

for determining the size of furnace to be used applies to continuously heated buildings. For intermittently heated buildings, it is advisable to increase the size by an amount ranging from 75 per cent to 200 per cent depending on the heat capacity of the construction materials, the higher percentage applying to materials of high heat capacity, such as concrete and brick.

Follow the same methods for an oil furnace as for coal where a conversion unit is to be used, making sure that the ratio of heating surface to grate area exceeds 20 to 1. If it does not, a size larger furnace should be selected. Use the manufacturers' Btu rating of furnaces designed for exclusive use with oil, and select a burner with liberal excess capacity.

Gas furnaces approved by the *American Gas Association*, which grants a Certificate of Approval to manufacturers, must carry the rated Btu per hour and official output in addition to an approval seal. Manufacturers' catalogs are also required to carry the output data.

The selection of the proper size gas furnace for a given installation can be easily made by using the following *A.G.A.* formula:

$$R = \frac{H}{0.9} \quad (2)$$

where

H = total heat loss from building in Btu per hour.

R = official *A.G.A.* output rating of the furnace in Btu per hour.

In the case of converted warm air furnaces a slightly different procedure is necessary, as the Btu input to the conversion burner must be selected rather than the furnace output. The proper sizing may be done by means of the following formula:

$$I = 1.56H \quad (3)$$

where

I = Btu per hour input.

The factor 1.56 is the multiplier necessary to care for a 10 per cent heat loss in the distributing ducts and an efficiency of 70 per cent in the conversion burner.

SELECTING THE FAN

Choose a fan which, according to its manufacturer's rating, is capable of delivering a volume of air, expressed in cubic feet per minute, against a frictional resistance, expressed in inches of water, computed by adding together the following items:

1. The frictional resistance of a warm air trunk or leader.
2. The frictional resistance of a return air trunk or duct.
3. The resistance to the flow of total volume of air through the furnace casing or hood, which is usually considered from 0.10 to 0.15 inches of water.
4. The frictional resistance through any other accessories, such as washers or filters.
5. A factor of safety of 10 per cent of the resistance calculated above.

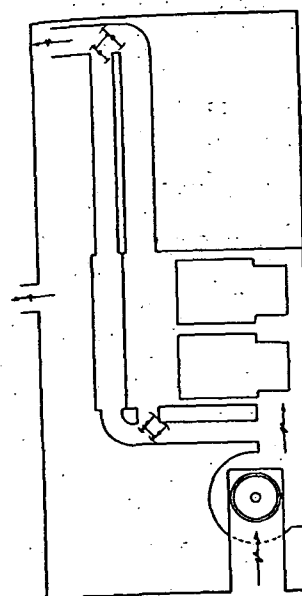


FIG. 11. HEATER ARRANGED TO USE OUTSIDE AIR, WITH TEMPERED AIR CHAMBER ABOVE WARM AIR CHAMBER SHOWING DOUBLE DUCT DISTRIBUTING SYSTEM AND MIXING DAMPERS AT BASE OF RISERS

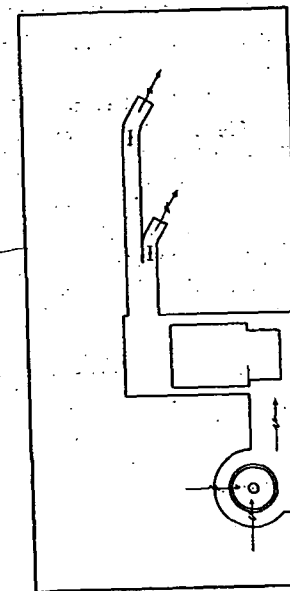


FIG. 13. HEATER ARRANGED FOR RECIRCULATION WITH TRUNK LINE DISTRIBUTING SYSTEM SHOWING TEMPERATURE CONTROL BY AIR VOLUME AT OUTLET, OR DIRECT ON HEATER

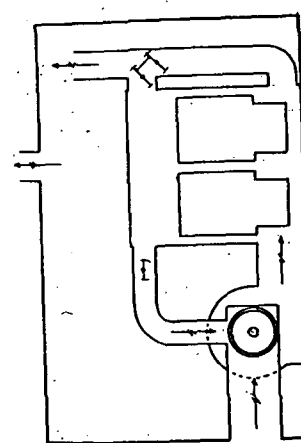


FIG. 10. HEATER ARRANGED TO USE COMPLETE OUTSIDE AIR WITH TEMPERED AIR CHAMBER ABOVE WARM AIR CHAMBER SHOWING MIXING DAMPER TO TEMPER AIR, ALSO MIXING DAMPER TO DUCT FROM WARM AND TEMPERED AIR CHAMBERS

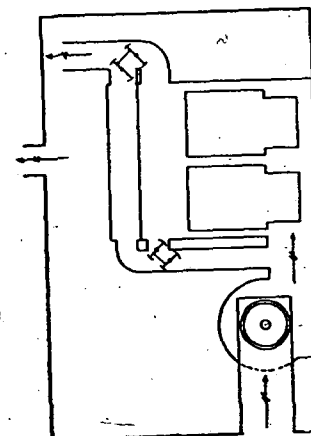


FIG. 12. HEATER ARRANGED FOR OUTSIDE AIR WITH WARM AIR CONNECTION TO FAN INLET TO TEMPER AIR, ALSO MIXING DAMPERS FROM WARM AIR AND TEMPERED AIR CHAMBER