

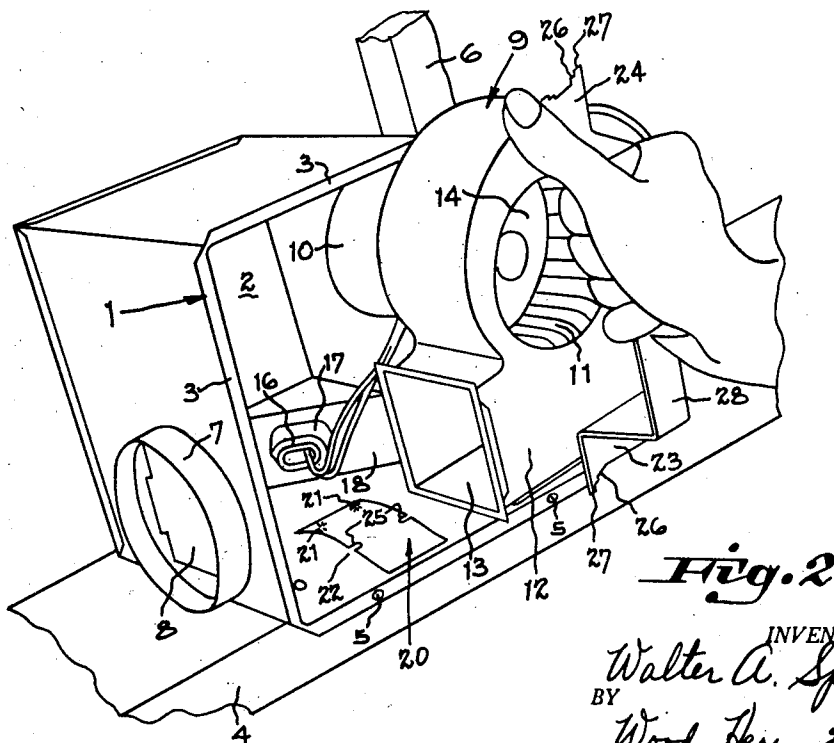
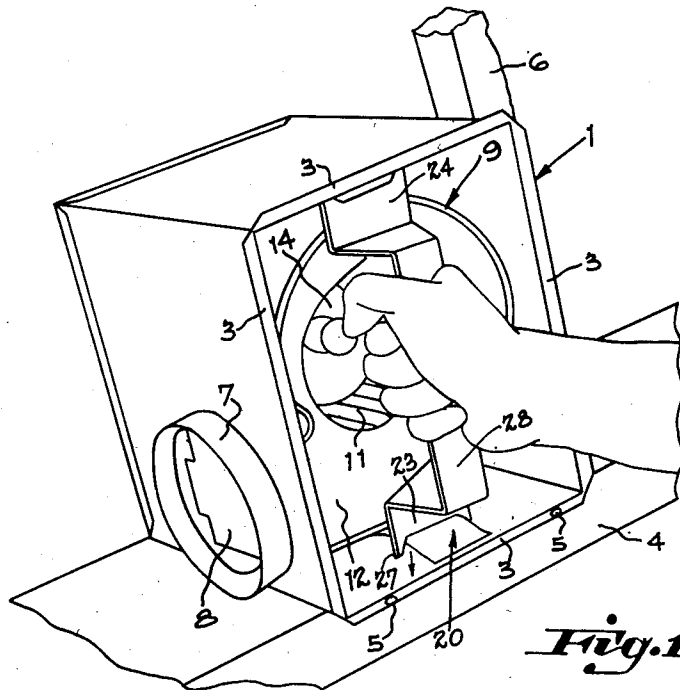
July 30, 1957

W. A. SPEAR
VENTILATOR UNIT

2,800,849

Filed April 20, 1955

2 Sheets-Sheet 1



INVENTOR.
Walter A. Spear.
BY Wood, Heron & Co. ATTORNEYS.

July 30, 1957

W. A. SPEAR
VENTILATOR UNIT

2,800,849

Filed April 20, 1955

2 Sheets-Sheet 2

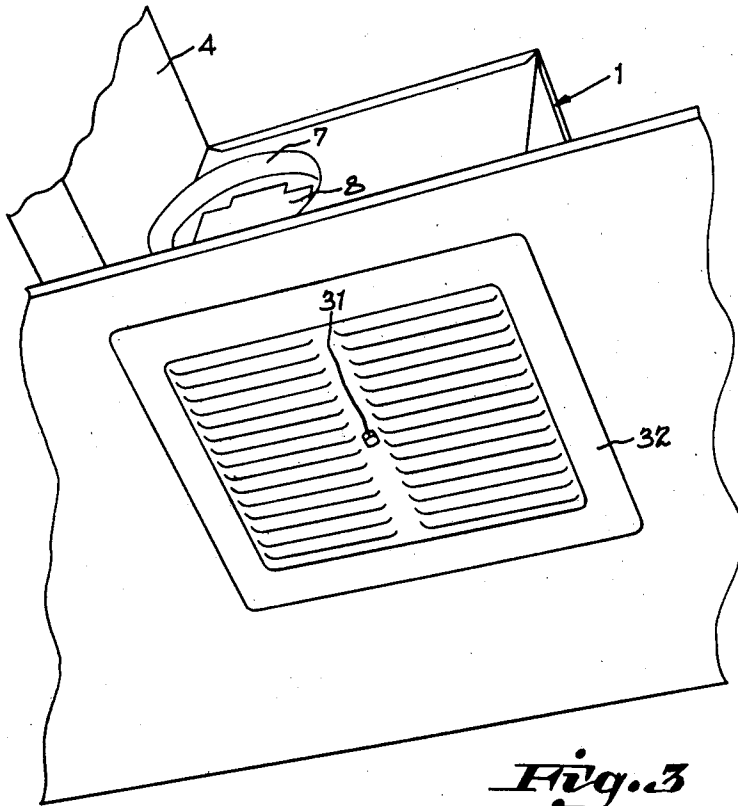


Fig. 3

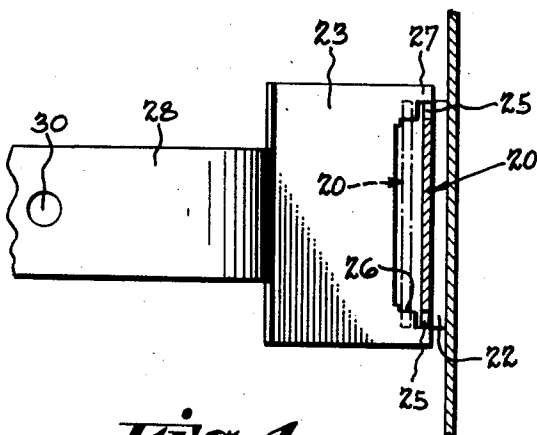


Fig. 4

INVENTOR.
Walter A. Spear.
BY
Wood, Heron & Evans.
ATTORNEYS.

1

2,800,849

VENTILATOR UNIT

Walter A. Spear, Cincinnati, Ohio, assignor to NuTone, Inc., Cincinnati, Ohio, a corporation of New York

Application April 20, 1955, Serial No. 502,547

7 Claims. (Cl. 98—43)

This invention relates to improvements in the construction of ventilating fans which are adapted for installation in the wall or ceiling of a room to exhaust air therefrom.

The typical wall or ceiling ventilator comprises a louver exposed at a wall or ceiling face, behind which a motor and fan unit is mounted, the same being so constructed as to draw air through the grill or louver and discharge it at the other side. Usually, the motor and fan assembly is housed within a box having an outlet passageway. In many ceiling installations, the box is fitted between joists so that the air drawn from the room is discharged between the joists into the space above it or to the atmosphere through a suitable opening at the end of the passageway constituted by the joists.

In a construction of this type, continued operation of the fan causes the blades, motor, and box interior to become dusty and grease-laden, especially if the air contains cooking vapors as from a kitchen. These accumulations, unless removed from time-to-time, are unsanitary and constitute a fire hazard. Since the housing fits closely around the motor and fan or blower wheel assembly in the usual construction, it is very difficult to reach the interior surfaces where dust and grease may have accumulated, and proper cleaning therefore is very difficult.

The principal objective of this invention has been to provide a ventilator unit consisting of a housing equipped with the usual surface grill or louver and containing fan or blower wheel assembly which readily and conveniently may be demounted from the box to facilitate the cleaning of all of the parts. A further objective of the invention has been to provide a simplified construction whereby demounting of the motor and associated fan blades or blower wheel may be accomplished in a direct way without removal of screws or fastening elements that would otherwise require the use of tools.

In accordance with the present invention, the housing member of the unit and the motor with its associated fan or blower wheel are equipped with one or more co-operable clip fasteners, one part of each seating against and being positively locked by a mating part such that the power unit, when mounted, is held rigidly, securely, and safely in operating position, but such that its removal may be effected by yieldably disengaging one member of each fastener from the other to free the motor and permit it to be lifted out or dropped from the housing. In the preferred construction, the cooperating clips present guide surfaces through which the proper seating of the power assembly is facilitated.

The invention further contemplates a power unit equipped with a handle which may be grasped to hold the same during mounting or demounting thereof, but which, at its central portion, constitutes a fastening for the grill or louver and which has one or both of its endwise portions configured to constitute fastener elements adapted to cooperate with mating members carried by the housing. By this simple construction, the cost of

2

manufacture is greatly reduced and the ease with which the power unit may properly be cleaned is improved.

A typical ventilating fan unit embodying the features of the present invention is shown in the accompanying drawings in which:

Fig. 1 is a perspective view showing the fan and motor assembly in mounted position, preparatory to removal thereof from the housing;

Fig. 2 is a view similar to Fig. 1 showing the fan and motor assembly removed from the housing, preparatory to mounting of the same therein;

Fig. 3 is a perspective view showing the entire unit mounted in a ceiling or wall with the grill in place; and

Fig. 4 is a fragmentary detail view looking at the handle end of the power assembly showing a preferred construction of the yieldable fastening clips.

The housing of the unit is indicated generally at 1 and constitutes a sheet metal box having an open face and a back closure wall 2. The side walls of the housing adjacent the open face are flanged laterally as at 3 to stiffen the structure and also to facilitate its attachment to joists or to a wall in which an opening has been cut to receive the housing. For example, as shown in Figs. 1 and 2, one side wall of the housing may be placed against the face of a joist 4 with the front flange 3 of that side wall relatively over-hanging the edge of the joist, to which it is fastened by nails or screws 5. If additional support is required, one or more straps or cross pieces 6 may also be installed to hold the housing firmly in place in the building structure.

One side wall of the housing is equipped with an outlet 7 and may also comprise a damper 8 pivotally mounted therein. The damper is normally closed, by spring means (not shown) or by gravity, but is opened under air pressure or in other suitable manner when the fan is operated, to permit air to be discharged into a duct installed in the space between the joists or beyond the wall or ceiling in which the unit is mounted.

The power unit portion of the apparatus is indicated generally at 9 and comprises an electric motor 10 and a blower wheel 11 which is mounted on the motor shaft. The blower wheel is housed within a volute sheet metal casing 12 as in conventional constructions. The motor proper is fastened in the usual manner to the volute casing by suitable fasteners so that the blower wheel operates within it, and the casing 12 terminates in an outlet neck 13 which mates with the inside of the casing 1 for communication with the outlet 7 thereof. Fan housing 12 has a central endwise opening 14 through which air is admitted to the blower wheel 11 so as to be propelled thereby through the outlet neck 13 and conduit 7.

The electric leads to the motor terminate in a plug 16 which is removably received within a socket 17. The socket is mounted in an outlet box 18 which is provided at the interior of the housing 1 at a portion of the space thereof which is not occupied by the motor and fan assembly. In installation, the electrician makes his connections to the socket 17 from conduits which enter the box 18 through suitable openings in the back wall or side wall of the housing 1.

For proper, noise-free operation of the power unit 9, it is requisite that the same be mounted firmly and securely in the housing 1. On the other hand, for proper cleansing of the parts, it is desirable that the motor and fan be readily demountable. Screw fasteners or the like have not been suitable for this purpose because they become loose, especially if the motor or blower wheel vibrates during operation, and also because they require the use of tools and are generally too much of a nuisance for the householder or housewife to bother with.

In accordance with the present invention, opposed side

walls of the housing 1 carry yieldable clip members 20. These may be spot welded in place along one end as at 21, while the other end is free. Only one of these clip members is shown in Figs. 1 and 2, and it will be understood that the other may be of the same or similar construction at the other side of the housing. One or both of these members are yieldably bowed so that the central portion thereof is spaced from the housing wall, as at 22.

Power unit 9 carries members 23 and 24 which mate with the members 20, the parts being so constructed that a projecting portion of the one is engageable within an aperture of the other under spring pressure, but is disengageable therefrom when the spring pressure is overcome. In the preferred construction, illustrated in the drawings, each yieldable clip 20 has notches 25 cut into its opposed edges, while each cooperating member 23 has finger portions 26 which engage the recesses 25 when the parts are brought together. The detents 26 lie within projections 27 which are spaced apart from one another distances corresponding to the over-all width of the spring clips 20, but the inner edges of the detents 26 are spaced apart distances which are less than the distances across the inward edges of the recesses 25. Also, the over-all distance across the projections 27, 27 from one pair to another is somewhat less than the width across the side walls of the housing 1 which carry the clips 20, but the spacing across the inner faces of the clips, when bowed, is somewhat greater than the spacing across the outer edges of the detents 26.

By this construction, therefore, the motor unit 9 may be introduced into the housing 1 with the projections 27 receivably straddling the clips. During inward movement of the motor unit, the outer portions of the detents 26 will come to bear upon the marginal facewise portions of the clips 20, relatively depressing the clips toward the side walls as this movement proceeds. However, the detents subsequently enter the recesses 25 and the clips then move toward one another and hold the power assembly against escape under spring pressure. The motor unit is thus locked in position against escape, but is mounted upon the springs which, by their yieldability, dampen the vibrations of the elements during motor operation.

To demount the motor, each bowed clip is depressed by the fingers sufficiently for its face to clear the other extremity of the detents. For convenience, the clip at one side of the housing is first depressed to release the lock at that side, then the clip at the other side is depressed, and the power unit is then entirely free to be withdrawn as soon as the connector 16 is unplugged from the socket 17. The back part of the motor is now readily accessible, as is the entire interior of the housing 1.

In the preferred construction, the locking members 23 on the power unit are fastened to the fan housing 12 by spot welding or the like. However, an advantageous construction is provided by constituting the locking members 23 as terminal portions of a handle 28 which straddles and is spaced from the air inlet opening 14 of the fan housing. The off-set of the central portion of this handle from the inlet opening 14 is such as to allow free passage of air to the opening, but the parts are so proportioned that the outer face of the central portion of the handle lies approximately in the plane of the open end of the housing 1. The central portion of the handle is provided with a threaded bore 30 or other suitable fastener which is adapted to receive a thumb screw 31 which extends through a suitable bore in the central portion of the louver or grill 32. The fastening 31 therefore serves to hold the grill in place against the wall or ceiling over the open end of the housing 1.

In this manner, only a minimum number of parts is required to mount the grill or louver and the power unit

firmly, while the use of tools to demount all of the parts is eliminated.

Having described my invention, I claim:

1. In the combination of a box-like sheet metal housing having an open face and an air outlet in a wall thereof, and a motor and fan unit adapted to be contained within said box to draw air through said open face and propel it through said outlet upon operation thereof, means for demountably fastening said motor and fan unit in said box, said means comprising at least one pair of cooperating fastening elements, the elements of said pair being mounted respectively upon said box and said motor and fan unit, one of the elements of said pair being in the form of a leaf spring which is normally convexly bowed and has at least one recess located substantially at an apex portion thereof, the other of said elements comprising a member having spaced fingers for straddling opposed edges of the said leaf spring and having at least one detent normally bearing upon a facial portion of said leaf spring when the parts are brought together but adapted to enter the recess of said leaf spring when the two are in alignment, the said leaf spring being depressible to release said detent, and the bow of said leaf spring being sufficient to exert a pressure upon said motor and fan unit when the same is mounted within said box to yieldably sustain the motor and fan unit therein.

2. A ventilating fan assembly, comprising a sheet metal box having side walls, a bottom, an open face, and an air discharge outlet in one of said walls, a motor and fan unit adapted to be contained within said box to cause air flow between said open face and said outlet upon operation thereof, a grill adapted to cover the open face of said box, means for yieldably and demountably supporting said motor and fan unit in said box, an inverted, generally U-shaped bracket fastened to said motor and fan unit, the central portion of said bracket constituting a handle to facilitate demounting of the motor and fan unit from the box, the central portion of said grill having a fastening element therein, and the central portion of said bracket being configured for cooperative engagement with said fastening element to fasten said grill over the open face of said box.

3. A ventilating fan assembly, comprising a sheet metal box having side walls, a bottom, an open face, and an air discharge outlet in one of said walls, a motor and fan unit adapted to be contained within said box to cause air flow between said open face and said outlet upon operation thereof, a grill adapted to cover the open face of said box, an inverted, generally U-shaped bracket fastened to said motor and fan unit, the central portion of said bracket being spaced from said motor and fan unit to constitute a handle facilitating demounting of the motor and fan unit from the box, the central portion of said grill having a fastening element therein, and the central portion of said bracket being configured for cooperative engagement with said fastening element to fasten said grill over the open face of said box, the said box having outwardly movable spring clips mounted at opposed points on the interior surfaces of the side walls thereof, the said bracket having projections extending outwardly beyond the motor and fan unit for yieldably engaging the said clips, and detent means for locking the said projecting portions to said yieldable clips.

4. A ventilating fan assembly, comprising a sheet metal box having side walls, a bottom, an open face, and an air discharge outlet in one of said walls, a motor and fan unit adapted to be contained within said box to cause air flow between said open face and said outlet upon operation thereof, a grill adapted to cover said open face, a bracket fastened to said motor and fan unit, said bracket presenting a central portion spaced from said motor and fan unit and constituting a handle to facilitate demounting of the motor and fan unit from the box, the central

5

portion of said grill having a fastening element therein, and the central portion of said bracket being configured for cooperative engagement with said fastening element, to fasten said grill over the open face of said box, the said box having yieldable clips mounted at opposed points on the interior surfaces of the side walls thereof, and the said bracket having projections extending outwardly beyond the motor and fan unit for frictionally engaging the said clips.

5. A ventilating fan assembly, comprising a sheet metal box having side walls, a bottom, an open face, and an air discharge outlet in one of said walls, a motor and fan unit adapted to be contained within said box to cause air flow between said open face and said outlet upon operation thereof, a grill adapted to cover said open face, a bracket fastened to said motor and fan unit, said bracket presenting a central portion spaced from said motor and fan unit and constituting a handle to facilitate demounting of the motor and fan unit from the box, the central portion of said grill having a fastening element therein, and the central portion of said bracket being configured for cooperative engagement with said fastening element to fasten said grill over the open face of said box, the said box having yieldable clips mounted at opposed points on the interior surfaces of the side walls thereof, and the said bracket having projections extending outwardly beyond the motor and fan unit for frictionally engaging the said clips, and releasable means for locking the same together.

6. In the combination of a box-like sheet metal housing having an open face and an air outlet in a wall thereof, and a motor and fan unit adapted to be contained within said box to draw air through said open face and propel it through said outlet upon operation thereof, means for demountably fastening said motor and fan unit in said box, said means comprising fastening elements arranged in cooperative pairs located respectively at substantially opposite points on said motor and fan unit, one of the elements of each pair being a leaf spring fastened to a wall of said sheet metal box, said leaf spring having a convexly bowed yieldable central portion spaced from the wall of said box and having a recessed located substantially at an apex of said bowed portion, the other of said elements of said respective pairs comprising a member projecting from said motor and fan unit and having spaced fingers for straddling opposed edges of said leaf spring and also having at least one detent normally bear-

6

ing upon a facial portion of said leaf spring when the parts are brought together but adapted to enter the recess of said leaf spring when the two are in alignment, the said leaf springs of said pairs respectively being depressible to release said detents and the bows of said leaf springs being sufficient to exert a pressure on said motor and fan unit when the same is mounted within said box by and between said pairs of fastening elements to yieldably sustain the motor and fan unit and to dampen vibrations incidental to the operation thereof.

7. In the combination of a box-like sheet metal housing having an open face and an air outlet in a wall thereof, and a motor and fan unit adapted to be contained within said box to draw air through said open face and propel it through said outlet upon operation thereof, means for demountably fastening said motor and fan unit in said box, said means comprising fastening elements arranged in cooperative pairs located respectively at substantially opposite points on said motor and fan unit, one of the elements of each pair being a leaf spring fastened to a wall of said sheet metal box, said leaf spring having a yieldable portion spaced from the wall of said box and having a recess located in said yieldable portion, the other of said elements of said respective pairs comprising a member projecting from said motor and fan unit and having spaced fingers for straddling opposed edges of said leaf spring and also having at least one detent to bear upon a facial portion of said leaf spring when the parts are brought together but adapted to enter the recess of said leaf spring when the detent and recess are brought into alignment, the said leaf springs of said pairs respectively being depressible to release said detents, and said leaf springs being adapted to exert a pressure on said motor and fan unit when the same is mounted within said box by and between said pairs of fastening elements to yieldably sustain the motor and fan unit and to dampen vibrations incidental to the operation thereof.

References Cited in the file of this patent

UNITED STATES PATENTS

1,473,325	Schwer	Nov. 6, 1923
2,565,636	Tinnerman	Aug. 28, 1951
2,619,021	Pfautsch	Nov. 25, 1952
2,710,573	Marker	June 14, 1955

FOREIGN PATENTS

399,914	France	May 8, 1909
---------	--------	-------------