New and Stale Bread.

The nature of the difference between new and stale bread is far from being known. It is only lately that the celebrated French chemist, Boussingault, instituted an inquiry into it, from which it results that the difference is not the consequence of desiccation, but solely of the cooling of the bread. If we take fresh bread into the cellar or into any place where it cannot dry, the inner part of the loaf, it is true, is found to be crummy, but the crust has become soft and is no longer brittle. If stale bread is taken back into the oven again, it assumes all the qualities of fresh baked bread, although in the hot oven it must undoubtedly have lost part of its moisture. M. Boussingault has made a fresh loaf of bread the subject of minute investigation, and the results are anything but uninteresting.

He took a round loaf, one foot in diameter and six inches thick, and plunged a thermometer into it three inches deep immediately on being taken out of the oven. When the thermometer was taken out it was found to indicate 78° Réaumur (207·50 Fah.). This might well appear surprising, seeing that the oven was heated to 240° R. But we must consider that in the inside of the loaf, on account of the water with which the dough has been mixed, the temperature cannot rise above boiling heat, that is, 80° R. (212° Fah.), as long as the bread has not lost all its water and become perfectly dry; but it takes a long time to come to that on account of the protective thick crust. The loaf was then taken into a room heated to 150° R., the temperature of the air. At this time it weighed 7½ lbs. In twelve hours the temperature of the loaf sank to 19°, in 24 hours to 15°, and in 36 hours to 14°. In the first 48 hours it had only lost 2 ounces in weight, which, in a loaf of such a size and weight, must be considered an insignificant loss. When after 6 days the loaf was again put into the oven, and the thermometer indicated that its temperature had again risen to 55° R., it was cut and found to be as fresh and to possess the same qualities as if had been taken out of the oven for the first time; but it had lost now not merely 2 ounces, but 12 ounces in weight. M. Boussingault now made separate experiments with slices of the loaf, and also with the crumb, all of which showed precisely the same results, so that it may be considered fully established that stale is distinguished from new bread less by containing a smaller quantity of water than by a peculiarly altered molecular condition, which begins to manifest itself in the process of cooling, which continues to develop itself more and more, and lasts as long as the temperature remains essentially unchanged, but is annulled the moment the temperature has reached a certain height. The molecular condition is the form and the union of the smallest parts dependent upon it; it decidedly indicates a mechanical relation which undergoes changes in consequence of chemical processes. It is this mechanical relation also which makes the difference dietetically between new and stale bread. New bread, in its smallest parts, is so soft, clammy, flexible, and glutinous (in consequence of the starch, during the process of fermenting and baking, being changed into mucilaginous dextrine), that by mastication it is with greater difficulty separated and reduced to small pieces, and in its smallest parts is less under the influence of the saliva and digestive juices. It consequently forms itself into hard balls by careless and hasty mastication and deglutition, becomes coated over by saliva and slime, and in this state enters the stomach. The gastric juice being unable to penetrate such hard masses, and being scarcely able even to act upon the surface of them, they frequently remain in the stomach unchanged, and, like foreign bodies, irritate and incommode it, inducing every species of suffering—oppression of the stomach, pain in the chest, disturbed circulation of the blood, congestions and pains in the head, irritation of the brain and inflammation, apoplectic attacks, cramp, and delirium.—*The Miller*.

Leather from Sheep Stomachs.

Among the recent patents is one issued to Edward Tivet, of Philadelphia, for a process of treating sheep stomachs, by which means a light and serviceable leather is produced particularly adapted for purses, bags, and other similar articles, as the leather produced by it is in the form of sacks or pouches.

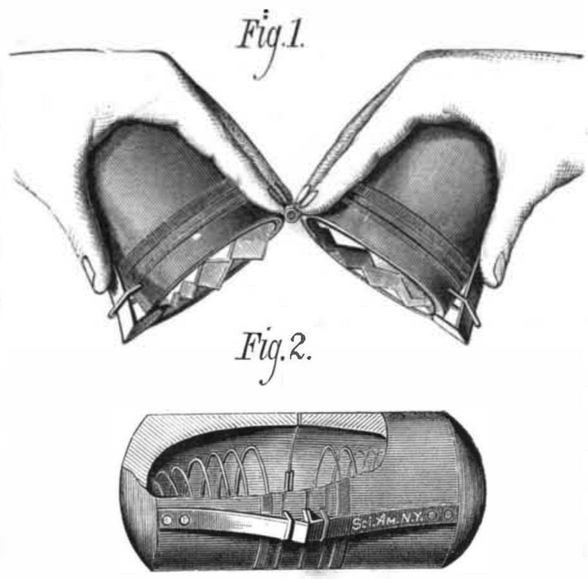
The following is the process: Take the stomach proper of the sheep, in the state in which it comes from the animal, the gut and ligaments being previously or subsequently severed, and empty it, and, while it is yet fresh, remove by a dull scraper the softest or least adherent layers of the external covering or serous surface, thus leaving the firmest part of the peritoneal or serous surface adhering to the muscular or middle membranes. The stomach is now turned inside out and brushed, so as to remove the mucous surface, thus leaving only the muscular tunic or middle membranes, covered on the outside by the portion of the serous membrane that remains, the result whereof is a thin white integument, presenting on the inside a multitude of *papillæ*, intimately adhering to it, which integument is to be treated so as to be preserved and its pliability retained. This may be accomplished by any known process of tawing or tanning, some glycerine being used for keeping the pelt in a suitable state of moisture. Among these processes the following may be mentioned. For tawing about ten pounds of the prepared integuments, form a paste of one half pound of alum dissolved in one half gallon of water, one and a half pound of best wheat flour, the yelks of one dozen eggs, and five ounces of pure concentrated glycerine, more or less, all well mixed together.

The integuments are placed in the paste, and permitted to remain therein for about one day, after which they are wrung out and hung up to partially dry, are then stretched to shape, and a small quantity of linseed oil rubbed over the muscular surface of the integuments, which are then permitted to dry to the full extent.

If desired, dye stuff may be advantageously applied to the integuments prior to the treatment with the paste.

A NOVEL EGG OPENER.

For almost every operation in the shop or household there are devices which not only save labor, but accomplish results more satisfactorily. The simple device shown in the accompanying engraving is one of those useful things that



EGG OPENER.

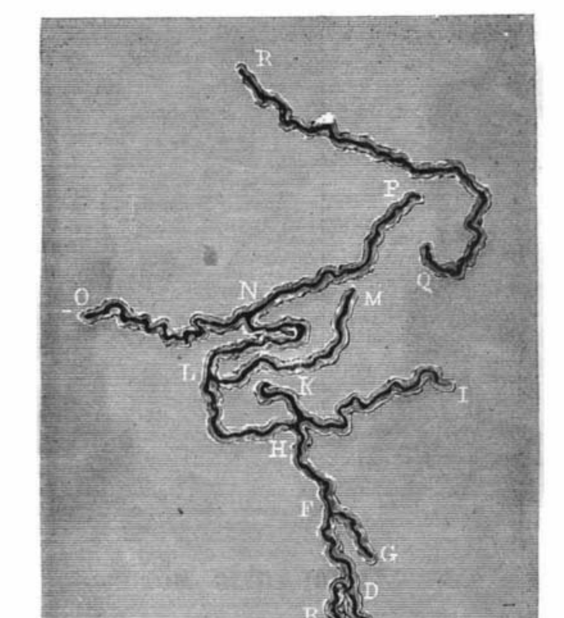
eventually finds its way into almost every house. It consists of two cups hinged together at one side, and each having at the opposite side a flat spring, the end of which is bent inward. Each cup contains a conical spiral spring for holding the egg in a central position when the device is shut.

The egg is inclosed in the cups, when the two flat springs are pressed inward so as to break the shell, after which, and while the springs are still pressed, the cups are opened, separating the shell and discharging the contents thereof. Upon releasing the flat springs the shell is thrown out by the spiral springs.

This device was recently patented by Mr. G. W. H. Kry, of Brooklyn (E. D.), N. Y.

ARTIFICIAL BALL LIGHTING.

The mica plate condensers which enter into the construction of Planté's rheostatic machine (*Comptes Rendus*, vol. lxxxv.) are sometimes pierced, when the plates of mica are too thin, under the action of a current from 800 secondary couples, the same as the glass of a Leyden jar too strongly



PATH OF ELECTRIC SPARK OVER A SHEET OF MICA.

charged by an electric machine. This accident has given M. Planté the occasion to observe a very curious fact, which consists in the slow and progressive movement of the electric spark. One of these condensers being placed upon an isolated metallic plate, in connection with one of the poles of the secondary battery, and the upper armature being touched with the other pole, a spark bursts forth upon some point of the surface of the too thin condenser, forming a fissure in advance of it. This spark then begins to move in the form of a very brilliantly luminous little globule, accompanied by a peculiar rustling sound, and slowly traces, on the tin foil of the condenser, a deep sinuous and irregular furrow. The annexed engraving gives a faithful representation of a part of the surface of a condenser on which the phenomenon has taken place. The spark appears at first at A, soon ramifies to B, then to C, then disappears to immediately reappear at the point, B, with such rapidity, and in such an inappreciable interval of time, that it seems to have made a leap. It directs itself afterward toward D, where it forms a new ramification, which ends at E, reappears at D, continues its course toward F, and so on. Sometimes (as in the present case) the spark shows itself anew further off at a point, Q, detached from the principal furrow, to end afterward at R, and the phenomenon only ceases when the sheet of mica no longer presents a portion thin enough to be traversed. In other cases, the spark remains for some time stationary around the same point; at other times, again, one of the branches elongates out of all proportion, and describes over the whole surface figures analogous to those on a geographical map. It should be understood that a tube of water is interposed in the circuit of the secondary battery, for the purpose of avoiding too intense calorific effects, and the deflagration of the whole condenser. During the progress of the phenomena, it cannot be foreseen through what points the spark will pass, and nothing is more strange than the movement of this dazzling little globule, which is seen slowly making its way and choosing the points toward which it is to direct itself according to the greater or less resistance of the different points of the isolating plate. The condenser is found to be cut through in the pathway of the spark, and the melted tin forms a double row of beads along the edges of the consumed mica. It is a sort of Voltaic arch produced successively at the expense of the material of the condenser, as in the electric candles of M. Jablochkoff; but the mica here contributes more to the brilliancy of the globule than does the incandescence of the metal, producing (like quartz and the silicates) electrosilicic light. This experiment may throw a new light on the phenomena of "ball lightning." It confirms the opinion already expressed on this subject by M. Du Moncel, in 1857, as well as certain views since proposed by M. Planté, and based on other experiments. It results from what has been said that, at the point where lightning of this kind manifests itself, there must very likely be formed the elements of a condenser, in which a powerfully electrified column of moist air plays the part of upper armature, the soil that of the lower armature, and the layer of interposed air that of the isolating plate. Here the spark is doubtless a globule of matter in fusion, of a different nature from that which constitutes the balls of lightning. But M. Planté has already shown, too, that there may be obtained, with dynamic electricity at a high tension, globular electric flames formed solely of the elements of the air and gases from the vapor of water, rarefied and incandescent; and that these globules naturally followed the movements impressed on the electrode under the conductive surface.

It only remains to show now that, were luminous electric globules formed of another matter, they might move spontaneously and slowly, even when the electrode remains immovable.

The experiment just described puts this fact in evidence, and appears to be of a nature to explain particularly the slow and capricious movement of ball lightning.

New Sources of Rubber.

The director of Kew Gardens (Eng.) has given much attention to the matter of extending the sources whence this valuable product is obtained. In his annual report he states that though a large proportion of the young plants of the Para rubber (*Hevea Braziliensis*) brought to Kew failed to thrive, seeds and plants of the Ceara rubber have been obtained, and a considerable stock successfully raised. Para rubber plants have been transmitted to Calcutta for distribution to Assam and Burmah, where, it seems, they are now doing well. Favorable reports have also been received from Singapore, where it is said that, judging from the progress the plants have made, the climate is evidently suited for their growth. The same may be said of Ceylon, whence the superintendent of the government gardens reports that cuttings of *Hevea* strike readily, as well as those of *Castilloa* and the Ceara plant.

In Jamaica, also, the plants of *Hevea* are doing well. The propagation of the Central American rubber plant (*Castilloa elastica*) is still being proceeded with at Kew, and during the past year plants of this species were sent to Liberia, Mauritius, Singapore, and Ceylon. The Ceara rubber, owing to its totally different habit from that of the other two species, will, it is thought, prove to be best fitted for cultivation in Bengal and the drier parts of India.

Regarding new sources of India rubber, reference is made to a creeping Burmese plant, the *Chavannesia esculenta*, which was first noticed so long back as 1860, and again made the subject of a pamphlet published in India in 1874. The plant is there stated to be one "for whose extermination in the teak tracts an annual budget provision is made." From Fiji samples of rubber were received at Kew, which were reported as "a strong, elastic, pure rubber, of the same character as the higher grades of African rubber." This rubber would seem to be the produce of a plant closely allied to *Tabernæmontana pacifica* or from *Alstonia plumosa*, both of which appear to yield caoutchouc in Fiji, and both of which belong to the same natural order Apocynaceæ. Regarding the rubber producing plants of the east and west coasts of Africa, which are referred to as species of *Landolphia*, also belonging to the same natural family as the pre-