

and filling up the furnace width, while the ash disposal is at the rear. In principle, its operation is the same as the side cleaning underfeed.

Class 1 Stokers, Household

A common type of stoker in this class consists of a round retort having tuyeres at the top where all of the air for combustion is admitted. Coal is fed from a storage hopper (Fig. 4) outside of the boiler by means of a

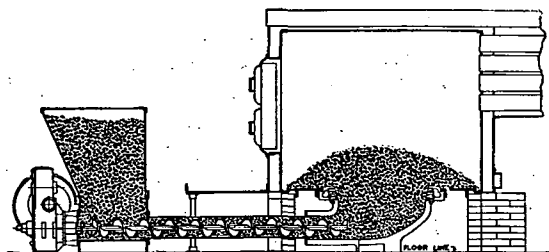


FIG. 4. UNDERFEED SCREW STOKER, HOPPER TYPE

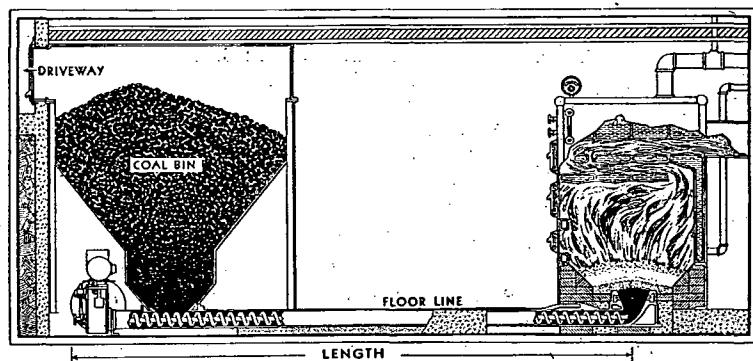


FIG. 5. UNDERFEED SCREW STOKER, BIN TYPE

worm into the bottom of this retort and beneath the fire. The equipment includes a blower which is driven by the same motor that drives the stoker.

Some household stokers are provided with automatic grate-shaking mechanism together with screw conveyers for removing the ash from the ashpit and depositing it in an ash receptacle outside the boiler. Certain types can also be provided with a coal conveyer which takes coal from the storage bin and maintains a full hopper at the stoker. In some cases the stoker hopper functions as the coal bin as shown in Fig. 5, and an extended worm is used to convey the fuel to the boiler. They may feed coal to the furnace either intermittently or with a continuous flow regulated auto-

matically to suit conditions. Where the boiler is provided with indirect coils for heating the domestic hot water, the stoker may be arranged so that it can be used the entire year to maintain a continuous hot water supply.

Household stokers are made for all classes of fuel—anthracite, bituminous and semi-bituminous. The *United States Department of Commerce* has issued commercial standards for household anthracite burners, which may be secured by application. The requirements stated in these standards are described in the following paragraphs.

Operating Requirements

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. Methods of test according to Code No. 3 of the A.S.H.V.E.¹ are to 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.

The maximum rating as defined in the preceding paragraph shall be based upon combustion of Pennsylvania anthracite having the following approximate analysis:

Volatile matter 3.5 to 9 per cent; ash content not to exceed 15 per cent; sulphur content under 1.5 per cent; ash fusing temperature 2750 F, or above (volatile, ash and sulphur content on dry basis in accordance with A.S.T.M. method D271-33); Btu content 12,000 or above; properly sized as follows: A No. 1 buckwheat should pass through a round mesh screen having ⅜ in. holes and over a similar screen having ⅝ in. holes. The undersizing should not exceed 15 per cent and the oversizing should not exceed 10 per cent. A No. 2 buckwheat (rice) should pass through a round mesh screen having holes ⅜ in. in diameter and over a like screen having holes of ⅝ in. in diameter. The undersizing should not exceed 15 per cent and the oversizing should not exceed 10 per cent.

Coal Storage. It is recommended that the coal bin or closet be constructed so as to be dustproof.

Electrical Consumption. The electrical consumption shall not exceed 18 kwh per 2000 lb of coal burned at any rate of coal feed above 50 per cent of the maximum.

Operation Upon Other Sizes of Coal. The foregoing specifications have been drafted for operating with the Nos. 1 and 2 buckwheat sizes of anthracite. In the event that other sizes are recommended, ratings shall be based upon the same efficiency and ash loss requirements.

¹A.S.H.V.E. Performance Test Code for Steam Heating Solid Fuel Boilers (Code 3), (A.S.H.V.E. TRANSACTIONS, Vol. 35, 1929).