GREEN'S AIR HEATER AND ECONOMIZER.

Fig. 1 shows the usual manner of installing the economizer manufactured by the Green Fuel Economizer Co., Matteawan, N.Y. Cold water comes from the pump direct

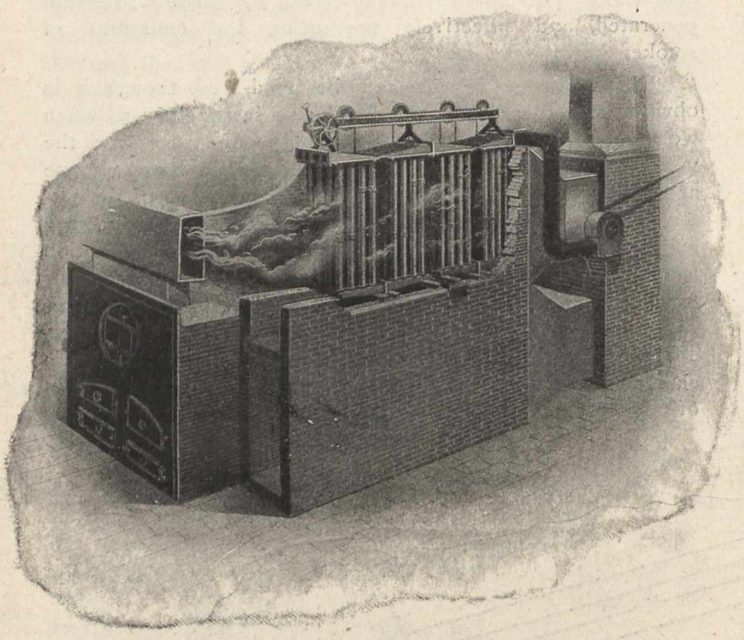

Fig. 1. Green Economizer Installation.

to the economizer manifold from which it is distributed to the different sets of tubes. These tubes are made of cast iron so as not to be easily affected by any acid forming during combustion from sulphur in the coal, which, condensing with the moisture on the cold surfaces, would easily corrode wrought-iron tubes.

Owing to the vertical arrangement of the tubes soot does not readily settle upon them, but they are provided with scrapers that travel up and down the tubes, being driven by a small engine or motor. After having been scraped from the tubes, the soot falls to the bottom of the chamber and is raked out through openings provided for the purpose. Between the temperature of the escaping gases and the temperature of the cold water pumped to the economizer there is a difference of from 350 to 400 degrees F., which gives a rapid rate of water heating.

In the process of manufacture the tubes are cast vertically in dry sand moulds, and are then turned off at the ends and pressed into the heads by means of powerful hydraulic pressure. No packings or other similar devices are employed to secure tightness, and the vertical manner of installing the economizers makes it possible for them to expand freely without injurious strains.

In Fig. 2 is shown a tube air heater unit in which, as in all of these heaters, the tubes are 9 feet long between headers with an internal diameter of 3⅞ inches, and hydraulically pressed into the top and bottom boxes. To secure uniform velocity and distribution of the air passing over from one series of tubes to the next, the boxes of the headers are made sloping. The air is kept moving at good speed, which, together with the system of frequent redistribution through the tubes, prevents the possibility of short circuiting or eddying, giving a high efficiency of heating surface. As shown in Fig. 2, each unit of tubes is separate so that any number of units may be set up to fill the capacity requirements of any given plant. Also, if it is desirable to prolong the time that the air is in the heater, any number of rows may be connected up in series.

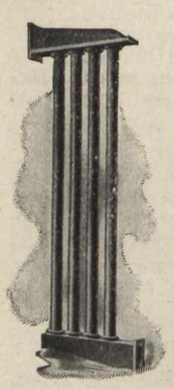

Fig. 2. A 4-tube Air Heater Unit.

In entering the heater the cold air enters where the flue gases leave to pass to the chimney, while the heated air is taken out at the end nearest the boiler, where the flue gases are the hottest. In this manner a uniform difference of temperature is maintained between the flue gases outside the tubes and the air inside the tubes, by means of which rapid transfer of heat is obtained.

These heaters and economizers are used in steam laundries, testing mills and hospitals. Where hot air is required for drying, it is usual to install an economizer and an air heater in series as shown in Fig. 3. In this installation a number of dampers and passages are provided so that it is possible to operate the economizer and heater together, to operate them separately, or to allow the gases to pass direct to the chimney. By this method either or both of the devices can be cleaned or repaired while the boiler plant is in operation. In an installation of this kind, where hot air is used for drying, the heat saved from the escaping gases takes the place of the steam that would otherwise be used in steam heating coils, thus effecting a double saving.

In a test of a combined economizer and heater plant where the gases entered the economizer at 460 and the heater at 301 degrees F. the water in the economizer was heated from 112 degrees to 248 degrees and the air in the air heater was heated from 70 to 152 degrees. Air at this temperature would take up nearly 0.01 pound of water per cubic foot, making it effective for drying purposes. In this case the heater was small so that a higher temperature of the air could be obtained by increasing the number of tubes. In another test with gases at 512 degrees F. 4,616 cubic feet of air a minute were heated from 54 degrees to 201.6 degrees. In this instance, 12.2 pounds of coal were used a minute, so that the heat saved in the hot air represented about 9 per

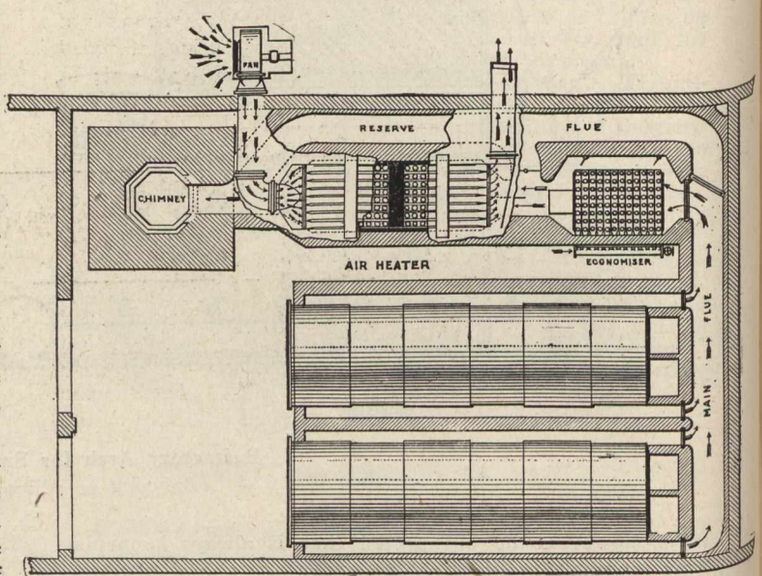

Fig. 3. Combined Installation of Heater and Economizer.

cent. of the total heating value of the coal, or, with the average boiler efficiency, about 14 per cent. of the heat recovered in the boilers. This would mean a saving of about one ton of coal a week. In a third plant a saving of 14 per cent. of the fuel was obtained, so that the saving will average about one-seventh of the total coal bill.

A PLAIN MILLING MACHINE.

Gear Feed.

This machine embodies a number of new and important improvements which will be appreciated. Attention is called to the positive gear-feed drive and change-feed mechanism, by which twenty changes of feed can be made without stopping the machine; the new clutch mechanism in connection with the hand wheels; also the box type of knee and telescopic elevating screw. The spindle has a No. 12 B.& S. taper hole in front end, is made from hammered crucible steel, has a ¾-inch hole through its entire length, and runs in self-centreing bronze boxes arranged to compensate for wear. It has a slot across end to engage clutch on arbor,