

FIG. 9. 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 approximately that of A when small diffusers are used 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 slightly away from the wall, and for low velocities, should be fanned out parallel to the wall.

theaters; relatively high velocities can be used. These will work satisfactorily if adjustable outlets are used to avoid areas of local turbulence.

In small or medium size theaters, it is sometimes practicable to use side wall or front wall distribution. For the satisfactory operation of such a system during the winter heating period, the returns should preferably be 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.

For multi-room buildings diagrams shown in Fig. 9 illustrate distribution methods for small rooms with exposed wall, such as offices, hotel (guest) rooms, hospital (patients) rooms, apartments, etc.

For a small store the cooling distribution of various distribution methods

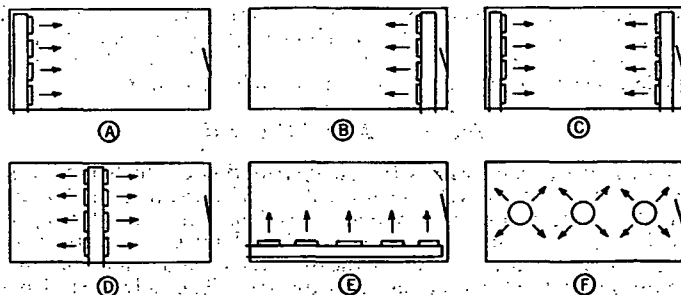


FIG. 10. SMALL STORE COOLING DISTRIBUTION

- A. Rear Wall. High outlet velocity, satisfactory if properly designed; possibility of excessive air motion and drafts if used for wrong application.
- B. Front Wall. High outlet velocity, results same as A.
- C. Front and Rear Walls. Moderate room air motion, outlet blows should not impinge giving rise to down drafts in center.
- 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. Outlets should be selected of sufficient size to allow or blocking when not located in perfect squares.

is illustrated in Fig. 10. Marine applications of air distribution systems are given in Chapter 47.

REFERENCES

- ¹ Control of Air Streams in Large Spaces, by G. L. Tuve and G. B. Priester (A.S.H.V.E. TRANSACTIONS, Vol. 50, 1944, p. 153).
- ² Air Conditioning Principles, by C. O. Mackey (International Textbook Company, Scranton, Pa., 1941, p. 187).
- ³ Throw of Air from Slots and Jets, by R. D. Madison and W. R. Elliot (A.S.H.V.E. JOURNAL SECTION, Heating, Piping and Air Conditioning, Nov. 1946, p. 108).
- ⁴ Modern Air Conditioning, Heating and Ventilating, by W. H. Carrier, R. E. Cherne, and W. A. Grant (Pitman Publishing Corp., New York, N. Y., 1940).
- ⁵ A.S.H.V.E. RESEARCH REPORT No. 1155—The Performance of Stack Heads, by D. W. Nelson, D. H. Krams and A. F. Tuthill (A.S.H.V.E. TRANSACTIONS, Vol. 46, 1940, p. 205).
- ⁶ A.S.H.V.E. RESEARCH REPORT No. 1226—Performance of Side Outlets on Horizontal Ducts, by D. W. Nelson and G. E. Smedberg (A.S.H.V.E. TRANSACTIONS, Vol. 49, 1943, p. 68).

BIBLIOGRAPHY

Jets

- Calculation of Turbulent Expansion Processes, by W. Tollmien (NACA Tech. Memo. No. 1085, September, 1945).
- Investigations of the Turbulent Mixing Regions Formed by Jets, by A. M. Kueth (Journal of Applied Mechanics, Vol. 2, p. 87, 1935).
- Air Flow at Discharge of Fan-Pipe Lines in Mines, Part II, by G. E. McElroy (U. S. Bureau of Mines Report of Investigations No. 3730, November, 1943).
- Investigation of Flow in an Axially Symmetrically Heated Jet of Air, by S. Corrsin (NACA-ACR No. 3123—declassified—December, 1943).
- Isothermal and Nonisothermal Air Jet Investigations, by V. Cleaves and L. M. K. Boelter (Chem. Eng. Progress, Vol. 43, No. 3, Trans. Section, March 1947, p. 123).
- Diffusion of Submerged Jets, by M. L. Albertson, Y. B. Dai, R. A. Jensen and Hunter Rouse (Proceedings ASCE, December 1948, p. 1571).

Air Distribution

- A.S.H.V.E. Research in Air Distribution and Air Duct Friction, by C. Tasker (A.S.H.V.E. JOURNAL SECTION, Heating, Piping and Air Conditioning, April 1948, p. 125).
- Turbulence—A Fundamental Frontier in Air Distribution, by H. B. Nottage (A.S.H.V.E. JOURNAL SECTION, Heating, Piping and Air Conditioning, April 1949, p. 115).
- Air Distribution and Draft, by J. Rydberg and P. Norbäck (A.S.H.V.E. JOURNAL SECTION, Heating, Piping and Air Conditioning, January 1949, p. 167).
- Downward Projection of Heated Air, by Linn Helander and C. V. Jakowatz (A.S.H.V.E. JOURNAL SECTION, Heating, Piping and Air Conditioning, March 1948, p. 129).

Outlet Performance

- The Rationale of Air Distribution and Grille Performance, by C. O. Mackey (Refrigerating Engineering, June 1938, p. 417).
- A.S.H.V.E. RESEARCH REPORT No. 1076—Air Distribution from Side Wall Outlets, by D. W. Nelson and D. J. Stewart (A.S.H.V.E. TRANSACTIONS, Vol. 44, 1938, p. 77).
- A.S.H.V.E. RESEARCH REPORT No. 1206—Performance of Stack Heads Equipped with Grilles, by D. W. Nelson, D. H. Lamb and G. E. Smedberg (A.S.H.V.E. TRANSACTIONS, Vol. 48, 1942, p. 279).
- A.S.H.V.E. RESEARCH REPORT No. 1204—Entrainment and Jet Pump Action of Air Streams, by G. L. Tuve, G. B. Priester, and D. K. Wright, Jr. (A.S.H.V.E. TRANSACTIONS, Vol. 48, 1942, p. 241).

Slots and Perforated Panels

- Air Discharge from Narrow Slots, by F. F. Stevenson (Heating, Piping and Air