APPARATUS FOR TESTING BREADSTUFFS.

In the accompanying plate, reproduced from the industrial publication, *Machines, Outils et Appareils*, are represented the various apparatus used in France for ascertaining the composition and quality of breadstuffs, such as their density, their hydration, their proportion of gluten, their degree of expansibility, etc.

DENSIMETER (Figs. 1 and 2).

Fig. 1 represents, in vertical section, the little instrument called a *densimeter*, by means of which it is easy to measure density with great accuracy. It is nothing else than a glass flask, A, closed by a hollow stopper, B, which is surmounted by an elongated tube terminating in a small funnel. Toward the center of this tube there is engraved a horizontal mark, *a*, which indicates what shall be the level of the distilled water with which the flask is filled. After the flask has been filled with water it is accurately weighed, and, as this weight will always be the same, it may then be marked on the bottom of the vessel. Thus the weight of the densimeter figured is 85·25 grammes when it is full up to the mark *a*. To use it we begin by weighing exactly 10 grammes of the grain to be tested, and which we then put into the flask, taking care afterward to shake the latter so as to free it from air bubbles, and then to close it. If the level does not reach the mark, *a*, a small quantity of water must be added; but if, on the contrary, it exceeds it, the excess must be removed by absorbing it with a piece of twisted bibulous paper introduced through the funnel.

When no densimeter like the one described is at hand, the real volume and specific weight of the grain may be estimated quite approximately by means of a tube graduated into cubic centimeters and fractions, as shown in Fig. 2.

Let us suppose, for example, that this tube is filled with distilled water up to the eighth division, which represents 80 millimeters. If, after weighing a gramme of grains, these be thrown successively into the tube (care being taken to disengage the air bubbles), we shall naturally see the level of the water rise. Now if, after the last grain, such level marks 88 millimeters, we may evidently draw the deduction therefrom that all the grains have displaced but 0·8 of a cubic centimeter of water, and that consequently its density is—

$$10 \div 8 = 1·25.$$

DESICCATING APPARATUS (Figs. 3 and 4).

In order to know the proportion of water contained in the grain it is not necessary, when operating upon small quantities, to have a special stove for drying it; but a small apparatus will answer, like that shown in vertical section in Fig. 3, and in plan in Fig. 4. This consists of a pot, D, filled with linseed or neatsfoot oil, and placed over a small laboratory furnace, E, situated under a kitchen chimney funnel. The fuel used may be charcoal or live embers. If gas be at one's disposal, it would be preferable to place the pot on a small portable gas stove.

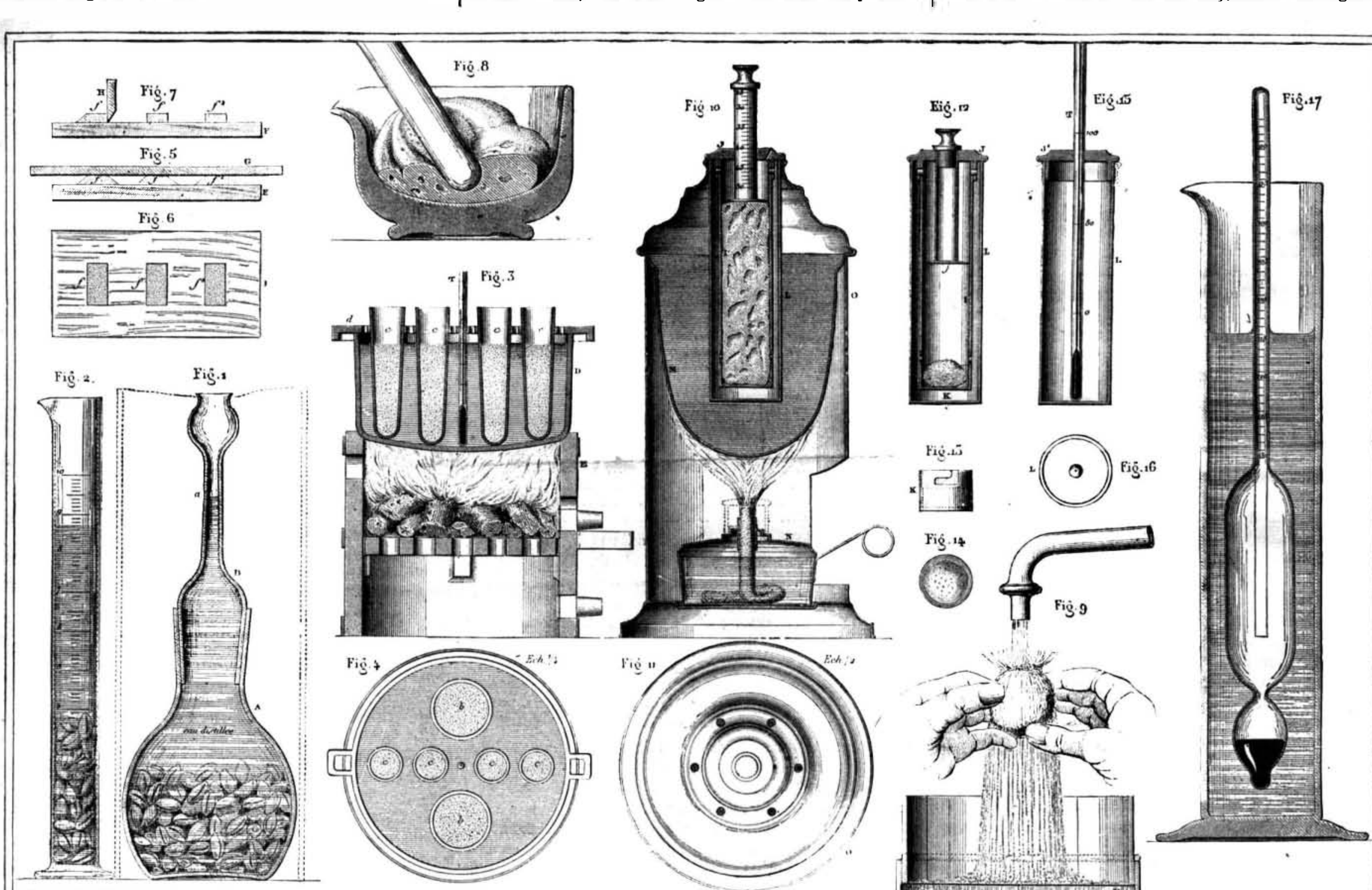
The samples of grain, having been first crushed in a small marble mortar, are each weighed with care and placed in capsules of baked clay, *b* (Fig. 4), or in a sort of conical glass test tubes, *c*, all of them supported by a cover, *d*, containing apertures. The oil bath should be heated to a temperature of a little over 100°, which may be ascertained by means of a mercurial thermometer, T, graduated up to 160° to 180°.

After from three-quarters of an hour to an hour the desiccation may be regarded as complete. If, however, on removing the samples and weighing them there is some doubt that they are not entirely dry, they should be put back into the capsules and submitted to a temperature of 120°.

of testing wheat flour: Sixteen grammes of each flour to be compared are taken and formed into a paste with 8 grammes of water. The stiffest paste indicates that the flour that composes it is the best, and the softest paste, on the contrary, proceeds from the poorest flour.

PROPORTION OF GLUTEN.

Beccari appears to be the first who succeeded practically in isolating the gluten from the other elements of the grain. The best method of doing this with accuracy consists in mixing the flour with half its weight of water in a crystal mortar (Fig. 8) with a glass rod, in order to form a homogeneous paste, which is afterward formed into a ball with the hands and held under a stream of water, as shown in Fig. 9. This water detaches the starch and carries it along with it through a very fine silk sieve, H, which is placed beneath so as to catch all the small particles that have not been sufficiently wet, and that are afterward added to the ball. This latter is compressed, while turning it continuously between the fingers under the stream of water from one-half to three-quarters of an hour, until it contains nothing but gluten. This state of its composition may be known from the appearance of the water, which, when it flows through the sieve clear and limpid, gives evidence that it contains no longer any starchy material. Not only is the gluten then freed from the starch that it contained in its tissues, but also from all other soluble bodies that accompanied it. In this state it is strongly compressed in the hand to express a part of the water that it stills holds mechanically, and then weighed.



IMPROVED APPARATUS FOR TESTING BREADSTUFFS.

When the level is exact, we weigh the whole upon the pan of an accurate pair of scales. We find, for example, that the weight is 87·45 grammes. Now, as the filled flask weighed 85·25 grammes, if we add to these figures the 10 grammes of grain, the total weight will be 95·25 grammes. The difference between these two quantities marks in cubic centimeters the volume of water displaced, say—

$$95·25 - 87·45 = 7·8 \text{ cubic centimeters.}$$

This, then, is the real volume of the grain in cubic centimeters. Consequently, the density is equal to—

$$\frac{10}{7·8} = 1·282.$$

In general, if we represent by p the weight of the flask and its stopper; P, that of the water it contains; Q, the weight of the grain in open air; x, that of the water that it displaces in the vessel; Q′ being the weight of the flask filled with water and grain; we have—

$$x = Q + (P + p) - Q'.$$

If, in performing the experiment, care be taken to count the number of grains making up the 10 grammes, the mean volume of each grain may be had in cubic millimeters, as well as the number of grains included in a kilogramme. Thus in the example given the 10 grammes contained 195 grains, so the mean volume of each grain was—

$$7{,}800 \text{ cubic millimeters} \div 195 = 40 \text{ cubic millimeters,}$$

and the number of grains per kilogramme

$$= 195 \times 100 = 19{,}500.$$

PEKAR PROCESS FOR TESTING FLOUR (Figs. 5, 6, and 7).

Upon a small wooden board, F, covered with a coating of shellac, is placed a small heap of flour, *f*, which is pressed down by means of a piece of plate-glass, G, and then, by means of the cutting edge of a glass tool, H, is given the form of a rectangle. In the same way are arranged other heaps, f^1, f^2, etc., which are placed as near to the first as possible, care being taken to have them of the same thickness. The board thus filled with heaps of flour is immersed in water until the flour is completely wet. When it is taken out, the differences in coloration may be much better distinguished. These differences are rendered still more striking by the addition of 5 per cent of sulphuric acid to the water.

THE OSER PROCESS.

Mr. J. Oser, of Krems, has proposed the following process

When the operation is performed carefully, absolutely not a particle of the gluten is lost, and consequently the method may be regarded as sufficiently exact in practice.

BOLAND'S ALEUROMETER (Figs. 10 to 16).

We owe to Mr. A. Boland the remarkable instrument called an *aleurometer*, and which is designed to measure the degree of expansibility of gluten.

The apparatus consists of a small copper cylinder, I (Figs. 10 and 12), 0·105 of a meter in length and 26 millimeters in diameter. This is surmounted with a screw plug, J, which closes it above, and which serves at the same time as a guide for the hollow rod, *j*. This latter terminates at the base in a flat disk, *j′*, that performs the role of piston, and that enters the cylinder freely so as to occasion no friction when it is raised by the elastic force of the heated gluten, and so as to permit the steam to escape above. The rod is graduated into 25 equal parts. The first division, corresponding to the point 25, is immediately under the button that rests on the cover, J, and the last is 50 millimeters lower down; consequently each degree corresponds to a separation of 2 millimeters, and this same point, 50, is 11 millimeters above the disk—a distance equal to the thickness of the cover. Finally, to the lower part of the cylinder is affixed, by a bayonet catch, a small receptacle, K (Figs. 13 and 14), 13 millimeters in height, the upper edge of which is also 50 millimeters beneath the diaphragm, *j′*. It is into this receptacle that is placed the ball of gluten whose elasticity is to be tested. The cylinder, I, forming the aleurometer properly so called, is placed, when operating, in a copper sheath, L (Fig. 15), which is placed in an ellipsoidal vessel, M (Figs. 10 and 11), that performs the role of a stove, and that is filled to a certain height with neatsfoot oil heated by a spirit lamp, N, placed underneath. The sheath, L, which is wholly immersed in the oil, has a flat bottom, and is closed above with a cover, J' (Fig. 15), which may be taken off and put on at will to permit of the introduction and removal of the aleurometer, as seen in Fig. 10, or of the introduction of a thermometer, T (Fig. 15), that marks from 50° to 200° C.

The entire apparatus is inclosed in a thin copper jacket, O, containing apertures in the upper part of its circumference, and united with a circular copper base that carries a spirit lamp, N.

While the paste is being prepared as described above, the oil bath is heated up to 150°. Then the gluten is inserted in the receptacle, K, and the aleurometer is placed in the vessel, M. As the capacity of the cylinder, I, and of its receptacle, K, is limited to the dimensions indicated, only 7 grammes of the gluten are taken, and with this a small ball is formed which is rolled in dry powdered starch to prevent it from sticking to the sides of the instrument, which itself has been slightly oiled. After the introduction of the cylinder containing the gluten into the oil the temperature of the latter is kept up for ten minutes, and then the lamp is extinguished. The apparatus is then left to itself for ten minutes longer, and after the height to which the diaphragm has risen has been ascertained, the diluted gluten is taken from the aleurometer.

Mr. Boland explains that the gluten, under the influence of the water that it contains, and which is disengaged in the form of steam through the orifice, *o*, dilates and rises and solidifies, moulding itself as it does so against the inside of the cylinder. In its expansion it traverses, first, the empty space of 25 degrees that separates it from the diaphragm, *j'*, and acquires enough force to raise the latter several times its maximum of dilatation, expressed by the 50 degrees brought to light above the cover or screw cap, J.

It may happen that the gluten does not reach the rod—that is to say, that it does not possess 25 degrees of dilatation. This would indicate that the flour whence it was derived was unfit for making bread.

ROBIN'S APPRECIATOR (Fig. 17).

In his treatise on baking, Mr. Boland says: "One of the most intelligent bakers of Paris . . . has found that gluten acquires solidity in cold water, softens in hot water, and loses its consistency in water about to boil; that mineral acids convert it into a material that he compares with bitumen; that vegetable acids dissolve it more or less; and, finally, that it may be totally dissolved by leaven when the latter has passed the limit of alcoholic fermentation and a formation of acetic acid has occurred. The apparatus devised by him (Fig. 17) to determine the quantity of gluten contained in flour is based upon the solubility of this substance, and of the albuminous matter in diluted acetic acid without touching the amylaceous matter. It is nothing else than a very sensitive areometer, whose divisions make known at first glance the number of 2-kilogramme loaves that a 157-kilogramme bag of flour will furnish, provided, always, that the gluten is of good quality."

Mullein as a Remedy for Coughs.

Dr. Quinlan, of Dublin, who last year read a paper at the British Pharmaceutical Conference on the hemostatic properties of the *Plantago lanceolata*, has recently investigated the properties of the common mullein, *Verbascum thapsus* (*British Medical Journal*, January 27, p. 149). This plant has long been used in Ireland as a domestic remedy for consumptive cough, and Dr. Quinlan has made a series of experiments with a view to determine if it really possesses the valuable properties attributed to it. He finds that when boiled in milk the patient takes the decoction readily, and experiences a physiological want when it is omitted. Its power of checking phthisical looseness of the bowels and the relief afforded to coughing were very marked, so that the patients took hardly any other cough mixture. In early stages it appears to have a distinct power of increasing weight, but in advanced cases Dr. Quinlan remarks that he is not aware of anything that will do this except koumiss.

Cleaning Watches with Benzine.

A correspondent of the *Watchmaker and Metalworker* tells how he cleans watches with benzine. The method may be useful for other fine work. He says: I immerse the parts in benzine and dry in boxwood sawdust. This gives the gilding a fresh, new look which I have not been able to get by any other process. The movement must be entirely taken down. The dial screws may be screwed down tightly and left, but all parts united with screws must be separated, so that there will be no places where the benzine can remain and not be at once absorbed by the sawdust.

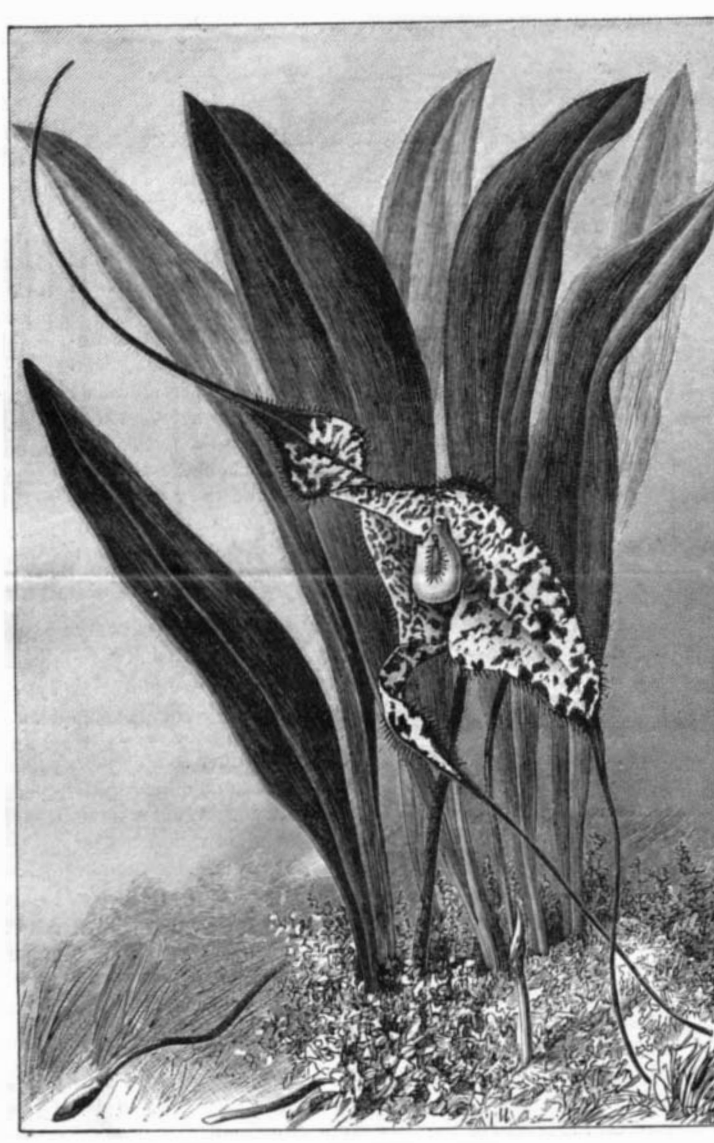
I have a large alcohol cup, which I fill about half full of benzine, taking down my movement and putting the larger pieces in the fluid. The scape wheel, balance, and delicate parts I treat separately, that they may not be injured by contact with the heavier pieces. I then take the pieces one at a time, and tumble them into the sawdust. In a few seconds they will be dry, when I pick them out and lay in a tray, using brass tweezers, which do not scratch. I treat all the parts in this way except the mainspring, when a slight use of the brush and clean chamois will remove all dust. Of course, the holes must be cleaned with a pointed peg; and I wipe out the oil sinks with chamois over the end of a blunt peg, but it is not often necessary to clean the pinions with a peg; they will come out of the sawdust bright and clean.

The mainspring must not be put in benzine unless you want it to break soon after. The fluid seems to remove the fine oily surface which a spring gets after working for a time, and which is very desirable to retain; so I clean my springs by wiping with soft tissue paper. If they are gummy I put on a little fresh oil to soften, and wipe off, being careful not to straighten out the spring.

THE MASDEVALLIA CHIMÆRA.

The *Masdevallia chimæra* is one of the most fantastic productions of the vegetable kingdom. In looking at this strange flower one sees the colors of a nocturnal bird, the form of a large spider in the middle, with two small piercing black eyes.

This flower is a native of the deep, humid valleys of New Granada. B. Roezl discovered it in the valley of Cauca, in 1872, and since that time it has been found successively by G. Wallis, Klabosch, and other collectors of ornamental plants.



THE MASDEVALLIA CHIMÆRA.

The *Masdevallia chimæra* was described for the first time in 1872 by M. H. G. Reichenbach, but incorrectly. The description has been corrected since, but it is none the less true that the history of the flower is still full of contradictions. The plant which was described in 1873, in the *Illustrated Horticulturist*, under the name of *M. chimæra* was not the one which M. Reichenbach described under this name, but is apparently another species—the *M. nycterina*. The various illustrations of *M. chimæra* which have appeared in some botanies differ considerably from each other in the coloring, and even in the form of the flowers; it appears that this species is really polymorphous. Roezl has even disputed the identity of the plant described by M. Reichenbach with the one discovered by him, to which he persists in attributing much larger dimensions and several particular characteristics. Recently the *Gardeners' Chronicle* published a description of this flower, which is similar to the one described by Roezl.

The *Masdevallia chimæra*, which we illustrate, flowered in the month of November, in the collection of M. F. Massange de Louvrex, Chateau of St. Gilles, Liege. It is very much like the one described and illustrated by M. W. G. Smith in the *Gardeners' Chronicle*, and it presents all the characteristics attributed to this species in the recent description by the learned orchidologist of Hamburg.

The culture of these plants is not difficult, but certain conditions are necessary. The most important is the quality of the water, which must be free from lime, pure, and fresh. The air should also be pure as that of the mountains. The temperature should not be raised either day or night. As to the soil, the less earth there is, the better it will be. Living moss is sufficient, with good drainage of pieces of broken crocks and charcoal; there may be added some fragments of fibrous earth.

The plant is developed in compact bunches of leaves, thick, and of a relative length of 0·20 m.; the flower stems, slender and also lengthened (0·10 m.), creep in the moss, and are terminated by a very large flower (0·20–0·25 m.), which blossoms under the leaves, unless it is supported by a light prop. The flower cup is very open and deeply divided into three diverging lobes, whitish, but abundantly speckled with small, unequal, and irregular spots of dark pink, and all bristling with hairs, scattered but abundant, white or rose colored, according as the surface from which they proceed is one or the other color.

The lobes are directed, one upward, the other two downward. All three form an angle a little twisted, especially the upper one. They are prolonged in a long, smooth horn (0·08–0·10 m.), which is rose colored, straight, or a little curved. The two petals are very small (0·003 m.). The lip formed in the inferior petal of the flower is relatively large (0·014 m.); articulated at the base; of a pale pink; it has two converging crests in the middle part; the border has the form of a marine trumpet, raised at the edge, curved internally, and cut into teeth; the extremity large; the bottom has three projecting crests; column very short, curved, pale yellow; ovarium bent upon the peduncle, thick, soft, and of a brown color.—*La Nature.*

Ball Bats.

Probably the largest manufactory is that of Spalding, at Hastings, Mich., where 100 men are employed. Half a million bats are supposed to be the demand for the present year. The *Northwestern Lumberman* says:

Ash is the staple bat wood. The ash bat is universally preferred and used by professional players, and gives the best satisfaction. In the matter of weight, strength, and durability, bats of that wood seem best adapted to the wants of the batter. A proportion of fancy, and necessarily higher-priced, bats are made of cherry. Including the different woods and various sizes, there are 22 styles of bats made for the trade, ranging in price at retail from 10 cents for a juvenile article up to $1.50 for an æsthetic cherry bat.

The Hastings factory will use in the neighborhood of 350,000 feet of ash, 250,000 feet of basswood, and 50,000 feet of cherry lumber this season, which means about 25,00 gross or 30 car loads of bats, and the demand may be such as to increase the output. Another bat factory at South Bend, Ind., will consume about 125,000 feet of lumber, and one at Grand Rapids, Mich, 75,000 feet more.

The bats made in the East are said to represent about 10 per cent of the total product, and are mainly of a cheap order, many of them being made from pine and oak. Including everything, the estimates made place the amount of lumber consumed in bat making at from 900,000 to 1,000,000 feet. Giving the industry the benefit of the doubt, and figuring the average of two feet to a bat, the figures given at the start are reached—500,000 bats.

The best kind of lumber is required in making good bats, and the stocks of the raw material are kept two years in advance, in order to have them thoroughly dried. Kiln drying is avoided, principally on account of the waste entailed by the method. If made from the kiln dried material, a great many bats would check, and they would have to be thrown out. Hence the precaution is taken of having the lumber in exceptionally good condition as to seasoning and quality before using it in manufacture.

Taking into consideration the prices of the medium and higher grade bats, together with the mere cost of two feet of lumber and the simple work of turning out the bats, it might strike the casual observer that there was considerable money in making bats. Yet, if in the business, a man might find there was less profit than seemed to be the case. The lumber must be good, and must be carried for a considerable time, while it requires good machinery and careful workmanship on as nice a job as turning out a first-class bat.

At the Hastings factory a large number of croquet sets and fishpoles are also turned out, which consume 1,500,000 feet of lumber. Mallets and balls are made of maple, handles of ash, and boxes of basswood. About 1,000,000 feet of maple are used, something over 300,000 feet of basswood, and the remainder is chiefly heart and lance wood for jointed fish-rods.

Hay is King.

The statistics of the United States prove that it is among the foremost crops raised in this country, if not the very first. At the present time there are estimated to be, in the United States, 40,000,000 sheep, 40,000,000 cattle, and 20,000,000 horses. In two-thirds of the country these animals require to be fed from three to five months, and they will consume an aggregate of 90,000,000 tons, which, at $5 per ton, represents the enormous sum of $450,000,000. Is not hay, therefore, king?—*Wesley Redhead.*