed, and so on through all, keeping only such eggs as are entirely free from infection.

CURIOUS EXPERIMENT IN INSTANTANEOUS CRYSTALLIZATION.

It is well known that various salts dissolve in water in different proportions, and that the solution usually takes place more readily when the water is warm. After cooling, crystallization of the fluid takes place, but this may be prevented by leaving the solution in absolute quiet and protecting it



from contact with the air. It is then said to be supersaturated, and the least shock, or the addition of a minute crystal of the salt, is sufficient to cause instantaneous crystallization of the whole. A curious experiment, based on the above, has recently been devised by M. Peligot: 150 parts, by weight, of hyposulphite of soda are dissolved in 15 parts of water, and the solution is turned into a large test tube, previously warmed, so as to half fill the same. Another solution of 100 parts, by weight, of acetate of soda in 15 parts of boiling water is made, and this is carefully poured in on top of the first solution, so as to float on and not mingle with the latter. To the above two solutions is then added a little boiling water, and the whole is left in quiet to cool.

After the cooling is accomplished, a little crystal of hypo sulphite of soda may be let down into the liquid. The fragment will traverse the acetate solution without effect thereon; but on its reaching the solution below, instant crystallization of the same will take place, as shown in the figure on the left of the illustration. As soon as the reaction in the hyposulphite is finished, a crystal of acetate of soda may be caused to produce a similar result in the acetate solution