

ing used for the gathering of grain, and as we gaze upon our modern harvester cutting its wide swath through the field of waving grain, little do we realize the importance of such a machine, and the great part it is playing in the world's industry and trade. If every machine in existence today were to be wiped off from the face of the earth, and the patents themselves were to be destroyed, one statistician has calculated that it would result in the death of one-third of the world's population and the rest would be barely able to eke out an existence.

The old sickle was a peculiar tool, and it required no inconsiderable amount of skill to use it to advantage, in fact if one of our modern farm hands were to attempt to use it he would find himself seriously handicapped. The man held the sickle in his right hand and gathered a bunch of stalks in his left, then with a sweeping semi-circular stroke he cut the stalks, then laid the bunch of stalks together with the ears on the ground, and then prepared for the next stroke. As the stalks were comparatively low, the man had to stoop to work, even if he left considerable of the stalk on the ground. The work required hands and between every stalk or two the reaper must stoop nearer to the wheat. At its best it was hard, wearisome labor, wasteful of time, strength and wheat, for much of it was lost, trampled upon, and destroyed. To prevent the loss and to make it easy to bind the wheat into sheaves the stalks were gathered together into little heaps, these heaps were then bound together and made the sheaves.

When we take into consideration the complexity of the operations themselves from the time the man took the sickle in his hand until the grain was finally bound into the sheaf, it is not to be wondered at that for nearly two thousand years little or no advance was made in harvesting machinery.

The first people to try to invent a real harvesting machine were the English. England was a great colonizer and demands were constantly made on her for food stuffs, which she was not able to supply owing to the fact that there were no harvesting tools on hand to harvest any considerable crop. The English inventor had little or nothing to guide him, and so he naturally copied the old machine used in Gaul sixteen hundred years ago before, and then endeavored to improve it. About the only difference between the old Roman machine and the first English machine was the fact that the motive power consisted of a

horse instead of an ox, and that there was a reel in front of the machine to bring the grain into the cutting apparatus. The horse walked behind and pushed the wagon into the standing wheat. The forward motion of the wagon also turned into the revolving motion of its wheels and by means of a simple mechanism this rotary motion was transferred to the motion of the reel and this revolved just as long and as fast as the cart was pushed forward by the horse. At

ments in character, however, and many years of testing and thought, of trial and experiment were put in before anything like a real practical machine was produced. It was finally seen that a mistake was being made by having the machine pushed through the grain and that it must be pulled, but up to 1826 we find harvesting machines that were propelled in this manner.

We may divide the history of the harvesting machine into three epochs. The first from the

eration after generation passed through the same stage of mechanical development in harvesting machinery. The second was a stage of hardship, an epoch when men realized intuitively that of necessity something must be invented to handle the grain crop, and every cog, bolt, bar and beam represented a certain portion of some human life. Like the potter of Versailles they threw their furniture into the fire and robbed themselves, their homes, and families of the necessities of life in order that they might give to mankind a machine that would supply the world with bread. Trial, failure, and loss seemed to be the only road to success, and on the American continent alone over 3500 patents were taken out on improvements of machinery. The harvesting machine is not the result of a Marconi, an Edison, or a Bell. It is not the work of any one individual, but it is a combination of the lives and the souls of these individuals who have contributed a share towards the completion of the grand whole. During this experimental stage there was a weeding out, a survival of the fittest, a period when the stable and the perfect were evolved from the unstable and incomplete. We might in detail go into the different steps in this great evolution. We might describe the invention of such parts as the elevator, the endless apron, the knoter, the butter, the chain drive, etc., but as these are all merely points in mechanical detail, they do not concern the proposition in hand, and even today the self-binder is undergoing a transformation.

From 1850 to 1912 is the period of refinement, and the perfection of details. The period when the world adopted the harvesting machine into its list of mechanical appliances. This is the shortest period of them all, but from the standpoint of development, the results are out of all proportion to the length of time that has elapsed. The tools of man's handiwork are complete in their every detail, and all that is needed is that the mind of the inventor shall plan out a certain piece of work and the mechanical part of it will shape itself into position. How different in the early days of harvesting machines, when the idea itself was merely the smallest part of the work. There were no large shops or factories nor fine machines nor tools to shape the iron and wood, and it is safe to say that had anyone in 1756 conceived of the idea of our modern self-binder it would have been impossible to construct it owing to the lack of mechanical skill and mechanical tools.



A Team of Oxen in Sussex.

last the inventor had gotten something that contained the real basic principles of a harvester, in fact if we leave off the binder attachment of a self-binder of today we find we have the same principles employed. The very fact that the wheels could be made to drive the reel was conclusive evidence that they could be made to drive other mechanism, and thus perform the several operations which were gone through by the man with the sickle. For a long time the great

earliest times until 1786 when hand labor was the only means employed.

The first epoch was that of necessity. The second, which might be called the experimental epoch, from 1786 to 1850, and the third from 1850 to 1912 the stage of refinement and perfection of details and the world-wide acceptance of the harvesting machine. Living in the ancient tombs and caves, in strange homes, the battle for bread demanded that a man must gather



As They Still do it in Brittany.

difficulty was in getting something that would cut the grain, and the inventor spent many wearisome hours in trying to solve the problem by the use of a rotary knife that would cut the grain the same as the sickle in the hands of the harvester. The problem was finally solved about 1786, when a machine was invented in England which would cut off the heads of the wheat. The first of the machines that were made seemed to be of this header type. All were experi-

a certain amount of grain, for his own use, and as there was no market for surplus, his own hands were sufficient unto the gathering of a quantity that would sustain life. In these early days there was little or no individuality. The world itself was known by nations and tribes. Might made right and the laws of modern peace were then unknown. God-given as the land was, man deemed it sufficient unto his needs, with the result that for hundreds of years, gen-