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MECHANICAL POWER[1]

I HAVE selected for my address to-night the subject of power—mechanical power—because I believe even workers in science do not fully appreciate the extent to which our present-day civilization is dependent upon this product of science. It is only within a century, however, that mechanical power has become so great a factor in our daily lives.

A century is a very short period in comparison with the number of years man has inhabited this earth. Up to within about a century ago, man truly obeyed the biblical injunction to earn his bread by the sweat of his brow, for the great majority of men and women were slaves or serfs. The Greek and Roman civilizations rested on slavery. Athens had 400,000 slaves to 100,000 free citizens. The industries of Rome were run almost entirely by slave labor.

In the latter days of the Roman Empire, water power became sufficiently developed to compete with slave labor, and "water mills" gradually displaced slave labor in the bakeries, in irrigation and in sawing marble. During the middle ages, mechanical power from water wheels and wind mills was applied in grinding grain, in metallurgical processes and in mining and quarrying, but to a limited extent only.

By the end of the seventeenth century, the coal-mining industry reached appreciable proportions in England and on the continent. As the mines were worked to greater depths, the pumping of water from them became a serious problem. The pumps were operated by horses—as many as 500 horses being employed at one mine for this purpose. The expense of pumping became so great that many mines were abandoned. This situation was relieved by the invention of the steam-pumping engine—that of Savery in 1698 and of Newcomen in 1705.

Economic conditions at this time—the first half of the eighteenth century—are indicated by the average wages of a skilled workman in England, about $2.40 a week. Wheat varied from $1.00 to $1.50 a bushel. Thus, the carpenter or mason could earn only from two to three bushels of wheat for his week's work.

Before the eighteenth century, man used only a few elements of machines and crude combinations of them. In the latter part of that century occurred those great inventions in spinning and in weaving where the skill and intelligence of the workman were transferred to

[1] Address of the retiring president of the Nebraska Chapter of Sigma Xi on May 15.