

in Fig. 10. These units are also built in a plunger feed type and the drive for the coal feed may be an electric motor or a steam or hydraulic cylinder.

Stokers in this class are available for burning all types of anthracite, bituminous and lignite coals. The tuyere and retort design varies widely according to the fuel and load conditions. On the bituminous models, the grates are normally of the stationary type and the ash accumulates on the grates surrounding the retort. With the average bituminous coal, the ash then fuses into a clinker which is removed periodically.

The anthracite stokers in this class are normally equipped with moving grates which discharge the ash into a pit below the grate. This ash pit may be located on one or both sides of the grate and on some installations is made of sufficient capacity to hold the ash for several days or weeks operation.

#### Class 4 Stokers

Stokers in this group vary widely in details of mechanical design and the several methods of feeding coal previously described are employed.

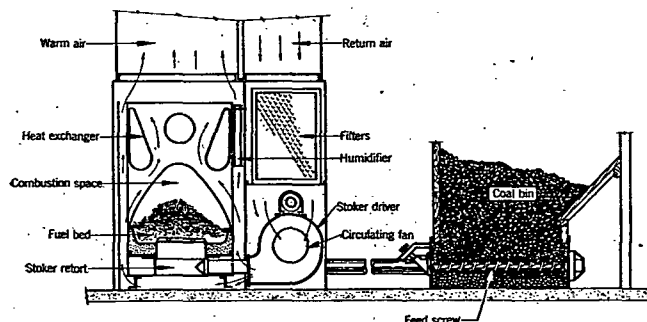


FIG. 8. STOKER-FIRED WINTER AIR CONDITIONING UNIT

The underfeed stoker is the most widely used, although a number of the overfeed types are also used in the larger sizes of this class. Bin feed, as well as hopper models, are available in both the underfeed and overfeed types.

#### Class 5 Stokers

The prevalent stokers in this field are: (a) overfeed flat grate, (b) overfeed inclined grate, (c) underfeed side cleaning, and (d) underfeed rear cleaning.

The rear cleaning underfeed stoker is usually of the multiple retort design and is used in some of the largest industrial plants and central power stations. In some instances, zoned air control has been applied on these stokers, both longitudinally and transversely of the grate surface.

Underfeed side cleaning stokers are made in sizes up to approximately 500 boiler horsepower. They are not so varied in design as those in the smaller classes, although the principle of operation is much the same. The overfeed spreader type stoker (Figs. 2 and 3) is adaptable to a wide

variety of coals and is being extensively used in capacities up to 1000 boiler horsepower.

#### Combustion Process

Due to the marked differences in design and operating characteristics of stokers and the widely different characteristics of stoker coals, it is difficult to generalize on the subject of combustion in automatic stokers.

In anthracite stokers of the small Class 1 overfeed type, burning takes place entirely within the stoker retort and tuyere. The ash and refuse of combustion spills over the edge of the tuyere into an ash pit or receptacle from which it may be removed either manually or automatically.

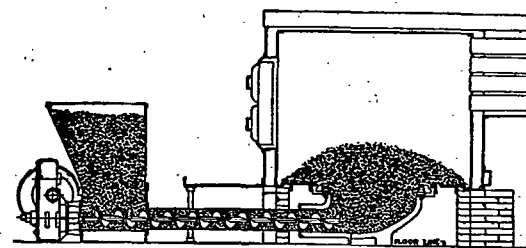


FIG. 9. UNDERFEED SCREW STOKER, HOPPER TYPE, CLASS 2, 3 OR 4

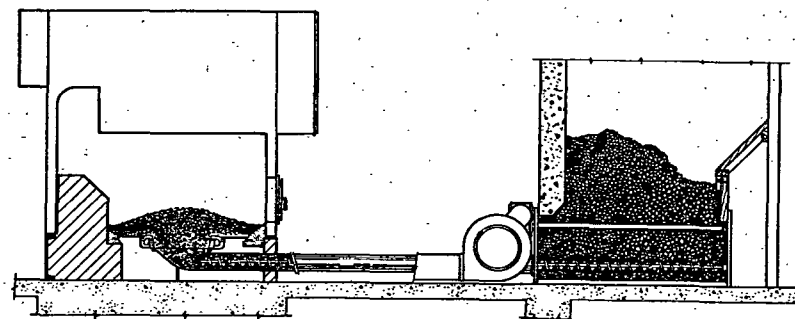


FIG. 10. UNDERFEED SCREW STOKER, BIN TYPE, CLASS 2, 3 OR 4

The larger underfeed anthracite stokers operate on the same principle except that the retort is rectangular and the refuse spills over only one or two sides of the grate. Anthracite for stoker firing is usually supplied in the No. 1 buckwheat or No. 2 buckwheat size.

Since the majority of the smaller bituminous coal stokers operate on the underfeed principle, a general description of their operation will be given. When the coal is fed from the hopper or bin into the retort, it moves upward toward the zone of combustion and is heated by conduction and radiation from the burning fuel in the combustion zone. As the temperature of the coal rises, it gives off moisture and occluded gases, which are largely non-combustible. When the temperature increases to