

be changed from the thin rectangular to the more nearly square shape. Stack heads should have upper end curved to provide easy flow of warm air to the room.

WARM-AIR REGISTERS

The registers used for discharging warm air into the rooms should have free or net area not less than the area of the leader in the same run of piping. The free area should be at least 70 per cent of the gross area

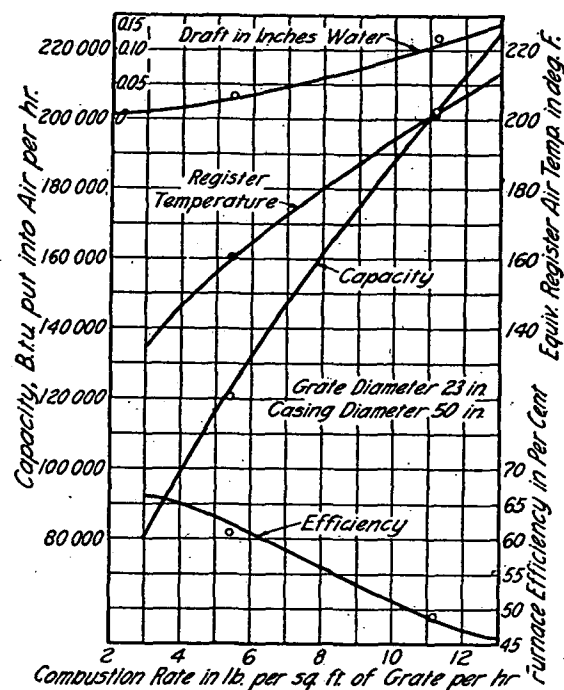


FIG. 6. TYPICAL PERFORMANCE CURVES FOR A WARM AIR FURNACE AND INSTALLATION IN A THREE-STORY TEN LEADER PLANT, OPERATING ON RECIRCULATED AIR

of the register. No upper floor register should be wider horizontally than the wall stack, and it should be placed either in the baseboard or side wall, if this can be done without the use of offsets. First floor registers may be of the baseboard or floor type with the former location preferred. No first floor register should require a register box more than 14 in. wide, although it may be longer than 14 in.

RECIRCULATING AIR SUPPLY DUCTS AND GRILLES

The ducts through which air is returned to the furnace should be designed to minimize friction and turbulence. They should be of ample

area, in excess of the total area of warm-air pipes, and at all points where the air stream must change direction or shape, streamline fittings should be employed. Horizontal ducts, should pitch, at least one-half inch per foot, upward from the furnace.

The recirculating grilles (or registers) should have a free area at least equal to the ducts to which they connect, and their free area should never be less than 50 per cent of their gross area.

The location and number of return grilles will depend on the size, details and exposure of the house. Small compactly built houses may frequently be adequately served by a single return effectively placed in a central hall. More often it is desirable to provide two or more returns,



FIG. 7. ELEVATION OF THE WARM AIR RESEARCH RESIDENCE

provided, however, that in two-story residences one return must be placed, to effectively receive the cold air returning by way of the stairs.

Where a divided system of two or more returns is used the grilles must be placed to serve the maximum area of cold wall or windows. Thus in rooms having only small windows the grille should be brought as close to the furnace as possible, but if the room has a bay window, french doors, or other large sources of cooling and leaking of cold air, the grille should be placed close by, so as to collect the cool air and prevent drafts. When long ducts of this type are employed they must be made oversize and favored in every way. This precaution is particularly important when long ducts and short ducts are used in the same system. The long ducts must be oversize if they are to operate satisfactory, in parallel with short ducts.

Return ducts from upstairs rooms may be necessary in apartments, or other spaces closed off, or badly exposed. Metal linings are advisable in such ducts. It is important that these ducts be free from unnecessary friction and turbulence, and that they be located to prevent preheating of the air before it reaches the furnace.