Class 3. 100 to 300 lb of coal per hour.
Class 4. 300 to 1200 lb of coal per hour.
(A fifth class is included covering stokers having a feeding capacity above 1200 lb of coal per hour).

Class 1 and Class 2 Stokers, Household

Since these stokers are used primarily for home heating, it is desirable that their design be simple and attractive in appearance, and that they be quiet and automatic in operation.

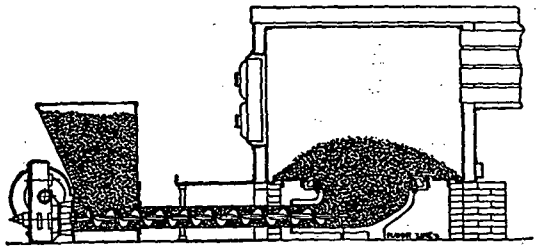

FIG. 5. UNDERFEED SCREW STOKER, HOPPER TYPE

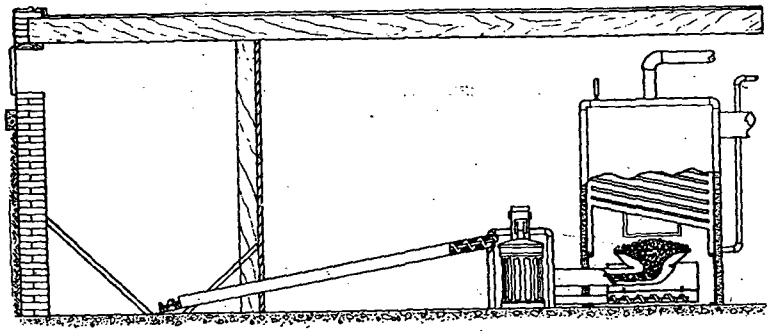

FIG. 6. UNDERFEED SCREW STOKER WITH AUTOMATIC ASH REMOVAL

A common type of stoker in this class consists, essentially of a coal reservoir or hopper, a screw for conveying the fuel from the hopper to the burner head or retort, a fan which supplies the air for combustion, a transmission for driving the coal feed worm, and an electric motor or motors for supplying the motive power for both coal feed and air supply as indicated in Fig. 5. The shape of the retort in this class of stokers is usually round although rectangular retorts are favored by some manufacturers. In all cases, however, the retort incorporates tuyeres through which the air for combustion is admitted.

Some household stokers are provided with an automatic grate-shaking mechanism together with screw conveyors for removing the ash from the ashpit (Fig. 6) and depositing it in an ash receptacle outside the boiler.

Certain types can also be provided with a coal conveyor which takes coal from the storage bin and maintains a full hopper at the stoker. In some cases the coal bin functions as the stoker hopper as shown in Fig. 7, and an extended worm is used to convey the fuel to the combustion furnace.

Domestic stokers may feed coal to the furnace either intermittently or with a continuous flow regulated automatically to suit conditions.

Household stokers are made for all classes of fuel; anthracite, bituminous and semi-bituminous coals, and coke. The *United States Department of Commerce* has issued commercial standards for household anthracite burners, which may be obtained by application. Standards of performance for bituminous coal stokers are also being developed by *Bituminous Coal Research, Inc.* The standards for anthracite stokers are described in the next paragraphs.

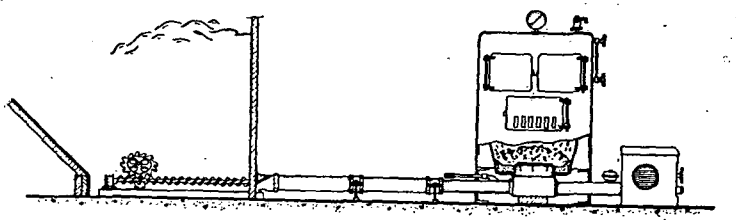

FIG. 7. UNDERFEED SCREW STOKER, BIN FEED TYPE

Operating Requirements for Anthracite Stokers

Efficiency. The over-all efficiency of the unit at all points above 50 per cent of maximum coal feed shall be above 50 per cent when installed in a round sectional cast-iron boiler having three intermediate sections and 1½ in. of asbestos insulation or its equivalent in good condition of repair, operating at 50 per cent or more of the boiler capacity. The efficiency shall be maintained for any continuous period of 4 hours during any test or observation run.

Ash Loss. Combustible in ash shall not exceed 7.5 per cent of the Btu content of the coal as fired at any rate of coal feed above 50 per cent of maximum. Subsequent to the issuance of these standards the Society adopted a Code[1] which should be followed in all details applicable to stoker testing.

Clinker. Ash removing systems should at all times be capable of disposing of any clinker which may be formed under any conditions of operation with the coals prescribed.

Combustion Rate. A combustion rate of at least 13 lb per square foot of horizontal projected area of ash ring per hour must be continuously maintained for at least 9 hours with the above conditions of efficiency, ash and clinker.

Flue Gas. Flue gas shall be not below 6 per cent in carbon dioxide with a reasonably tight boiler at any rate of operation above 50 per cent of maximum coal feed.

Maximum Rating. The maximum rating, in terms of gross square feet of water or steam radiation which the burner will supply, when intended for installation in the average existing cast-iron boiler, shall be 90 per cent of the maximum steam produced in a round cast-iron boiler in good repair having three intermediate sections and the equivalent of 1½ in. of asbestos insulation. However, in no case shall the maximum rating be greater than 29 sq ft of direct steam radiation for each pound of coal fired per hour, and in no case shall ratings be based upon efficiency figures below 50 per cent.

[1] A.S.H.V.E. Standard Code for Testing Stoker-Fired Steam-Heating Boilers (A.S.H.V.E. TRANSACTIONS, Vol. 44, 1938, p. 366).