QUALITY OF WHEAT AND TIME OF CUTTING.

In a leisure hour, if such a thing should come in harvest time, some reader may be interested in some notes on the quality of wheat for flour as influenced by the time of cutting. We take such suggestions from a paper prepared by Prof. N. H. Townshend of the Ohio State University, for the *Farm and Fireside:*

For the purpose of human food, the most valuable constituents of a grain of wheat are starch and gluten. Starch forms on the average about 60% of the kernel; it is one of the commonest and most important articles of food. Gluten is even more nutritious than starch, its composition being more nearly that of animal substances, but it is found in the wheat kernel in much less quantity than the starch; in Ohio, wheat it may amount to 10% or possibly to 15%, while in drier climates the proportion is greater. In addition to the value of gluten as food, it has properties which make it especially valuable in combination with starch for making bread. It forms with water a most tenacious paste, and when fermentation, or chemical action, is set up in dough, this paste forms a thin pellicle about the bubbles of carbonic acid gas as they are produced, and retains them. This retention of the gas causes the dough to expand, or rise, so that when baked in this condition the bread comes from the oven thoroughly viscular or light. A flour exclusively of starch, or containing insufficient gluten, will not retain the gas, and consequently does not rise; the more gluten there is in flour, the more perfectly the dough made of it rises, and the lighter and better the bread. Flour from soft wheat, which contain abundance of starch but are deficient in gluten, command but a low price for bakers' use in Eastern cities, while flour from flinty wheat, which is more glutinous, and strong enough to raise itself not only, but possibly a mixture of cheaper flour and a good quantity of water, is in good demand and at higher prices.

A question which may help to fix the proper time for cutting grain, here presents itself. Are the starch and the gluten deposited in the wheat kernel at the same time, or does the deposition of either precede that of the other? One means to determine this is by the use of the microscope, and accordingly, observations were made almost daily through the month of June and July. The method pursued is very simple; a thin slice across a kernel of wheat was put on a slide and wet with a drop of water, then a little tincture of iodine was added; the iodine turns the starch granules blue, and leaves the gluten uncolored. Using a two-third or one-half inch objecture, it could be seen that while the kernel is "in the milk," starch grains are formed and begin to be deposited, while not until the kernel has passed into the doughy stage can gluten be seen. When first visible the gluten cells form a layer next the bran; they are circular or irregular in form, some distance apart, and manifestly not filled; later in the season they fill and crowd each other into square form, and when quite full the rows of gluten cells appear much like the ends of bricks in an arch. Numerous observations will warrant the conclusion that the starch begins to be deposited in the kernel before the gluten, and also that the starch cells may be well filled while the grain is still soft; that the deposit of gluten begins later than the starch, and that the gluten cells are not thoroughly filled until the kernel begins to be hard. In hard and flinty varieties of wheat the gluten was found to form earlier than in soft wheat, such as Clawson; with the latter the gluten continued to increase to the time when circulation was arrested by the drying of the straw.

There is then no reason to doubt that early cut wheat makes the whitest flour and bread. The real issue, however, is not one of color, but of quantity. If the flour of early cut wheat is white from the absence of the usual percentage of gluten, and the presence of disproportionate amount of starch, such flour will be weak, will not rise, or stay up as well, and in short, will not make equally light, tough, moist and sweet bread. The wheat of dry, inland regions is more flinty and glutinous than that of moister climates, and makes a better flour.

PRESERVATIVE WRAPPING AND PACKING PAPER.—Mr. John F. Rodgers, of Philadelphia, claims to have discovered a preservative wrapping and packing paper for protecting cloths, furs, etc., from mildew and ravages of moths and other insects. The patent bears the date January 9th, 1878. The paper used is made from woolen and cotton rags and manila rope or manila paper. This paper is saturated with a mixture of 70 parts, by measure, of the oil remaining from the distillation of coal tar naphtha by live steam with five parts crude carbolic acid, containing at least 50% of phenols, 20 parts of thin coal tar, heated to about 160° Fah., and five parts of refined petroleum. After saturating the paper it is passed through squeezers and over hot rollers for the purpose of drying. When cool it is cut into sheets as desired, and the drying completed in the atmosphere. The paper thus treated is used for packing woolen clothing, cloths, furs, carpets, and all material likely to be injured by moths, mice, or vermin, and will also to a great extent, he states, prevent cotton material from mildew.

FORMATION OF COAL.—E. Fremy holds that there are several kinds of isomeric cellulose, constituting the skeleton of plants. Coal is not an organized substance. The vegetal impressions presented by coal are produced as in shales or other mineral matters. The chief substances contained in the cells of plants under the double influence of heat and pressure produce bodies having a great analogy to coal. The pigments, the resins, and the fats of leaves, if submitted to heat and pressure, yield compounds which approximate to bitumens. The vegetable matter which gave rise to coal has undergone, first, the peaty fermentation, the coal being then formed by a secondary transformation.

A KNOWING ENGINE.—A new automatic pumping engine is in operation at the Providence (R. I.) Water Works. It has 10 cylinders, 5 for water and 5 for steam, arranged alternately in a circle. It possesses an enormous capacity, but it will, without attention from the attendant, do the duty of pumping either for a single faucet or for a dozen steam fire engines. The cylinders are all connected to a single central upright shaft, which automatically either makes 1 revolution in 5 minutes or 25 in 1 minute, according to water required. If the fire burns low the engine will open the damper. If this is not sufficient it will put on the blower.

TO PRESERVE NATURAL LEAVES.—The fresh leaves are spread and pressed into a suitable dish with alternate layers of fine, thoroughly dry sand, as hot as the hand can bear. When the sand has cooled they may be removed, smoothed, and dipped for a few moments in clear French spirit varnish, and allowed to dry in the air. By many melted white wax is preferred to varnish. This latter must not be too hot. The dried leaves are dipped in the melted wax, drawn several times over the edge of the vessel to remove excess, and hung up until the film of wax is thoroughly cooled and hardened.

PROTECTING VULCANIZED RUBBER.—To protect vulcanized rubber against the action of oils and fats, Herr C. Schwanitz, Jr., of Berlin, works in the rubber by rolling through heated rollers a mixture of 6 pounds of prepared chalk, 3.2 ounces of sulphur, 1.67 ounces of litharge and 1 pound of glycerine of 1.23 specific gravity. In order to vulcanize articles made and shaped from this material, they are placed in a bath of glycerine, and all exposed to a pressure of steam of two to three atmospheres.

"O, YES," said an old lady, "the modern cookstove is a great invention, and when my boy James gets through his studies in practical engineering, so he can come home and run it, I'll buy one of 'em, but not afore."

A HALF CENTURY OF RAILROADS.

On the 27th of October next, it will be just 50 years since the first locomotive solved the problem of railroad transportation. Unbelievers were many, and one critic, a member of the English committee, inquired of Stephenson, the engineer, whether his machine, running at the rate of nine or twelve miles per hour, would not cause a terrible accident if it should meet an obstacle, a cow for instance. "Yes, to the cow," quietly replied Stephenson. The application of steam to highways was the dawn of a new era in freedom of communication and transportation. Since the introduction of steam as a motor, wonderful improvements have been made, and if it was difficult for contemporaneous witnesses to grasp the immensity of the discovery, it is no less difficult for us now, after 50 years of use, to fully measure all of the direct and indirect consequences that flow from this marvelous means of communication.

George Stephenson declared his discovery to an assemblage of English engineers on the 27th of October, 1829, and on the 17th of September, 1830, the first English railroad was opened between Liverpool and Manchester. Belgium speedily followed the example of England, and in 1837, France inaugurated the Paris and Saint Germain railroad. In 1835, five years after the first railroad, 1,320 miles of road were in operation in the world. At the present time, or at least at the commencement of the year 1878, for our general statistics stop at that year, Europe possessed 94,128 miles of railroad while the United States had about 80,000 miles, and all other parts of the world about 22,000 miles.

These figures are taken from a valuable German work which appeared in the *Gazette d'Augsbourg*. The author states that the capital employed in the building of the railroads of the world amounts to $15,000,000,000, (60 milliards de marks.) An enormous capital for a single industry not yet much older than the average life of man. Here, continues the author, is a fact in political economy never seen since the world began. It has exercised a predominating influence over all human relations, sensible not only in the material domain, but in the intellectual and moral condition of civilized people. Journalism has notably become subject to this influence, since political wants and views, as well as social contiguity change in proportion as we have become cosmopolitan, or have increased our triumphs over the forces of nature in becoming independent of time and space.

Railroads have entirely changed the conditions of productions. They, with steamships, have enabled thinly settled localities of the world, to produce immense crops upon virgin soil, and compete with and triumph over the denser population but worn out soil of older Europe. If 50 years of steam communication have produced such an astonishing result, what may we not expect at the end of a second half century?—*Mining and Scientific Press.*

A VERY SIMPLE PANTAGRAPH.—Schnaus suggests the use of a fine rubber cord, about 15 inches long, supplied with a loop at each end, and having on it a small white bead, sliding on it with gentle friction. By securing one end to the table by a pin, and passing a pencil through the other end, and drawing its point over the paper with the right hand keeping the string stretched, and causing the bead to describe the outline of a simple drawing placed beneath it, a tolerably good copy of the drawing will be produced, bearing any desired proportion to the original, according to the position given to the bead on the string; thus, if the bead is in the center of the cord, the drawing will be double the size of the original. The best results are only obtainable after some practice, and by employing a finer point than a bead.