to the temperature of 150° F., and stir into it about one ounce of the extract of malt containing diastase. Keep this mixture at a temperature until it becomes a transparent and thin fluid. Then raise the heat till the mixture boils, and after a few minutes, strain it through a linen cloth, and put it in a warm place to dry up. The product is dextrine.

## Conversion of Starch into Sugar by Diastase.

With the other three ounces of the extract of malt, act upon starch paste in the same manner, only with the difference that a general heating at from 150° to 160° must be continued for several hours. Dextrine is first formed, but this is converted, by continuance of heat, into sugar. The temperature of 150° is most favourable for the production of sugar. At a boiling heat the action of diastase is destroyed.

## Maize or Rice Starch.

The general processes in the manufacture of wheaten-starch have been found inapplicable to maize and rice; on this account, these substances have been for the most part disregarded by manufacturers. Mr. Polson, of the Royal Starch Works. Paisley, however, who has studied the characteristic qualities of the cereals in question, has at length devised a combination of processes, by the employment of which the production of starch from maize and rice is rendered a profitable manufacture, and to whom I am indebted for some valuable papers upon the processes of manufacture.

By means of these processes, a starch of a firstclass quality is obtained from maize or Indian corn, the obeapest of all grains, by mechanically separating the starch from the other constituents of the grain, resort being had to chemical agency only for the purpose of dissolving out a small portion of foreign matters which remain after the mechanical treatment. Thus the gluten, which is the most valuable portion of the grain considered as food, and the other constituents, are obtained separately, without any loss of weight or deterioration in quality, and in a state well suited for the purpose of feeding cattle.

In preparing maize or rice starch, according to Mr. Polson's system, the grain, which may be either whole or coarsely ground or bruised, is steeped in water for a few days until it is thoroughly soaked. It may be allowed to ferment thereafter, with the view of thereby facilitating the subsequent processes; but the fermentation is not essential to these operations, and it is preferred to omit it, and proceed at once to bruise or reduce the soaked grain to a pulp by means of a levigating machine. This pulp is mixed with water, and the husks and fibrous matters are separated by means of a sieve or sieves, made of fine silk gauze, or other suitable material. The sieves may be constructed like the bolting machines used in flour mills, or they may be in the form of flat frame-seives, either kind being driven in connection with the general machinery of the establishment. The husks and fibrous matters separated by the sieving process may be passed a second time through the levigating machine and through the sieves, for the purpose of extracting a further quantity of starchy matter. They may then be dried and ground, in which state they are very suitable for feeding cattle, as they retain their

natural properties unaltered, not having been subjected to the action of any chemical agent, and consequently their sale for that purpose constitutes a source of considerable economy in the manufacture of starch. The starchy matter separated by the sieving process contains a portion of gluten and other matters, which cannot be effectually separated by the means usually adopted for the manufacture of wheaten-starch. According to the present invention, however, this may be effected by the employment of any of the three following processes :-In the first, the starchy matter, as it leaves the sieving apparatus, is made to flow level or slightly inclined; the width of the plain and the amount of the starch flow being so proportioned as to cause the latter to spread out uniformly in a thin stream, covering the entire surface. The water and gluten, with the other foreign matters, pass off at the further extremity of the depositing plane, leaving the starch deposited over the whole surface. As the deposit of starch does not take place equally at all parts of the depositing plane, but becomes less towards the extremity of which the water and gluten pass off, and as this inequality disturbs the process of deposition and separation, provision is made for securing a uniform inclination during the entire process, by gradually damming up the flow by means of a series of weirs placed across the depositing plane at suitable intervals. These weirs are formed of slips of wood, which are placed one above another from time to time as the deposit increases, and they are made water-tight by means of pieces of cloth of the width of the depositing plane, and fastened down to the plane by one edge, whilst the other edge is folded over the front of the slips of wood forming the weir, and made to stream over the top of them in the direction of the current. The starch thus obtained is washed with water and dried in the usual manner; and though it is not absolutely free from foreign matters, it is strong and of good colour, and is very suitable for some manufacturing purposes. The gluten, and other matters which have passed off with the water at the end of the depositing plane, may be treated by the usual alkali process, and then again passed over the depositing plane for the production of starch in a state of superior purity. According to the third process referred to for the final treatment of the starch, the alkali process is adopted as in the second process; but the foreign matters which remain after the alkali treatment of the starchy matter or starch are separated by mixing it with water in a depositing frame, will be found to descend to the bottom of the mass, and the pure starch may be drawn off by means of a syphon or tap.

The various operations which have been described, or some of them, are applicable to the preparation of starch from other farinaceous substances besides maize and rice, the process being modified to suit the various substances treated by them.

## Starch from Peas.

This variety is prepared on a large scale by soaking peas for some days in water till they are quite soft and passing them through a cylinder; the paste is then passed through a linen cloth or