April 6, 1943. N. J. SMITH 2,315,667

REFRIGERATING APPARATUS

Filed Feb. 28, 1940 2 Sheets-Sheet 1

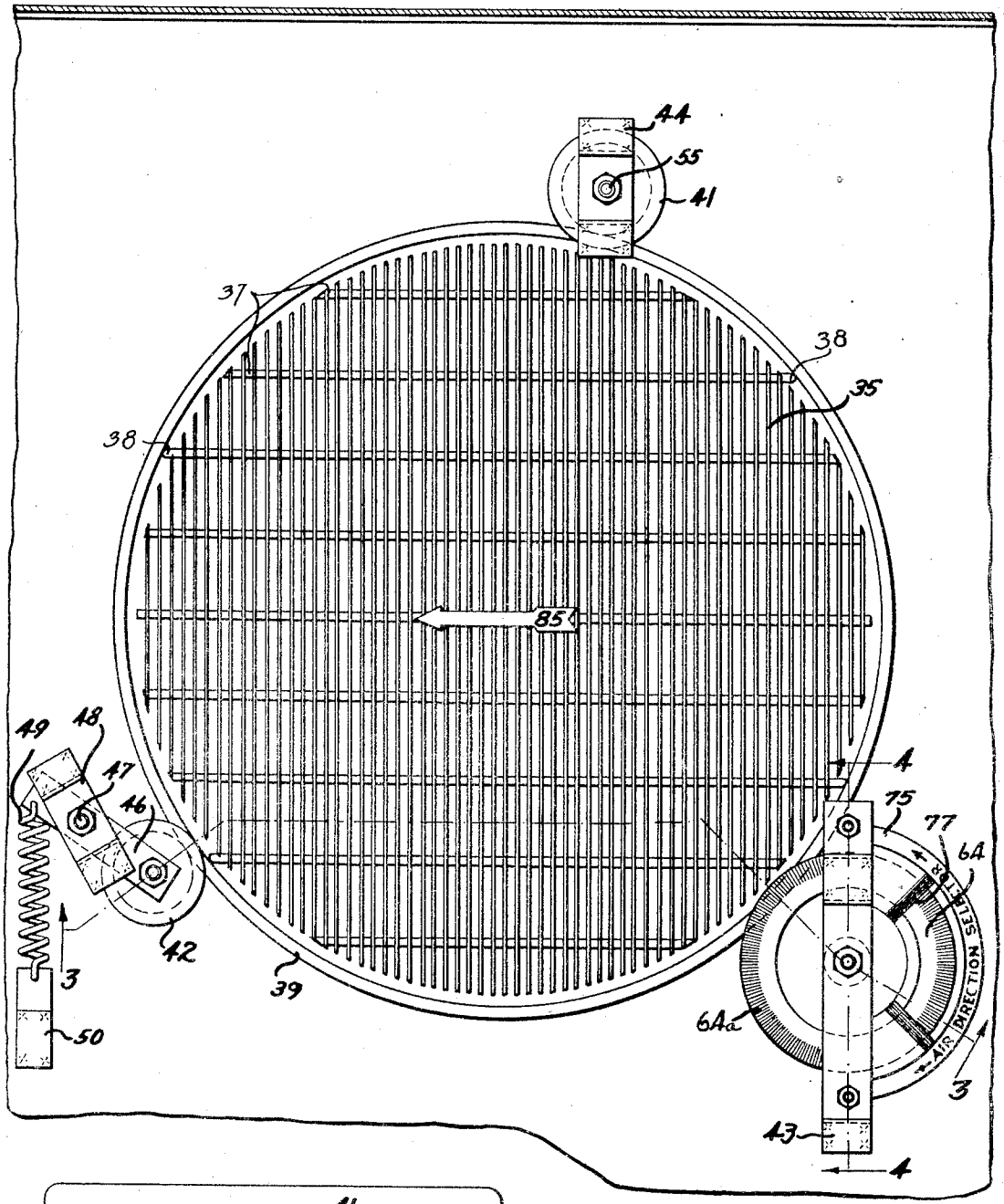


Fig. 2

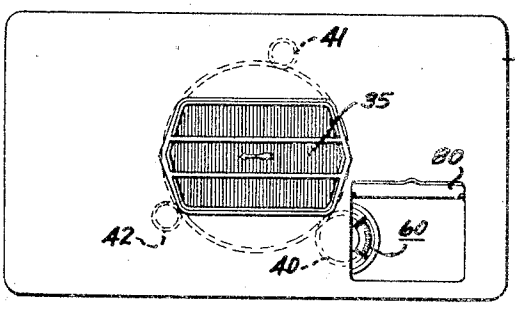


Fig. 1

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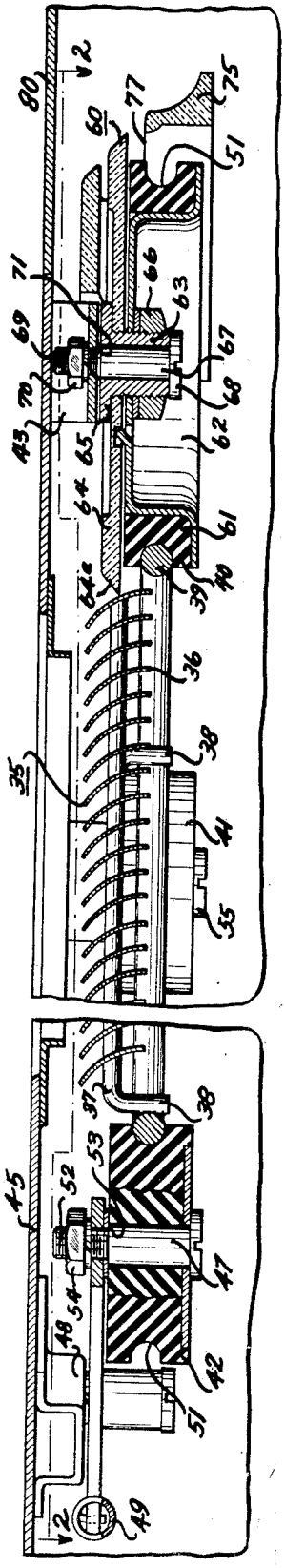


Fig. 3

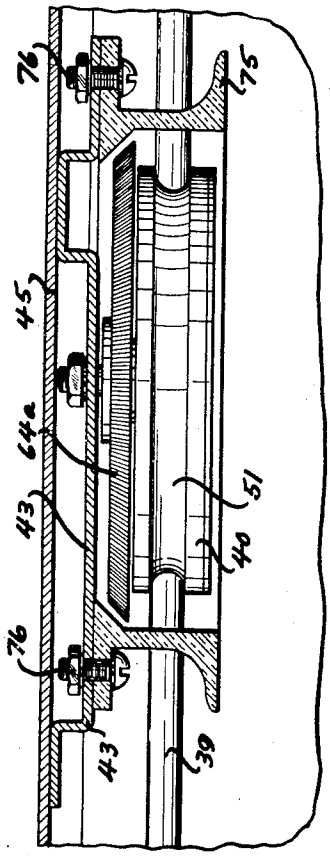


Fig. 4

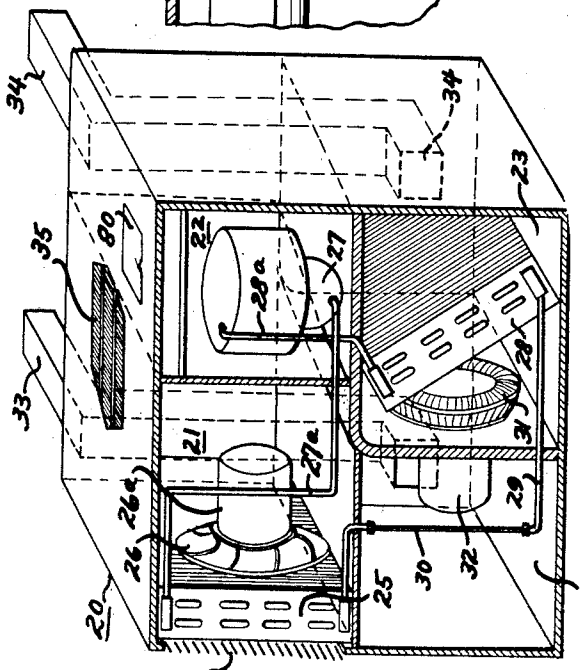


Fig. 5

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UNITED STATES PATENT OFFICE

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REFRIGERATING APPARATUS

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Application February 28, 1940, Serial No. 321,294

5 Claims. (Cl. 98—40)

This invention relates to refrigerating apparatus, and particularly to means for controlling the direction of discharge of air from an air circulating or conditioning apparatus.

When circulating air within a room, for cooling or ventilating the same, it is often desirable that the direction of flow of the stream of air be changed in order to meet altered conditions within the room. This is often necessary due to a change in the location of various major pieces of furniture, which altered arrangement requires that the stream of air be changed in order to prevent direct contact of the air circulating within the room upon a person occupying the changed location of the object of furniture.

It is thus an object of this invention to provide an air deflecting means which may be readily changed so as to alter the direction of flow of air leaving an air conditioning or circulating apparatus, without necessitating the removal or alteration of the apparatus in any way.

It is also an object of the invention to provide an air flow directing means which is built into an air circulating or conditioning apparatus, the operating mechanism of which is concealed by a wall thereof, to alter the position of the air flow directing means by movement of a projecting manipulating means.

It is still another object of the invention to provide an air deflecting grille structure having a plurality of angularly positioned air deflecting vanes, which grille is rotatably mounted within the path of a stream of air to cause deflection of the air in various directions upon rotation of the grille, and to provide means for rotating the grille structure by the use of an exposed manipulator knob which may comprise one of the supporting elements for the rotating grille structure.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a top plan view of an air circulating conditioning apparatus showing the relative locations of the air deflecting means and the operating manipulator for the deflecting means;

Fig. 2 is a top plan view of the air deflecting and operating apparatus taken just below a supporting wall for the apparatus and substantially along line 2—2 of Fig. 3;

Fig. 3 is a cross-sectional view taken along line 3—3 of Fig. 2;

Fig. 4 is a cross-sectional view taken along line 4—4 of Fig. 2; and

Fig. 5 is a view of an air conditioning or circulating apparatus, shown somewhat diagrammatically, in which the air deflecting means is used.

In this invention, I have provided an air deflecting grille structure which may be supported adjacent an air discharge aperture of an air circulating or conditioning apparatus in such a manner that the grille structure may be readily rotated by means of a projecting manipulator knob to alter the direction of flow or air leaving the air circulating or conditioning apparatus. I have shown my air deflecting grille means as being used in conjunction with a self-contained air conditioning apparatus.

The air conditioning or circulating apparatus comprises a cabinet or housing **20** which is subdivided into an air cooling compartment **21**, a compressor compartment **22** and a condenser compartment **23**. Air from the room which is being conditioned is drawn into the cooling compartment **21** through an opening **24** positioned in the side wall of the housing **20**. The air is caused to be drawn over a cooling coil or evaporator **25** by means of a fan **26** driven by an electric motor **26a** and is discharged into the compartment **21**, which compartment provides a plenum chamber from which the air may discharge into the room through the air deflecting grille **35**.

The air being drawn through the cooling coil **25**, by means of the fan **26**, is cooled in its passage through the cooling coil by the vaporization of liquid refrigerant within the same. The vaporized refrigerant is withdrawn from the evaporator by means of a compressor **27** through a conduit **27a**. The gaseous refrigerant is compressed within the compressor **27**, in a manner well known in the art, and is discharged therefrom through a conduit **28a** to a condenser **28** wherein the compressed refrigerant is condensed and liquefied. The liquefied refrigerant is conducted from the condenser **28** to the evaporator **25** by means of a conduit **29**. To control the rate of flow of liquid refrigerant from the condenser **28** to the evaporator **25**, a liquid expansion control device is interposed within the conduit **29** and may consist of a fixed restrictor **30**, which may comprise a small bore tube.

In order to cool the condenser **28**, a fan **31** is provided for circulating air over the condenser. The fan **31** is power operated by means of a motor **32**. To obtain air for circulating over the

condenser 28, a duct 33 is provided which has one end in open communication with a source of air exterior of the room within which the air conditioning or circulating apparatus is positioned and has the opposite end in communication with the chamber 23a, which is on the suction side of the fan 31. The exterior air is drawn through the duct 33 into the chamber 23a and discharged into the condenser chamber 23 by the fan 31, thereby forcing the air to pass over the condenser 28 and be discharged from the chamber 23 through a duct 34 leading from the chamber 23 to the exterior of the room within which the air conditioning apparatus is positioned.

The air deflecting grille 35 is provided with a plurality of air deflecting vanes 36. These vanes 36 are positioned at an angle with respect to the direction of flow of the stream of air in the path of which they are positioned, to cause the air to be deflected from a straight path of travel. The vanes 36 are mounted in substantially parallel arrangement upon a plurality of rods 37, thereby providing a grille structure. The ends of some of the rods 37 are bent downwardly as at 38 and are attached to a circular track 39, whereby the grille 35 will be supported upon a circular track which may be suitably mounted to permit rotation of the grille 35.

The circular track 39 is rotatably mounted upon a three-point suspension which comprises a roller 40 which has a fixed position, a roller 41 which also has a fixed position, and a roller 42 which is pivotally mounted in such a manner as to permit pressure to be applied by the roller 42 against the track 39 in order to cause the track to frictionally engage the rollers 40, 41 and 42, thereby suspending the grille between the rollers adjacent the circulating room air discharge aperture of the air circulating or conditioning apparatus. The rollers 40, 41 and 42 are fabricated from a material, such as rubber, which will provide a good friction contact surface between the rollers and the track.

The roller 40, which comprises one point of suspension for the track 39, is also to be used as a manipulating knob to cause rotation of the grille 35 when desired. The rollers 40 and 41 have a fixed position adjacent the circulating room air discharge aperture of the air circulating or conditioning apparatus and are supported by means of brackets 43 and 44 which are spot-welded, or attached by other suitable means, to the wall 45 of the air circulating or conditioning apparatus. The roller 42 is supported upon an arm 46 which in turn is pivotally supported at 47 to the bracket 48. The bracket 48 is spot-welded, or otherwise suitably attached, to the wall 45 of the air conditioning or circulating apparatus.

The roller 42 is mounted upon one end of the arm 46 on one side of the pivot 47. The end of the lever 46 on the opposite side of the pivot 47 from the roller 42 is attached to one end of a tension spring 49. The opposite end of the tension spring 49 is attached to a bracket 50, which bracket is spot-welded or otherwise suitably attached to the wall 45 of the air circulating or conditioning apparatus. The spring 49 exerts a pull upon one end of the lever 46, tending to cause rotation of the roller 42 about the pivot 47, thereby forcing the roller 42 against the track 39 of the grille structure 35.

Each of the rollers 40, 41 and 42 is provided with a recessed portion 51 in which the track 39 will ride and be retained in frictional engagement with the rollers. Since the roller 42 is always exerting a force against one side of the circular track 39, and since the track is also always in engagement with the rollers 40 and 41, it is seen that a three-point suspension for the track 39 is provided by frictional engagement with the rollers 40, 41 and 42 and which will permit rotation of the track 39 between the rollers 40, 41 and 42 when one of the rollers is rotated.

The pivot 47 for the roller 42 comprises the pivot pin 47, upon the shank of which the roller is mounted. The threaded end 52 of the pivot 47 is of reduced diameter from the remainder of the shank portion thereof, thereby providing a shoulder 53 which abuts against the arm 46 to space the pin 47 in such a manner as to permit rotation of the roller 42 upon the pin 47. The upper end 52 of the pin 47 is threaded to receive a nut 54 to retain the pin in position upon the arm 46.

The roller 41 is provided with a similar pivot and attaching means 55 for suspending the roller from the bracket 44 and to permit rotation of the roller 41.

The roller 40, which provides one of the points of suspension for the track 39, and which is also a part of the manipulating knob 60, consists of a ring 61 fabricated from a material, such as rubber, which will provide a good friction surface for the track 39. The ring 60 is attached to a flanged cup-shaped member 62 by vulcanization or other suitable means. This cup-shaped member 62 is provided with a central opening therein, through which a stud 63 is positioned. A circular disc 64, having a knurled edge 64a, is positioned adjacent the bottom face of the cup-shaped member 62. The stud 63 also extends through a central opening provided in the disc 64, the stud 63 being provided with an enlarged shoulder 65 upon the upper end thereof which engages the face of the disc 64. The stud 63 is threaded to receive a nut 66 which, when tightened upon the cup-shaped member 62, will draw the shoulder 65 against the disc 64 to force the same into contact with the cup-shaped member 62, thereby rigidly attaching the disc 64 to the cup-shaped member 62, and thus to the roller 40.

A pivot pin 67 having an enlarged head 68 extends centrally through the stud 63, the end of the stud resting upon the head 68 of the pivot pin 67. The pivot pin 67 is provided with a smooth shank portion which will provide a bearing surface to permit rotation of the stud 63 upon the pin 67 and thus will permit rotation of the roll 40 and the disc 64. The pivot pin 67 is also provided with a reduced end portion 69 which is threaded to receive a nut 70. The reduced end portion 69, thereby, provides a shoulder 71 upon the pin 67 which will permit the pin to be rigidly fastened to the bracket 43 by the nut 70, thus supporting the roller 40 and the disc 64 upon the bracket 43.

A semi-circular decorative housing 75 is adapted to cover and protect a major portion of the roller 40. This housing 75 is attached to the bracket 43 by means of the bolts 76. The housing 75, however, is provided with a slot 77 through which the knurled edge portion 64a of the disc 64 may extend, thereby providing means whereby the disc 64 may be engaged by the finger of an operator in order to rotate the disc 64 and thus the roller 40.

Since the grille 35 and the supporting rollers 40, 41 and 42 are all mounted behind a wall 45,

and concealed from view, it is evident that it is necessary to provide some means of access to the manipulator knob **60** so that the knurled edge portion **64***a* of the disc **64** may be engaged by an operator to cause rotation of the roller **40** and thus rotate the grille **35** to alter the position of the air directing vanes **36** of the grille **35**.

To provide for access to the manipulating knob **60**, a small hinged door **80** is provided in the wall **45** of the air circulating or conditioning apparatus. As will be noted in Fig. 1, wherein the door **80** is shown in open position to permit access to the manipulating knob **60**, a portion of the manipulating knob **60** is exposed when the door **80** is in the open position, and particularly that portion of the manipulating knob which consists of the housing **75** and the slot **77** through which the knurled edge **64***a* of the disc **64** extends to permit engagement by the finger of an operator.

A small direction arrow **85** is attached to the surface of the grille **35** to indicate the position of the grille and the direction the flow of air from the grille will take, due to the position of the grille.

By the use of this invention, it is seen that I have provided a completely concealed mechanism for causing rotation of an air deflecting grille structure and one which may be rotated by fingertip control to vary or change the direction of flow of air from an air circulating or conditioning apparatus in an infinite number of directions. This is particularly advantageous in that it will permit an air circulating or conditioning apparatus to be positioned in any part of a room and to permit air circulation from the air circulating or conditioning unit at any angle desired.

While the form of embodiment of the invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. An air conditioner including a cabinet having a wall provided with a discharge aperture, air conditioning means within said cabinet, air circulating means for drawing air into the cabinet passing it through the air conditioning means and discharging it through said aperture, and adjustable air directing means comprising a grille having a plurality of air directing vanes, a track for supporting said grille, a plurality of spaced rollers in engagement with the outer periphery of said track and including means for rotatably supporting said track and said grille adjacent said aperture, a fixed pivot for one of said rollers, a floating pivot for another of said rollers, means for biasing said floating pivot radially toward the center of said grille, and manipulating means having a driving engagement with said track to cause rotation of said grille upon operation of said manipulating means.

2. An air conditioner including a cabinet having a wall provided with a discharge aperture, air conditioning means within said cabinet, air circulating means for drawing air into the cabinet passing it through the air conditioning means and discharging it through said aperture, and adjustable air directing means comprising a grille having a plurality of air directing vanes, a circular track for supporting said grille, a plurality of roller means in engagement with the outer periphery of said track and including means for rotatably supporting said track and said grille adjacent said aperture, a first of said roller means providing a manipulating means having a driving engagement with said track to cause rotation of said grille upon operation of said manipulating means, and another of said roller means including spring means exerting pressure radially towards the center of the grille for biasing said track means into engagement with said first roller means.

3. Air flow directing means for controlling the direction of flow of a stream of air including a grille adapted to be interposed into a flowing stream of air and provided with a plurality of vanes positioned at an angle with respect to the direction of flow of air passing through the grille, said vanes deflecting the air from a straight path of travel when passing through said grille, means for suspending said grille to permit adjustment thereof, comprising a pair of spaced rollers in engagement with the outer periphery of said track and having fixed pivots and a third roller in engagement with the outer periphery of said track and having a floating pivot, manipulating means for one of said rollers for causing adjustment of said grille upon operation of said manipulating means, and means for biasing said third roller radially towards the center of said grille so as to bias said grille into engagement with said pair of spaced rollers.

4. Air grille means adapted to direct the flow of air through an opening in a wall comprising in combination, air deflecting means, a frame for said air deflecting means including a circular element, means for adjustably supporting said frame on said wall comprising a plurality of spaced rollers and pivots for said rollers supported by said wall, said rollers being arranged to radially engage said circular element and constituting means for rotatably supporting said circular element, at least one of said rollers having a fixed pivot, and at least one of said rollers having a floating pivot, means for biasing said floating pivot radially with respect to the center of said circular element so as to maintain said circular element and said rollers in engagement with one another, and manipulating means for producing rotation of said circular element.

5. Air grille means adapted to direct the flow of air through an opening in a wall comprising in combination, air deflecting means, a frame for said air deflecting means including a circular element, means for adjustably supporting said frame on said wall comprising a plurality of spaced rollers supported by said wall and arranged in engagement with the outer periphery of said circular element and constituting means for rotatably supporting said circular element, a fixed pivot for one of said rollers, a floating pivot for another of said rollers, means for biasing said floating pivot radially towards the center of said circular element, and manipulating means for producing rotation of said circular element, said rollers comprising the sole means for supporting said circular element.

NELSON J. SMITH.