The cost of fuel oil at 2c. per gallon does not exceed 2.1 mills per K.W.H. at full load. The maximum consumption of oil is positively guaranteed, and if the price were 4c. instead of 2c. per gallon, the cost of producing current would be increased only 1/5 of a cent per K.W.H.

Any increase in the power output of the engine would reduce the cost of current, since the fixed charges would be lower per unit of production. If the engine were run at full load continuously during the whole year, one K.W.H. would cost only 7.4 mills, or, in even figures, ¾ of a cent.

Fig. 1 illustrates a power installation employing this engine, which illustrates the space saving this engine affords.

THE PILE HAMMER IN CONSTRUCTION.

Of the average contractor it can be said that no one is more ready to adopt labor or time-saving appliances than he. This statement applies quite as much to those engaged in excavating operations as it does to the one who undertakes to erect a modern sky scraper or to build a suspension bridge.

This article, however, has to do entirely with the former, for within the past few years the methods of excavation in important operations have presented conditions hitherto simple of execution. Foundations of greater magnitude than ever before demanded are now being made, requiring means not only to prevent the movement or caving of soil into the excavation, but frequently to support the foundations of buildings below which it is necessary to excavate.

The situation had to be coped with and its solution came with the introduction of steel sheet-piling.

Every innovation brings about the development of other appliances kindred to it, so with steel sheet-piling came the power driven pile hammer.

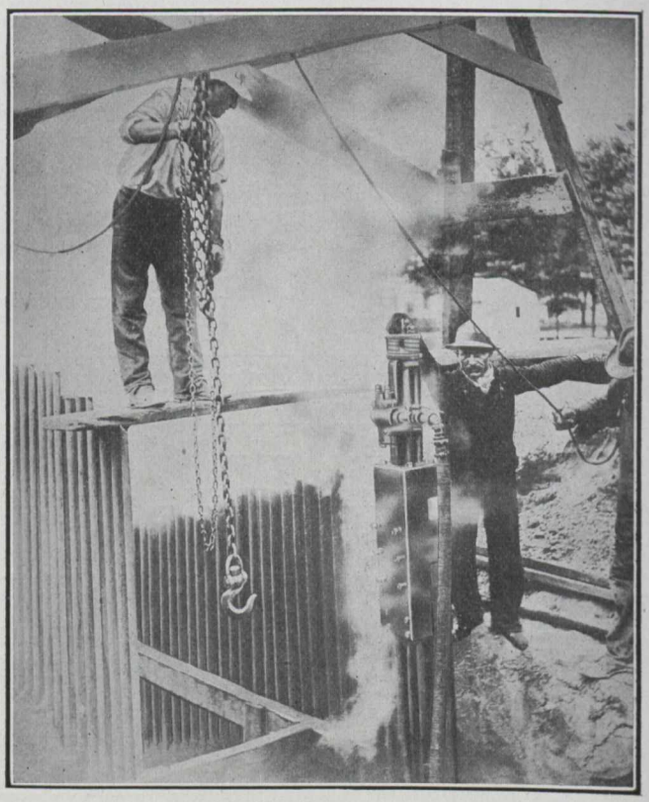
In trench work where pipe was to be laid at some depth below the surface it was the common practice, prior to the introduction of steel sheet-piling, to protect the side walls by planks or wood sheeting driven in place by men with mauls.

Between the old and the new method of trenching no better illustration can be offered to prove the advantage of machine operation than that set forth in the following:

The work was the laying of a terra cotta sewer pipe in the city of Watertown, N.Y. The course of the sewer was in a sandy soil which obtained uniformly throughout its length to a depth of about ten feet, underneath which was a wet sand mixed with gravel. The average depth of the sewer pipe below the surface was 15 feet. The nature of the soil, of course, necessitated the use of sheeting to prevent caving-in of earth and thus permit of a narrow excavation with the minimum of material to be removed. Accordingly, 400 sheets of ⅛-in. corrugated steel sheet-piling in 10-foot lengths were procured, and for driving them a steam driven pile hammer, weighing approximately 650 pounds, was used. The trench was first excavated for its width to a depth of about 5 feet which was left unsheeted. The sheet-piling was then carried by hand and set in position on each side of the trench and driven its entire length before any further excavating was done.

An A-frame built of timber straddled the excavation and from it was suspended a 2-ton triplex differential chain block. It was intended to use the chain block for raising and lowering the pile hammer during the driving and subsequently to withdraw the sheet-piling. Throughout the entire operation the work of placing the sheeting, drying it with the pile hammer, and pulling and resetting, was done by 3 men for each separate operation. As before stated, the sheeting was all handled by manual labor, and it required 1 hour and 30 minutes to set up 32 sheets in position for driving, including the time required to carry these sheets an average distance of about 175 feet. The time required to drive each sheet five feet into the sand was from 33 to 37 seconds; in fact the driving was done so fast that the triplex block could not be worked quickly enough to follow the pile hammer, and so it was steadied by hand, as shown in the accompanying photograph. No difficulty was experienced in doing the work in this way and the chain block was needed only to hoist the hammer from one pile to another. That this method of handling the hammer proved to be a success is, of course, largely due to the fact that it stood only about 4 feet high on top of the sheet-piling. Including the time required for moving both the hammer and A-frame, an average of 7 feet of trench was sheeted on both sides per hour.

Power to operate the pile hammer was supplied by a road-roller. Steam from it was carried through a 1-inch pipe a distance of about 125 ft. The pressure varied from 100 to



125 lbs. The weight of the driving piston in the pile hammer was 70 lbs. and struck 350 blows per minute. The tops of the sheet-piling were protected by means of a special driving hood of soft iron loosely attached to the base of the hammer between its jaws, so that it would not fall off when the hammer was raised. The hammer and driving cap proved entirely satisfactory for, although the thin sheets were used continuously during one entire season, not one piece was damaged seriously and the same sheet-piling is being re-used on another sewer job. The sheet-piling was braced by means of spruce waling pieces, 4 in. by 6 in. by 16 ft. long. The struts were spaced 7 feet apart.

The sheet-piling was all driven ahead of excavation, and as rapidly as the sewer pipe was laid and the trench backfilled, it was pulled, reset and driven, and thus the entire trench excavation was carried to completion.

The contractor for this work was Mr. Wm. J. Semper, of Watertown, N.Y. Wemlinger Type A Sheet-Piling in 10-foot sections was used, and it was driven with a McKiernan-Terry 3¼-in. pile hammer, manufactured and sold by the McKiernan-Terry Drill Co., 115 Broadway, New York.