Dec. 2, 1941. C. L. JOHNSON 2,264,572

AIR INDUCTION DEVICE

Filed July 17, 1940

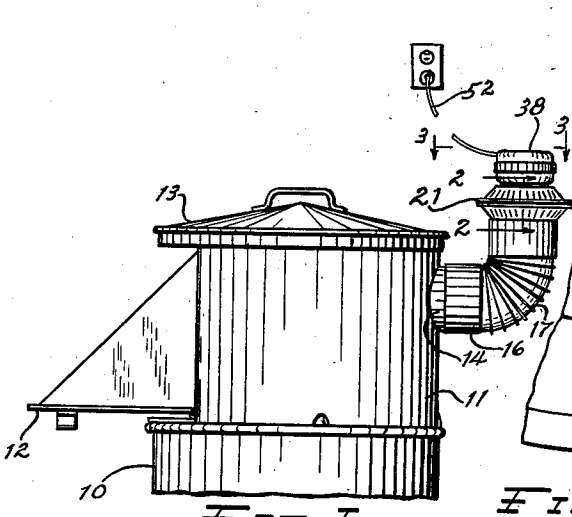


FIG-1

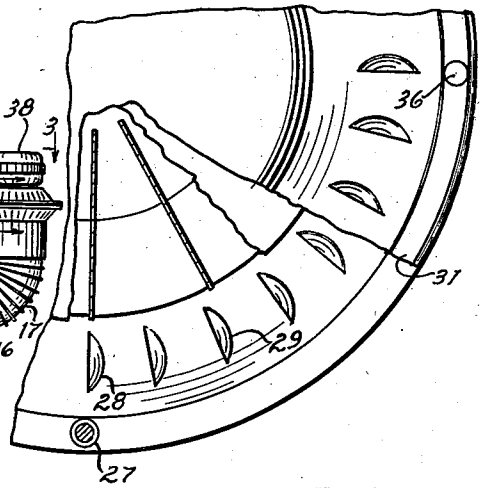


FIG-3

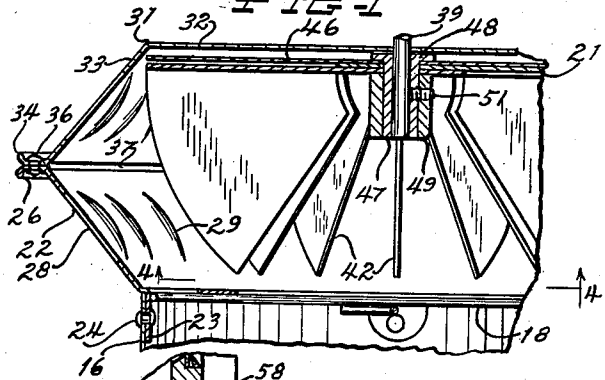


FIG-2

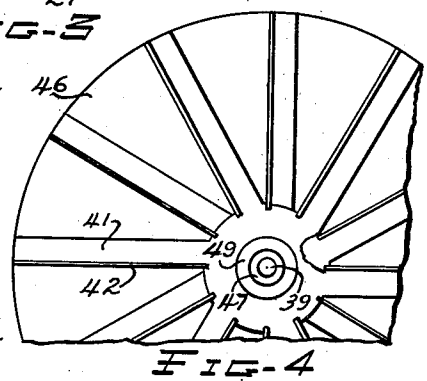


FIG-4

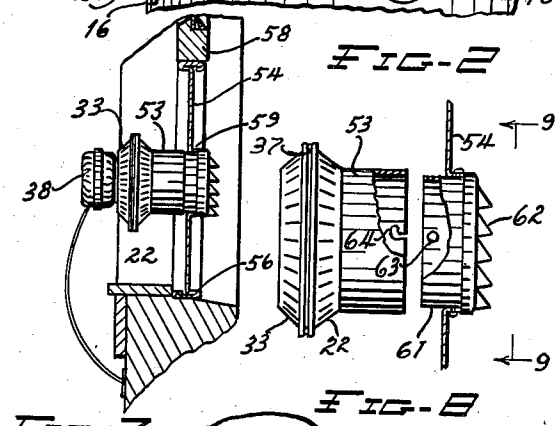


FIG-8

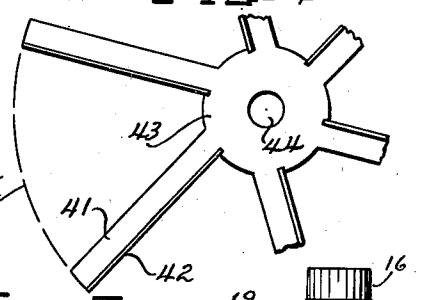


FIG-5

FIG-7

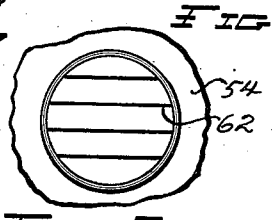


FIG-9

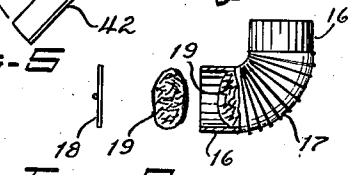


FIG-6

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AIR INDUCTION DEVICE

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5 Claims. (Cl. 230—46)

This invention relates to a device for inducing currents of air and more particularly to one by which induced air currents are diffused.

More particularly the invention pertains to a fan structure that includes a single direct air inlet and a diffused air outlet. Diffusion of air is obtained by a combined arrangement of blades and radially opening vents or outlets. These outlets are substantially perpendicular to the axis of rotation of the blades of the structure. Additionally, the structure may include an air filter located between the single inlet and outlet.

Prior to this invention other devices have been produced that are capable of inducing generally radial air currents but in many instances these are not provided with a single direct air inlet, filter area and fan blade driving means of the convenient and moderate proportions and arrangements of the present invention. Prior devices of this nature have been generally designed and manufactured for single uses, whereas the invention in its present form finds many applications of use.

One of the objects of the invention lies in the provision of a device of this class, the structure of which is of simple design and inexpensive to manufacture.

Another object of the invention lies in the provision of a device of this class that is capable of effecting a transfer of air from or to a confined area.

Another object of the invention lies in the provision of a device that will effect controlled movement of impurity laden air.

Another object of the invention lies in the provision of a device that is highly effective to induce the passage of impurity laden air through a suitable filter.

Another object of the invention lies in the provision of a device that will effect the radial distribution of air drawn from a single inlet source.

Other objects and advantages of the invention will be more fully understood from a consideration of the following specification, taken in conjunction with the accompanying drawing; and in which

Figure 1 is a side elevational view of the invention in position of use on a receptacle;

Figure 2 is an enlarged fragmentary vertical sectional view, taken substantially on the line 2—2 of Figure 1;

Figure 3 is an enlarged fragmentary plan view taken substantially as indicated at 3—3 of Figure 1, parts being broken away to disclose certain of the structural details;

Figure 4 is a plan view of the fan blades, being taken substantially as indicated at 4—4 of Figure 2;

Figure 5 is a view similar to Figure 4, showing one of the two or more units that may comprise the fan;

Figure 6 is a sectional view of the filter receiving portion of the structure being located between the inlet and outlet;

Figure 7 shows the device in slightly modified form in use as an air intake and filter in a window opening;

Figure 8 is an enlarged side elevational view of the structure shown in Figure 7; and

Figure 9 is a front elevational view of the air inlet of the structure of Figure 7.

For a clear understanding, the invention in its present form is shown applied to a receptacle for the purpose of removing impurity laden air therefrom. The receptacle shown partakes of the nature of a dust collector and forms the subject matter of my Patent No. 1,765,871, granted June 24, 1930. In this illustration of the invention, the receptacle from which dust laden air may be removed is generally indicated by the reference numeral 10. A dust collector 11 is mounted on the receptacle 10 and includes a door 12, cover 13, and an air outlet pipe 14. In the present instance a pair of sleeves 16 may be connected in right angle position by an elbow 17. Readily removable wire screens or grills 18 are located adjacent the ends of the sleeves 16 for the purpose of supporting one or more filter pads 19 against inadvertent displacement.

One of the sleeves 16 is adapted to support a fan structure generally indicated by the numeral 21. This structure includes a bell shaped portion 22 having an annular flange 23 that may, if desired, be permanently joined to one of the sleeves 16 in any suitable manner, as by rivets 24. The rim of the bell shaped portion 22 may terminate in a flange 26. Offset apertured lugs 27 are formed in the flange 26, being spaced uniformly around the bell shaped portion 22. The portion 22 is formed with a number of uniformly spaced apertures 28. These apertures are preferably so formed that a common wall of each is inclined and curved inwardly to produce inwardly opening louvers 29. These louvers open in a common direction into the path of air currents induced by the blades of the fan hereinafter more fully set forth.

A cover member 31 comprises a base wall 32 and a bell shaped portion 33. Portions 22 and 33 may be of the same general structure with all

louvers opening in the same direction and are secured along their corresponding flanges 26 and 34 in any suitable manner, as by rivets 36. Due to the lugs 27, flanges 26 and 34 are not in contact but together form a slot 37. Mounted on and secured in any suitable manner to the wall 32 is a motor 38, the rotor shaft 39 of which projects through a suitable opening in the wall 32 into the space formed by the connected bell shaped portions 22 and 33.

In the present illustration of the invention it is contemplated to provide a multiplicity of fan blades, and for simplicity of manufacture and ease of assembly these blade structures may consist of two identical units. For further convenience, each blade unit is formed from a disk that is cut to provide generally radially directed strips 41 and upstanding blades 42. The inner edge of each strip and blade terminates in a small central disk 43 that is apertured at 44. To more clearly understand this structure, it is pointed out that the blade in elevation of Figure 5 is of the size of the aperture bounded by the dash line 45, strip 41, disk 43, and blade 42. When two of these units are assembled, the blades 42 are disposed substantially as indicated in Figure 4 of the drawing. The blade units may be attached to a disk 46, the diameter of which is equal to that of the units. This disk is centrally apertured to receive a sleeve 47, having a base flange 48. The aperture 44 in each of the blade units receives the sleeve 47, the units being disposed in close proximity with the flange 48. A collar 49 is applied to the sleeve 47, being secured in a position to prevent relative rotation of the blade units and disk 46 in any suitable manner, as by a set screw 51. The sleeve 47 is apertured to receive the end of the shaft 39 and may be keyed to said shaft or secured against relative rotation by a further set screw.

When it is desired to utilize the above described device in the manner indicated in Figure 1, the electric cord 52 of the motor 38 is connected with a suitable source of current supply. The motor causes rotation of the blades 42 in a direction to move air radially outwardly toward the bell shaped portions 22 and 33. The air thus moved is readily caught by and passed through the inturned louvers 29 and in so doing creates a suction through the filter 19 fitted in the sleeves 16 and elbow 17. Thus any dust or other impurities in the air within the collector 11 will be drawn into and retained by the filter 19 and the clean air passed radially outwardly through the openings 28 of the portions 22 and 33. Additionally, a small amount of air may pass radially outwardly through the slot 37.

Attention is now directed to the modification of the invention illustrated in Figures 7 to 9 inclusive. In this instance, the fan structure is adapated to serve as a window ventilating device. The motor, fan blade units, and bell shaped portions enclosing the blade units may be constructed as heretofore described and bear corresponding reference numerals. The annular flange 23 of the portion 22 may be riveted or otherwise permanently secured to a sleeve 53. This sleeve is similar to or identical with sleeve 16 and is of sufficient length to house one or more of the filters 19 indicated in Figure 6 of the drawing. A metal or other suitable panel 54, having top and bottom flanges or seats 56, may be inserted into a window opening between a sill 57 and a window sash rail 58. Centrally of the panel 54 is a circular opening that may be defined by a flange 59. Secured in any suitable manner to the flange 59 is a tubular member 61. One end of the member 61 is fitted with louvers 62. These louvers may be of any suitable number and of a conventional fixed or movable type. The diameter of the tubular member 61 is slightly less than that of the sleeve 53, these two parts being adapted to have slight telescoping engagement. Diametrically opposite pins 63 on the tubular member are adapted to enter slots 64 in the sleeve 53, the sleeve 53 being rotatable to secure the pins and prevent inadvertent displacement from the tubular member.

The modification just described adapts the invention for use to draw fresh air into a room from the outside, cleanse the air in the process, and direct it into a room in such a manner that there is no direct blast upon any occupants. It is readily removable since the motor, fan structure, and sleeve 53 may be disconnected from the panel unit and said unit removed from a window opening. The invention may be readily installed in a transom panel, in the upper part of a window, or may be arranged in a vertical manner on a standard, if it is desired merely to circulate the air in a given closed area.

Although applicant has shown and described only one modification of the invention and two applications of use, it will be apparent to those skilled in the art that other modifications or adaptations may be made and are contemplated insofar as they are within the spirit and scope of the invention as defined in the hereunto annexed claims.

Having thus set forth my invention what I claim as new and for which I desire protection by Letters Patent is:

1. In a device of the class described, a motor driven shaft, a plurality of blades carried by said shaft, an enclosure for said blades, said enclosure having two sets of air outlet openings disposed radially of the axis of rotation of said blades, at least one of the walls of each of said openings being directed inwardly of said enclosure and in a common direction, certain other walls of said closure forming an air inlet opening disposed axially of and beyond the end of said shaft.

2. In a device of the class described, a motor driven shaft, a plurality of blades carried by said shaft, an enclosure for said blades, said enclosure including a pair of opposed connected dish shaped members, each of said members having air outlet openings in the circular sides of said members, said openings being disposed radially of the axis of rotation of said blades, at least one wall of each of said openings being directed inwardly of said enclosure whereby to readily pass air from the interior to the exterior of said enclosure in only one direction of rotation of said blades.

3. In a device of the class described, a motor driven shaft, a plurality of blades carried by said shaft, an enclosure for said blades, said enclosure including a pair of opposed connected dish shaped members, each of said members having air outlet openings in the side walls thereof and disposed radially of the axis of rotation of said blades, at least one wall of each of said openings being directed inwardly of said enclosure whereby to readily pass air from the interior to the exterior of said closure in only one direction of rotation of said blades, certain of the walls of one of said portions forming an elongated air inlet opening adapted to receive and mount a suitable

air filter, and means in said opening for securing the filter against displacement.

4. In a device of the class described, a motor driven shaft, an enclosure, into which one end of said shaft projects, said enclosure including a pair of opposed rim joined dish shaped members, a pair of superposed blade units mounted on said shaft within said enclosure, each of said units comprising a hub portion, generally radially directed strips extending from said hub portion, upstanding blades on each of said strips, said blades extending from said hub portion to the ends of said strips and being of a size only slightly less than the interior height of said enclosure, the base wall of one of said members having an air inlet aperture, and the side walls of said members having uniformly distributed air outlet openings.

5. In a device of the class described, a motor driven shaft, an imperforate disk secured to said shaft, a pair of superposed blade units on said shaft in close proximity with said disks, each of said units comprising a small hub portion, strips extending generally radially from said hub portion, the strips of one unit being alternated with the strips of the other of said units, upstanding blades extending the full length of said strips, an enclosure for said disk and said blade units, said enclosure including a pair of opposed abutting dish shaped members, said disk being adjacent the base wall of one of said members and an edge of each of said blades being in close proximity with the base wall of the other of said members, the sides of each of said members having uniformly arranged openings, at least one wall of each of said openings being directed inwardly of the enclosure and in the same direction whereby to freely pass air from the interior to the exterior of said enclosure in only one direction of rotation of said blades.

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