

and thus provides a larger plenum chamber. Fig. 3 illustrates a complete residence fan furnace installation showing location of fan, furnace, filters, plenum chamber and method of take-off of warm air pipe.

### FANS AND MOTORS

Centrifugal type fans are most commonly used, and these may be equipped with either backward or forward curved blades. Motors may be mounted on the fan shaft or outside of the fan with belt connection. Multi-speed motors or pulleys are desirable to provide a factor of safety and to allow for increased air circulation. For additional information on fans and motors, see Chapters 29 and 35.

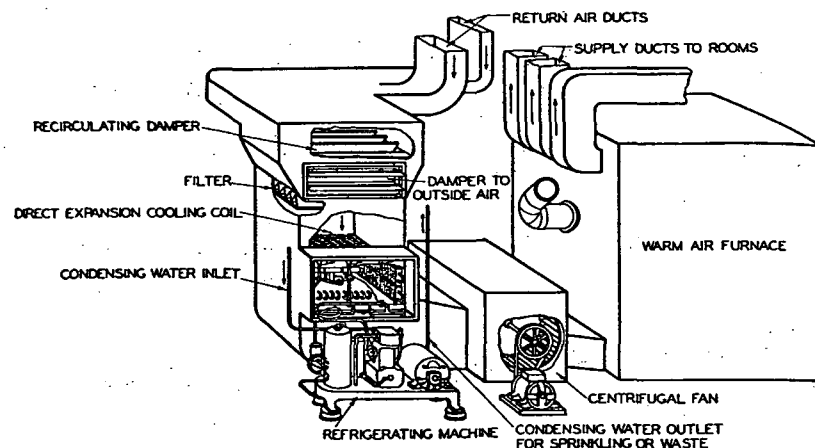


FIG. 3. COMPLETE RESIDENCE FAN FURNACE INSTALLATION FOR WINTER HEATING AND SUMMER COOLING

### SOUND CONTROL

Special attention should be given to the problem of noise elimination. The fan housing should not be directly connected with metal, either to the furnace casing or to the return air piping. It is common practice to use canvas strips in making these connections. Motors and their mountings must be carefully selected for quiet operation. Electrical conduit and water piping must not be fastened to, nor make contact with fan housing. The installation of a fan directly under a cold air grille is not recommended on account of the noise objection. (See also Chapter 32.)

### FILTERS

There are many satisfactory types of filters on the market. These include dry filters, viscous filters, oil filters and other types, some of which must be cleaned, some of which must be cleaned and recharged with oil, and some of which are inexpensive and may be discarded when they become dirty, and replaced with new ones.

The resistance of a filter must be considered in the design of the system since the resistance rises rapidly as the filter becomes dirty, thus impairing the heating efficiency of the furnace, in fact, endangering the life of the furnace itself. Manufacturers' ratings of filters must be carefully regarded, and ample filter area must be provided. Filters must be replaced or cleaned when dirty. (See also Chapter 28.)

### AIR DISTRIBUTION

The conditions of comfort obtained in a room are greatly influenced by the type of register used and the locations of the supply registers and return grilles. In general it has been found that changes in the type, air velocity, and location of the supply register affect the room conditions much more than the changes in the location of the return grilles. Due to the economic considerations involved, it is common practice to locate the supply openings on the inside walls of a residence and the return openings nearest the greatest outside exposure. Many designers prefer, however, to locate the supply registers so that the warm air from the registers blankets a cold wall, and mixes with the cold air dropping off from the exposed walls. This may be accomplished by the use of a supply register placed close to an outside wall in such a position that the warm air sweeps the cold wall surface. The ducts leading to supply registers which are located on exposed walls should be adequately insulated to reduce the heat loss from the ducts.

### Register and Grille Openings

Supply registers located in the floor are effective, but as they require frequent attention to keep them clean they should be avoided where another effective register location can be found. Tests conducted in the Warm Air Research Residence<sup>2</sup> have indicated that excellent results are obtainable with either high side wall or baseboard registers, providing a reasonable amount of precaution is employed. Baseboard registers should be of a deflecting-diffuser type which throws the air downward toward the floor and diffuses it at the same time. Register air temperatures under 125 F and air velocities over 500 fpm should be avoided as they may cause drafts.

High side wall registers must be of such type that the air is delivered horizontally or in a slightly downward direction, and must be so located as to avoid impingement of air on ceiling or wall. Directional flow diffusing type should be used to insure best results. Register air velocities should be such that the air stream carries to the opposite exposure. Velocities under 500 fpm are not recommended. Register air temperatures under 125 F are not objectionable. In fact, when cooling is desired, better air distribution is obtained with high side wall registers.

Unless registers, regardless of their location, are well proportioned and designed as well as decorated to harmonize with the trim, they may be unsightly. All registers should be equipped with dampers and must be sealed against leakage around the borders or margins.

<sup>2</sup>Loc. Cit. Note 1.