ELIHU THOMSON:

By KARL T. COMPTON[1]

Some of His Mechanical Inventions

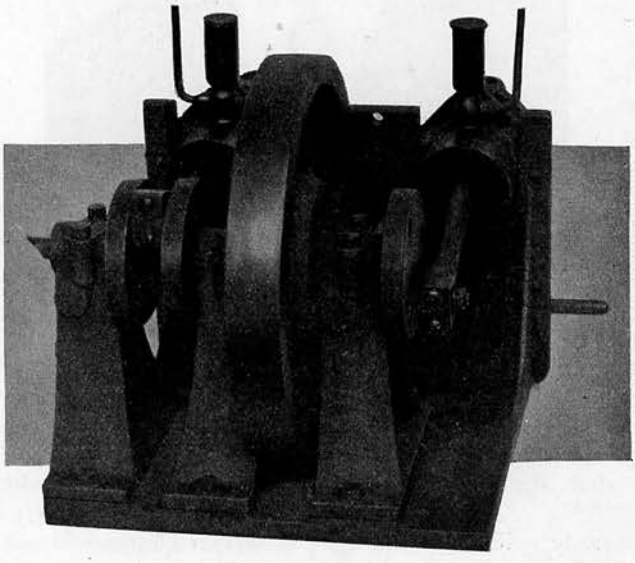
Two years ago this veteran inventor, engineer, and scientist was made an Honorary Member of the A.S.M.E. In celebration of his eightieth birthday, Dr. Compton interestingly recounts here a number of Professor Thomson's achievements in a field closely allied to the electrical one to which he has brought such honor and renown.

OIL-BURNING FLASH BOILER

Another development in which Professor Thomson has been deeply interested is that of steam generation and its subsequent utilization in high-efficiency engines. In 1901 he obtained a patent for a "vapor generator" which was virtually a steam boiler and an oil burner combined into a very moderate-sized structure in relation to the output. In this the fuel (oil or kerosene) is pumped through a small passage, while the exact amount of air for complete combustion enters through another passage in the head which acts as a sprayer. The pumping apparatus furnishes air and oil in exact proportions for complete combustion, and the supply may be increased or diminished at will.

The experimental apparatus was about six inches in overall diameter, and the furnace part less than half of this. The water passed through and was evaporated in a spiral tube of flat cross-section. This boiler would burn five pounds of kerosene oil per hour perfectly without smoke or odor, and produce highly superheated steam at a pressure of 170 to 180 pounds per square inch, using cold water fed at a rate of 70 pounds per hour. This performance represented 14 pounds of steam per pound of oil as compared with an estimated maximum of 16 pounds, and hence gave the device as a boiler an efficiency of 80 per cent. Furthermore, no hot flue gases were evolved. In fact, the exhaust was so cool that the hand could be held in it steadily without more than a moderate warmth being felt.

In developing this boiler, Professor Thomson had its application to automobiles in mind, but evidently it might be equally useful for many other purposes. One important feature in this connection is its ability to relight three hours after extinguishment simply by turning on the fuel supply. It seems, however, that his pioneer work in this particular field has never received the attention which it actually deserved.



ORIGINAL TWO-CYLINDER STEAM ENGINE OF HIGH EFFICIENCY, EMPLOYING PRINCIPLE APPEARING LATER AS UNIFLOW TYPE

PROFESSOR THOMSON'S "UNIFLOW" ENGINE

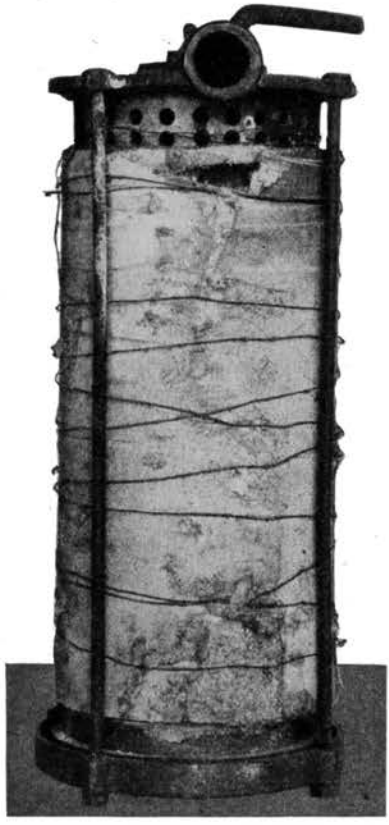
Hand in hand with his work on the above-mentioned boiler was his development of a high-efficiency engine. In his patent of 1903 this is termed the "fluid-pressure" engine. Again he had the application to automobiles in mind. It was a non-condensing reciprocating engine involving a somewhat novel principle in that the steam was permitted to flow in one direction only—from the intake to the exhaust—never turning

back to come once more in contact with the heated surfaces. He described its principle in the following words: "The conditions are such that there is no retraversing of passages, no retraversing of even the cylinder portion. The steam enters, goes forward and out, keeps running steadily forward, so that we do not have any of those interactions that use up energy. We have a temperature gradient from one end to the other of the steam cylinder."

The test on the first engine built by Professor Thomson indicated great economy. Thus a four-cylinder engine of this type gave 5 horsepower on an expenditure of 17.25 pounds of water per horsepower-hour, which was a remarkable result at that time.

No doubt Professor Thomson here laid down a new and important principle for engine design. Engines built on this principle are now generally known as "uniflow" engines, and have been manufactured and used to a considerable extent, especially in Germany.

In 1903 Professor Thomson devised a "regulator for vapor generators." The patent therefor covers a system which found application in steam automobiles using kerosene oil as fuel. It provides for effective regulation of the fuel supply to the burner, and also for regulation of the steam temperature and pressure by control of the water feed to the boiler. This device has been used in a number of automobiles built at Lynn.



FLASH BOILER FOR STEAM (UNIFLOW) ENGINES RUN BY EXACT MEASURED SUPPLY OF WATER, OIL (KEROSENE), AND AIR