

## Primitive Farm Implements

Archaeologists have estimated that agriculture as an occupation had its beginning about 7,000 years ago. It was then that man first established fixed places of abode with improved facilities for shelter and defense. He also began to cultivate the soil, to save and plant seeds, and to domesticate animals. In so doing, man made an important advance toward the assurance of a more adequate and dependable supply of food.

Nature did not endow man with natural means for loosening the soil, such as the claws with which many animals burrow in the earth. The pig can successfully root into the ground for a depth of several inches to secure roots and grubs for food. This is not the case with man, who needs the aid of hand tools for the cultivation of the soil. A study of the drawings and sketches on the walls of ancient habitations furnishes much information concerning these early hand tools.

Primitive agricultural implements were devices provided by nature, which could be used with little modification. The branch of a tree with a hook point could be made into a hoe for loosening the soil. Sharp stones and shells tied to handles were also used for hoes and even for certain forms of

sickles. Hollowed-out stones, into which grain could be placed and crushed with another stone, something after the order of a mortar and pestle, served as mills. These simple tools were the agricultural implements used by man for many centuries, as archaeological studies indicate. As late as the nineteenth century, on the Iowa frontier, "hominy blocks" or "corn crushers" were used — crude homemade mortars made from a tree stump in which the corn was pounded into meal. The settlers of Van Buren County called these hand-operated mortars "Armstrong mills."

The first important improvement in hand implements for agriculture came about with the discovery of metal. This was particularly true in the case of tools requiring sharp edges for cutting, such as hoes or sickles.

The story of the development of hand tools after the introduction of metal is well told in an old Chinese classic written by a king of the Han Dynasty some 2,000 years ago. "In ancient times, wooden hoes were used for plowing; shells sharpened for cultivation; wooden hooks for logging; buckets for drawing water. The people were toilsome and their profits small. Now-a-days, chopping and scraping hoes are used for plowing and cultivation; axes for cutting trees; sweeps for raising water. The people have more leisure but make a good profit." Thus in a few sentences the use of metal hand tools is described and the important

philosophy is set forth that an improvement in farm implements made a very definite beneficial contribution to the well-being of the farmer.

The function of hand implements is to apply the forces exerted by the muscles of a man in such a way as to make labor more effective or to make it possible to accomplish more of a certain task in a given amount of time. The ripe heads of grain might be plucked with the hands without the aid of a tool, as was done in earliest times, but a cutting edge made into the form of a sickle, by which a handful of stalks could be cut free with one motion, not only increased the accomplishment of the worker but made the operation easier to perform.

Hand machines with moving parts, by which they are distinguished from hand tools, have the same general function of applying the forces exerted by human muscles in such a way as to be more effective in performing certain operations. The hand corn sheller is a good example of the way in which labor is made more effective through machines. At one time in the early days of America, it was common practice to shell the corn grains from the cob by rasping the ear over a metal edge such as that furnished by a shovel. The hand sheller is a machine which performs the same operation by a combination of rough wheels which rub the grains from the cob with the same effort but much faster. Many other illustrations of the effective application of hand labor could be cited.

When metal became available, hoes for digging and scraping and sickles for reaping and cutting of forage and fiber crops used in the various countries took on a surprising amount of similarity. Usually hoes were made in two weights — a light hoe for cultivation and planting and a heavy hoe for digging into the ground in the preparation of a seed bed. The oldest literature and drawings on ancient buildings describe these tools.

It is surprising to note how little change was made in these implements down through many centuries from 500 B. C. to the eighteenth century. It has been stated by a Secretary of Agriculture of the United States that if an American farmer of the Revolutionary Days could have been moved back in history 2,500 years to an Egyptian farm, he would have found himself thoroughly familiar with the hand tools of that age and could have taken them up and proceeded to use them skillfully.

The sickle was later developed in many countries, notably in America, into a two-handed implement. For mowing grass the blade was lengthened and attached to a longer bent handle called a snath, with hand holds set at convenient places and angles. For the harvesting of ripened grain, a rack or group of slender wooden fingers was attached to the snath but placed directly back of the blade to receive the severed stalks. By a long swinging motion these stalks were placed in neatly

laid bunches or gavels to be gathered and bound into bundles. This implement was called the cradle and represented the most advanced development of hand harvesting implements.

The earliest threshing implement was the flail which consisted of a wooden bar or blade attached either loosely or with a hinged joint to a long handle. The grain to be threshed was placed in a thin layer on a threshing floor and beaten with this device. Often in America the threshing floor was placed in the farm barn. After threshing, the straw was removed with a fork and the chaff separated from the grain by winnowing or throwing the grain mixed with chaff into the air for the wind to separate out the chaff.

A significant aspect of the development of farm machines, from a world-wide viewpoint, is the fact that manual methods of farming involving the use of hand tools have continued unchanged to the present in certain countries, particularly in Asia.

Another important function of farm machines is that of applying power or energy from a motor, or a source other than human muscles, to perform a desired operation in agricultural production. As a motor, man has a very limited capacity. For instance, a sturdy laborer is able to develop power, or do work, such as in turning a crank or lifting weights, at the rate of 1/10 to 1/8 horsepower. The extreme high cost of power from human muscles can be estimated by considering a normal

wage. If the wage should be seventy-five cents per hour, the present minimum rate in the United States, the cost of power from human muscles would be six dollars per horsepower hour. At present, the cost of power from work animals or mechanical motors used on the farm is usually from three to twenty cents per horsepower-hour.

Furthermore, the cost of the labor used in performing an operation is influenced by the amount of power that can be utilized by the individual worker. For instance, the cost of labor for plowing with a four-horse plow will be about one-half that with a two-horse plow, or one-half when plowing with a two-plow tractor as compared with a one-plow tractor. Although in principle the rate of accomplishing work varies with the amount of power directed by the workman, there are economic and practical limits to the size of a machine which may be successfully used.

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