

An Assyrian Seeder, B.C. 504

about 1876. The invention of the famous lock coulters also dates from 1822.

The necessity of breaking up enormous tracts of virgin soil in the new countries, which in the course of the past century or two have been settled and ultimately formed into what is now the Agricultural Section of North America, has naturally led to the development here of innumerable forms and varieties of plowing implements; the United States Patent Office in 1902 reported that up to that date 11,825 patents had been granted in this line of industry. As illustrating conditions in this country three-quarters of a century ago, the enthusiasm of Daniel Webster, the great statesman, may be quoted. He had constructed an enormous plow and wrote as follows about it:

"When I have hold of the handles of my big plow with four pair of cattle to pull it through and hear the roots cracking and see the stumps all go under the furrow out of sight, and observe the clean, mellowed surface of the plowed land, I feel more enthusiasm over my achievement than comes from my encounters in public life at Washington."

The advantage of the modern plow may be illustrated by the estimate that by its use labor equivalent to that of one horse in three is saved.

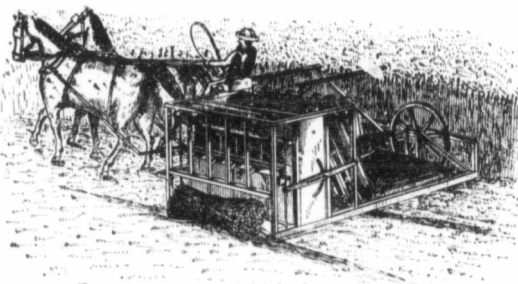
#### HARROWS.

After plowing comes harrowing; that is, the pulverization of the soil. The common drag harrow, is in essence, little more than an improvement used to drag over the plowed land. The original triangular form with teeth inserted gave place to the middle or oblong Roman harrow which came down to the middle of the nineteenth century almost unchanged. Iron and steel were substituted for wooden teeth, and afterward the harrow was made more flexible with hinges. Then came steel lever sectional harrows with adjustable teeth which could be set by the lever at any angle required. The spring tooth harrow, patented in 1869, nearly revolutionized the whole industry. The disc harrow, whose perfection in this country dates only from 1877, is really a very ancient type, and there are said to be early records of its use by the Japanese. A simple form of this harrow was patented as early

as 1847; but what is the well-nigh universal use of disc harrows is really a development of the past eighteen years.

#### SEEDERS AND DRILLS.

Down to the middle of the nineteenth century seed was commonly dropped or sown by hand, although historians assert that a sort of drill plow was used in Assyria as early as 680 B.C., and the Chinese lay claim to a similar implement 3,000 or 4,000 years ago. The invention of the machine which was the forerunner of the modern drill is rightly attributed to Jethro Tull, an Englishman, who has been called the "author of the horse-hoeing industry," and whose apparatus was produced about 1730. These machines were used to a considerable extent in England, but never found general acceptance in this country, the attitude toward them being well illustrated by the remarks of Rev. Jared Eliot, of Connecticut, in his "First Essay on Field Husbandry," published in 1754.



A Harvester Patented in 1893

"Mr. Tull's wheat drill is a wonderful invention, but it being the first invented of that kind, no wonder if it be intricate, as indeed it is, and consists of more wheels and parts than there is really any need of. This I was very sensible of all along, but knew not how to mend it. Therefore I applied myself to the Reverend Mr. Clapp, president of Yale College, and desired him for the regard he had for the public and to me that he would apply his mathematical learning and mechanical genius in that affair; which he did to so good purpose that this new modelled drill can be made for the fourth part of what Mr. Tull's cost."

In spite of the "mathematical learning and mechanical genius" of the president of Yale College, drills were not brought into general use until comparatively recent times. A writer in a letter dated 1786 spoke of a drill plow which he said his correspondent would find equal to "his most sanguine expectations." This writer had himself sowed oats with it successfully, but it seems to have been simply a barrel

attached to the plow, with holes in the bottom the proper size and distance apart.

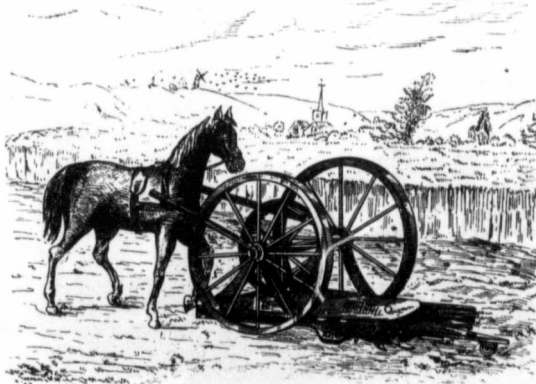
The first American patent on seeding machines was granted in 1799. Several others were issued during the early part of the nineteenth century, and in 1840 a device for regulating the feeding cavities and the amount delivered was patented. Other patents for side drills and force-feed drills followed, the first patent on the latter dating from 1851. The most remarkable development in the evolution of the modern grain drill has occurred within the past quarter of a century. The substitution of force-feed for gravity-feed was an important step, becoming the practical, everyday implement between 1876 and 1880. The shoe drill, patented in 1893, has largely succeeded the common hoe drill, and the disc feature has been applied to the drill in the West and the broadcast seeder attachment to the disc harrow.

Wheat, rye, oats, and barley are sown by the modern drill in equi-distant rows and by shutting

bottoms of little furrows, the ground crumbles down against the plant, which is not so readily heaved out by the winter's frost." Moreover, the use of the drill is quite an important preliminary to the introduction of the reaper and the harvester; and one of the difficulties which the manufacturers of the latter machines have to overcome in some of the more backward countries of the world is the antique method employed in sowing wheat. In such countries it has proved far easier to sell a reaper which could not be used than a drill which would have to be used before the reaper.

#### CULTIVATORS.

Jethro Tull, above referred to as the originator in England of the horse hoe system of cultivation, sowed corn in rows and cultivated between the rows. He invented the horse drill and the horse hoe or cultivator. His system, however, was not a complete success for a long time, and cultivating with the ordinary hoe was the general practice until fields of corn began to be of considerable size. Then came the single-shovel corn cultivators, drawn by one horse, which were usually produced by the village blacksmith, who a little later added another shovel. A United States patent for a hilling cultivator was granted in 1830. In 1835 came the first straddle row cultivator, which was not perfected for almost twenty years. A patent for a wheel riding cultivator was issued in 1846, and from about that time dates the enormous expansion in the manufacture of these implements, of which there is an almost endless variety—hand and horse, single and double, walking and riding, shovel bladed spring-tooth, disc, etc. Cultivators for specific purposes are now constructed for cultivating beets, spinach, sugar, cane, cotton, potatoes and several other plants. The first disc cultivator dates from 1878. Among recent improvements and novelties in this line may be mentioned a



A Reaper Patented in 1798