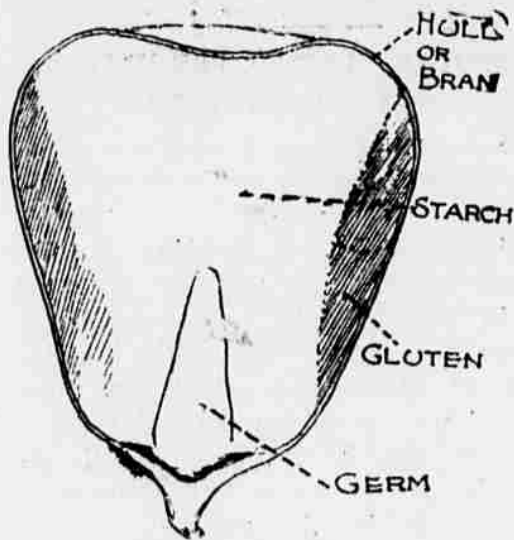


from linseed oil may turn yellow as the air acts on it.

Rubber Out Of Indian Corn.

On Dr. Wagner's table is a block apparently of rubber, the shape and size of a building brick. It has all the outward characteristics of India rubber, even to the odor. It was never near a rubber tree, and was probably grown in Kansas or Iowa, for it was made of corn oil squeezed out of the germs. The oil has undergone a sulphur treatment and a baking, and the rubber substitute results. Drop the brick on the floor and it rebounds as if it were the product from the tropics, and one must know something about the natural rubber to detect any difference in the two materials. The main point in favor of corn rubber is that it can be sold for about one-tenth the price of Para rubber, which costs about a dollar a pound. The corn rubber can be used in rubber boots, bicycle tires, sheet rubber,



THE CONSTITUENTS OF A KERNEL OF MAIZE.

water proofing, rubber heels, linoleum in nearly all classes of rubber goods. Its greatest use is probably in machinery, as in packing for valves. The fact that corn oil is not affected by the air, again proves of value, for its rubber products resist oxidization, remain pliable and do not crack as do most of the rubber substitutes made from vegetable oils. Even pure rubber oxidizes, while a mixture of half India rubber and half corn rubber remains soft.

Of course, there is no danger yet of the corn rubber driving into bankruptcy the men who are growing rubber trees, for the corn oil product lacks the tensile elasticity of the Para rubber; that is, it will not stretch and resume its original form as the natural rubber does. When it comes to compression, however, it seems to possess the qualities of the natural rubber.

The oil is also used for cattle feeding in corn oil cake, of which it forms about ten per cent. Little of this is fed to American stock, most of

it going to Hamburg and Antwerp to be fed into European cattle. In fact, Europe is a heavy consumer of corn oil and every year demands more. The first big shipments were in 1899, when Europe took \$888,000 worth. The next year the export reached a value of \$1,598,000 and last year it was \$2,045,000. In the last five months the Glucose Syrup Refining company alone has sent nearly a million dollars' worth of corn oil to Europe, exclusive of the United Kingdom. To the American it's a strange use the foreigners make of this oil—most of it goes into soft soap. Nearly all the continental people use soft soap instead of that in bars, such as Americans manufacture. Vegetable oils enter largely in the manufacture of soft soap and the Europeans find corn oil the most satisfactory, despite its price of \$23 a barrel. The chemists of the corn products companies have succeeded in "deglycerinating" the corn oil, taking out the glycerine and fatty matter and making it available for use in American soap and a new field is in sight.

Would Enlarge the Germ.

The germ from which the corn oil is made has become so valuable that the endeavor now is to grow corn containing larger germs than the ordinary maize. To this end experiments are conducted at the farm of the University of Illinois and in a few years seed corn with enlarged germs may be ready for the farmer.

The size of the kernel considered, the principal constituent of corn is the starch. To extract that the shelled corn is placed in vats, about a thousand bushels of corn to 8,000 gallons of water. In the water is a very small proportion of sulphuric acid, just enough to soften the kernel, loosen the glutenous matter and free the germ. After thirty or forty hours the water is drawn off to be evaporated, so that any of the corn it has absorbed may be recovered. In former years this water was wasted, now the phosphates and albumenoids in it amount to from one to one and one-half pounds to a bushel of corn that has been soaked. It is then mixed with the by-products which sell as cattle feed. This one point of saving is said to mean 1/2 million dollars a year to the concerns controlled by the Corn Products company.

The mass left behind after the water was drained off is run through mills, taking off the hulls, breaking up the glutenous matter and freeing the germs. How the germs are taken out of the mass has been told. The gluten, starch and hull are ground fine and passed over silk bolting cloth.

The hull or bran remains on top, but the starch and gluten pass

through. The gluten and starch get another bath and the starch, being the heavier, remains behind. The starch is now in solid form and after the last water is dried out the product is ready for the market.

In that state it may be used in the laundry, brewery or confectionery, or sold in the same can with baking powder, but it stands a good chance of staying in the factory and undergoing changes that will make it grape sugar, glucose or dextrine.

Paste, Dyes and Candy.

Dextrines are gums or paste. To make of starch a substitute for gum arabic it is treated with nitric acid and then baked. As dextrine the starch fixes dyes and colors on fabrics, particularly calico, and also may be used in paper boxes, oilcloth, ink, wall paper, for gumming envelopes and stamps, or wherever strong adhesive paste is required. Confectioners use it as a substitute for natural gums and for coating candy, and pharmacists find it valuable in



THOMAS KINGSFORD.

pepsin, emulsions, and in preparation of surgical bandages.

Glucose and grape sugar are the greatest single derivatives of corn starch. Thirty years ago practically no glucose was produced in the United States and now the exports amount to eight or nine million dollars a year, and the foreign products made of rice, wheat, potato and sago starches can't compete at home with the American corn glucose.

A hundred years ago two German chemists found sugar in the grape, and a few years later a Russian found it in starch, and, moreover, found starch sugar to be identical with grape sugar. To make glucose or grape sugar the starch is treated with muriatic acid, and after pressure the acid is neutralized by carbonate of soda. The acid is affixed to the sodium, forming common salt, and every trace of the carbonic acid remaining is carried off. By varying temperature, pressure and degree of acidity a variety of sugars can be produced. When the acid treatment or "conversion" is carried to the farthest grape sugar is produced. When the action