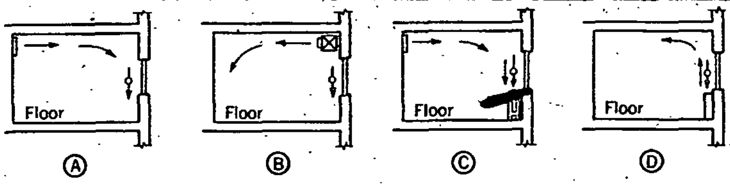

→ Winter convection current

FIG. 8. DISTRIBUTION METHODS FOR SMALL ROOMS

A. Satisfactory for cooling. Unsatisfactory for heating in severe climates where the outside temperature is consistently below 40 F, and single glass and uninsulated walls are prevalent.

B. Performance slightly poorer than A, unless supplemented by circular diffusers in bottom of the duct.

C. Satisfactory for cooling. Satisfactory for heating if direct radiation is properly controlled.

D. Satisfactory for both cooling and heating. The air should be discharged in a vertical plane parallel to the wall, and should be fanned out in this plane at an angle of 10 to 20 deg with the vertical.

period, the returns should be preferably located at the floor level and near the front of the theater to prevent cold spots which may result from exposed wall convection or infiltration from exits. Return intakes may be located higher where the exits and stage have separate means of heating.

Diagrams shown in Fig. 8 illustrate distribution methods for small rooms with exposed walls, such as for offices, hospital rooms, hotel rooms, apartments, etc. The cooling performance of various distribution methods as applied to a small store is shown in Fig. 9.

For specific requirements in connection with air distribution in marine applications see Chapter 38.

BALANCING SYSTEM

In designing an air conditioning system, it should be the aim of the engineer to so proportion the duct system that proper distribution of air to every supply opening will be obtained. Since this is almost impossible to accomplish in practice, it becomes necessary to have means of balancing the system to secure the desired amount of air in each space. There are a number of ways in which this may be accomplished, some of which are:

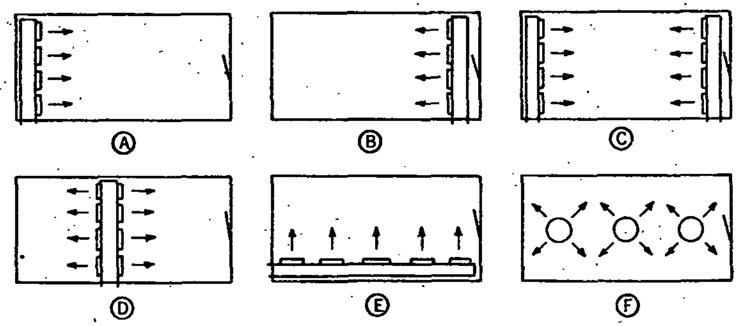

FIG. 9. SMALL STORE COOLING DISTRIBUTION

A. *Rear Wall.* High outlet velocity, possibility of excessive air motion and drafts.

B. *Front Wall.* High outlet velocity, possibility of excessive air motion and drafts. May cause excessive infiltration of outside air.

C. *Front and Rear Walls.* Moderate room air motion, outlet blows should not impinge giving rise to down drafts in center of store.

D. *Center.* Moderate air motion, no impingement of air streams. Good results.

E. *One Side.* Moderate room air motion, should blow toward exposed wall. Good results.

F. *Ceiling.* Low room air motion. Good results.

1. Dampers on the supply and return faces.
2. Dampers in the supply and return ducts.
3. Reducing the effective area of some supply openings by blank-offs.
4. Combinations of dampers in both supply and return air.

Dampers on the supply faces themselves are objectionable unless of special design (see Fig. 5), because of their effect on the air stream and noise. Dampers on the return faces are frequently objectionable because of noise. A damper in the supply duct some distance back of the supply opening forms a very satisfactory means of regulating the flow without disturbing distribution across the supply opening face. A damper in the return air duct has the advantage over one immediately behind the face in that it does not tend to create high localized velocities through the face as the latter might do if nearly closed. Blank-offs consisting of pieces of sheet metal covering a portion of the supply opening face can frequently be used satisfactorily, although determination of just what is required is a matter of experiment, and the balancing of the system is not nearly so conveniently accomplished as with dampers. Blank-offs have the further objection that as the area is reduced, pressure builds up and air motion tends to remain constant. Dampers in both supply and return air form the most flexible means of controlling the supply to the room and the static pressure within the room. When feasible, these dampers, particularly those in the supply ducts, should be a substantial distance from the supply opening, and ahead of the acoustic duct lining if used. Due consideration should also be given to the use of the several volume control and uniform distribution devices now available. See *Catalog Data Section.*

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