July 9, 1963 I. BORA 3,096,933

PORTABLE FUME EXHAUST FAN APPARATUS

Filed March 29, 1961 3 Sheets-Sheet 1

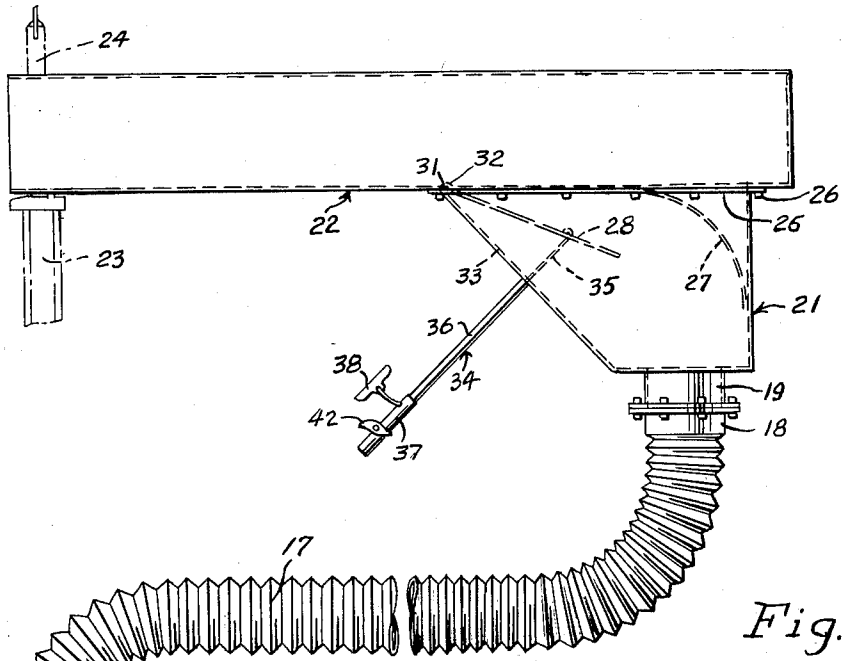


Fig. 1

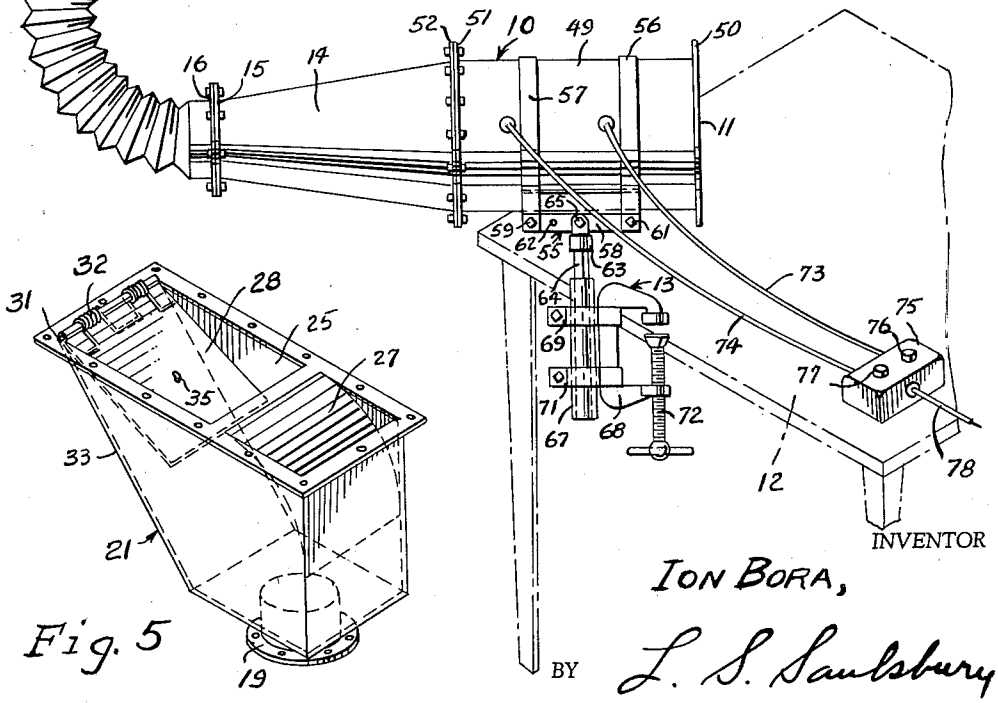


Fig. 5

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PORTABLE FUME EXHAUST FAN APPARATUS

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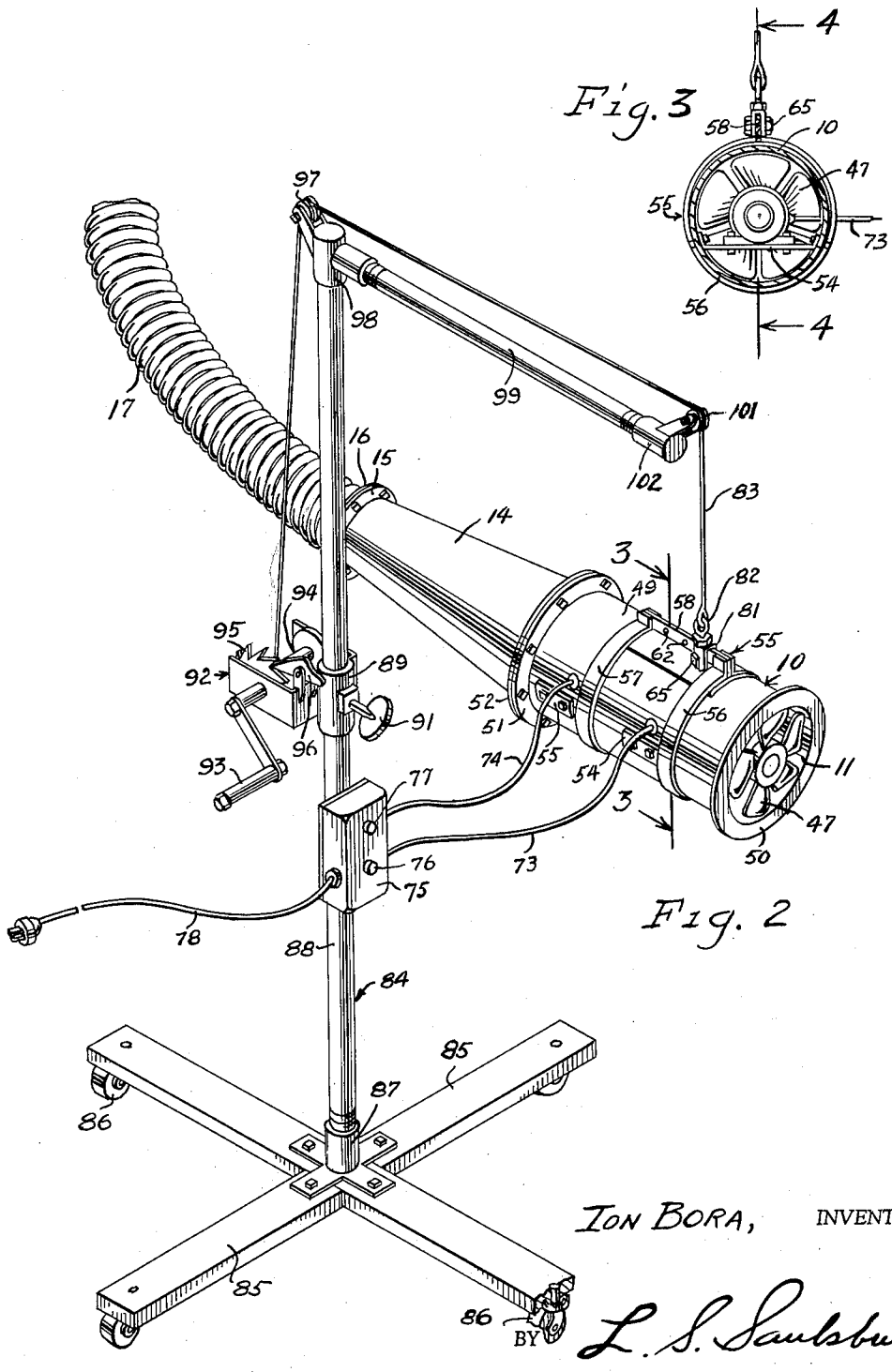


Fig. 3

Fig. 2

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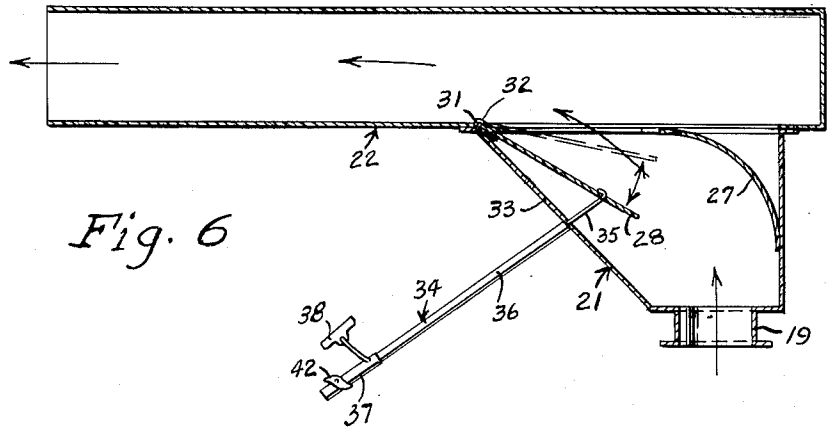
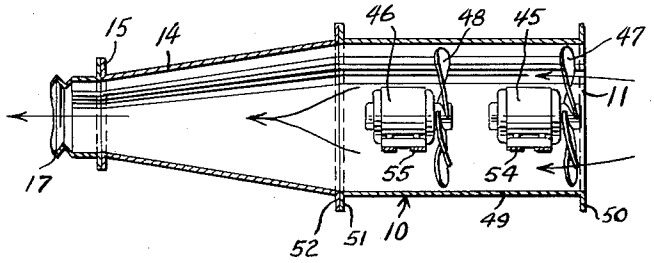


Fig. 6

Fig. 4



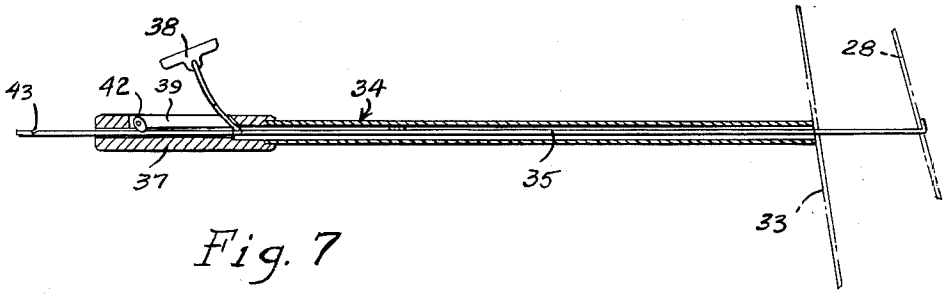


Fig. 7

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3,096,933

PORTABLE FUME EXHAUST FAN APPARATUS

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Filed Mar. 29, 1961, Ser. No. 99,313
6 Claims. (Cl. 230—235)

This invention relates to a portable fume exhaust fan apparatus and more particularly to an exhaust fan adapted to be used by welders to draw the fumes resulting from the welding operation.

It is the principal object of the present invention to provide a portable fume exhaust fan which can be located close to the work without great effort in effecting this adjustment so that practically all of the fumes resulting from a welding or simliar operation that create such fumes can be exhausted from the work area and free the welder from the harmful effects that can be derived from these fumes as well as clear the view.

It is another object of the invention to provide a portable fume exhaust fan apparatus which not only can be located close to the work operation but which can be easily adjusted and kept in the approximate area of the work by the welding operator by devices forming a part of the apparatus and as easily operable as the welding or work performing equipment with which the operator is working, the devices being on the fan support and the fan head being suspended to be swung easily, lifted or tilted by the touch of the operator's hand from his station in close proximity to the work.

It is still another object of the invention to provide a portable fume exhaust fan apparatus in which the exhaust fans themselves are actually brought into the close proximity of the work so that the maximum exhaust effect will be had, the fans being within the head that is located close to the work and not in a remote part of the fume conduit.

It is a further object of the invention to provide a portable fume exhaust fan apparatus that can be supported either from a bench upon which the work operation is being performed, the same being detachably connected thereto and affording adjustment means for properly angling and adjusting the height of the fan head or from a wheeled pedestal support with devices thereon for effecting the vertical adjustment and the angular positioning of the fan head to locate the fan intake in close proximity to the work area.

It is still a further object of the invention to provide a portable fume exhaust fan in which the fume intake head will be of small diameter so as to be located in a small work space and yet have a maximum exhaust effect the same being provided by having two exhaust fans arranged in tandem within the intake head and which can be operated separately for minor work or welding operations where the fumes resulting are of little consequence or when for major welding operations both fans within the head can be brought into play to exhaust the greater fumes resulting from this major welding or work operation.

Other objects of the invention are to providee portable fume exhaust fan apparatus, having the above objects in mind, which is of simple construction, has a minimum number of parts, inexpensive to manufacture, easy to install and handle, consumes little space commensurate with the exhausting power that it has, durable, light in weight, easy to adjust, efficient and effective in use.

For a better understanding of the invention, reference may be had to the following detailed description taken in connection with the accompanying drawing, in which

FIGURE 1 is an elevational view of the portable fume exhaust fan apparatus adapted for attachment to a work bench upon which the welding or work operation is being performed and constructed according to one form of the invention,

FIG. 2 is a perspective view of the portable fume exhaust fan apparatus in which the same fan head is used as with the first form but is supported from a wheeled pedestal upon the floor and constructed according to a modified form of the invention,

FIG. 3 is a transverse sectional view of the fan head as viewed on line 3—3 of FIG. 2,

FIG. 4 is a longitudinal sectional view of the fan head as viewed on line 4—4 of FIG. 3,

FIG. 5 is a top perspective view of the damper control unit looking into the open top thereof,

FIG. 6 is a longitudinal sectional view of the damper control and outlet conduit that is extended through a window to exhaust the fumes to the atmosphere outside the building premises, and

FIG. 7 is an enlarged longitudinal sectional view of the push-pull damper control wire.

Referring now to the figures and particularly the first form of the invention shown in FIG. 1, **10** represents a multiple fan head that can be located so that its fume intake end **11** can lie adjacent to a welding or similar fume producing work operation that may be performed on a bench **12**. In this form of the invention the fan head is supported on the bench in a detachable manner and for vertical adjustment by a C-clamp device indicated generally at **13** and which will be later described in detail.

The fan head **10** has a rearwardly-extending tapered outlet portion **14** with a flange **15** to which a flange coupling **16** of a flexible conduit **17** is connected. This conduit **17** is sufficiently long to permit adequate movement of the fan head **10** relatively to the bench **12** and the work area thereof. The flexible conduit **17** has a flange head **18** that is coupled to a depending flanged inlet **19** of a damper control unit **21** from which a horizontal exhaust conduit **22** extends. The conduit **22** is more or less fixedly supported to a window sill **23** and under a window section **24**. This combined damper and conduit is light in weight and can be easily moved to any building outlet so as not to detract from the portability of the equipment.

The exhaust conduit **22** and the damper unit **21** are formed of sheet metal and the damper unit is connected by its top open end **25** to the underside of the conduit **22** and fastening bolts **26**. The damper unit **21** has a rounded rear baffle wall **27** to direct fumes upwardly and forwardly into the conduit **22**. A damper plate **28** may close the unit opening **25** and is hinged on a cross pin **31** and urged by a torsion coil spring **32** reacting between an inclined forward wall **33** of the damper unit and the damper **28** to normally retain the damper **28** in its closed position over the opening **25**.

If it is desired to regulate the position of the damper **28** to an intermediate position as illustrated in FIGS. 1 and 5, or to a fully open position this is effected by a Bowden wire assembly **34**. This assembly includes a wire **35** attached to the damper plate outwardly removed from its hinge point and extends through a tube **36**, which is preferably flexible and has an enlarged rear end portion **37**. A handgrip **38** is connected to the wire **35** so that it can be pulled through a longitudinal slot **39** in the side of the enlarged portion **37**. An extension wire **41** that can be gripped by a hand turned clamp **42** on the portion **37** so as to hold the damper in any position between its closed and open positions, may be notched as indicated at **43** to identify the position of the damper and to render the turn clamp **42** more effective. The spring action upon the damper always urges the same toward its closed position and the clamp **42** holds the wire and the damper against the action of the spring **32**. The damper is closed when the exhaust fume fan is not in use and may be opened

only partially when but one of the operating fans is being used in the fan head 10.

In the fan head 10, there are two electric motor fans 45 and 46 having respectively exhaust fan blades 47 and 48 arranged to exhaust fumes created by a welding or other fume-producing work operation through the intake 11. Both of these fans are disposed in a cylindrically-shaped head part 49 that has an external flange 50 at the inlet end 11 for the purpose of keeping the air from going outside of the head part 49 as it is being drawn through the inlet 11 and a flange 51 that is connected to a flange 52 of the tapered head portion 14. The electric fans are supported by their motor on respective transverse shelf structure 53 and 54 extended across the interior of the head part and secured to the sides thereof as best viewed in FIG. 3.

Extended about the head part 49 there is disposed and fixed a clamp ring assembly 55 that includes laterally-spaced split clamp rings 56 and 57 and a balance piece 58 extending between the rings and running along the underside of the head part 49 and secured to the rings by respective clamp bolts 59 and 61. The balance piece 58 has a series of adjusting holes 62 to any one of which a head 63 of a vertically-adjustable telescopic support shaft 64 of the C-clamp assembly 13 is attached by a pivot pin 65 on which the fan head 10 is balanced for fore and aft tilting movement. The adjustable support 64 is retained in a clamp sleeve 67 for vertical adjustment therethrough and for swivel movement therein and held upon a C-clamp 68 by vertically-spaced clamp rings 69 and 71. The C-clamp 68 has a handgrip clamp screw 72 by which the C-clamp assembly 13 is made fixed to the work bench 12.

It should be apparent that through this C-clamp assembly 13 the head support assembly 55 that even after the C-clamp assembly 13 is attached to the work bench the welding operator can manipulate easily and locate the fan head 10 to position for the inlet opening 11 to have the maximum drawing effect upon the fumes being created from the welding operation. Cables 73 and 74 extend respectively from the fans 45 and 46 to a switch block 75 having two toggle switch buttons 76 and 77. A single cable 78 can be plugged to a receptacle source.

In the form of the invention shown in FIG. 2, the clamp ring assembly 55 is turned about so that the balance piece 58 extends along the top of the cylindrically-shaped head part 49. The pivot pin 65 is attached to a shackle 81 having an eye 82 to which a supporting cable 83 is attached. This cable 83 is suspended from a wheeled pedestal support indicated generally at 84. This wheeled support 84 has crossed foot extensions 85 from which there depends caster wheels 86. A fitting 87 is secured to the foot extensions 85 at the center thereof, and upwardly from which there extends a main support rod 88 on which the switch block 75 may be supported.

Above the switch block 75 on the support rod 88 is, supported by a clamp sleeve 89 and thumb screw 91, a hand-operated cable winch 92. This cable winch 92 includes a hand crank 93, a roll 94, a ratchet wheel 95 that holds the roll 94 against turning when ratchet latch 96 engages the ratchet wheel 95. The cable 83 extends upwardly from the cable roll 94 over a pulley 97 carried on a top bracket fitting 98 and outwardly over a boom rod 99 that extends laterally and over a pulley 101 extending from an end bracket fitting 102 and from which it is suspended to support the fan head 10.

It will be apparent that as the hand crank 93 is turned that the fan head 10 can be elevated to the desired height or it can be lowered by disengaging the ratchet latch 96 from the wheel 95. By locating the pivot pin 65 in any one of the holes 62 the fan head can be balanced or tilted from the shackle to have the proper inclination toward the work space to exhaust the fumes therefrom.

It will be seen that through the switch box 75 and the switch buttons 76 and 77 either one of the electric motor fans 45 or 46 can be operated or both fans can be operated in unison for maximum exhaust effect. The same fan head 10 is used in both forms of the invention, the first form being arranged for attachment to a work bench by the C-clamp device 13 while in the form of the invention shown in FIG. 2, the fan head is supported upon the pedestal stand 84 that can be wheeled over the floor surface and elevated close to the work space to locate the inlet 11 of the fan head 10 well within the center of the fumes created from the welding or work operation.

While various changes may be made in the detail construction of the apparatus, it shall be understood that such changes shall be within the spirit and scope of the present invention as defined by the appended claims.

What is claimed is:

1. A portable fume exhaust fan apparatus comprising, in combination, an exhaust conduit adapted to be supported on a window sill beneath a window section, damper means in said conduit, a flexible conduit connected at one end in air tight relation to said first mentioned conduit, a flanged coupling on the other end of said flexible conduit, a fan head including a cylindrical portion having a flange at one end and a tapered outlet portion having a flange at each end, the flange at the smaller end being bolted to the flanged coupling of said flexible conduit and the flange at the other end being bolted to the flange of said cylindrical portion, the other end of said cylindrical portion being formed with an open fume intake, transverse shelves extending across said cylindrical portion, a pair of bladed exhaust fans mounted on said shelves, a pair of electric motors individually connected to said exhaust fans, an individual wire connected to each electric motor, a control block having an individual switch for each wire, a common wire extending to said control block from a source of electric power, a clamp ring assembly for said cylindrical portion, said clamp ring assembly comprising a pair of laterally-spaced split clamp rings having clamping ears and bolts, a balance piece extending between said bolts, said balance piece having a series of adjusting holes therein, a pivot bolt selectively engageable in one of said adjusting holes for supporting said fan head, and vertically adjustable means supporting said pivot bolt selectively to vary the height of said fan head.

2. The structure of claim 1 wherein said means supporting said pivot bolt comprises a vertically adjustable telescopic support shaft selectively secured in pivotal relation in one of said adjusting holes, a C-clamp, and split clamping rings securing said C-clamp to said adjustable telescopic support shaft for clamping said fan head to a support.

3. A portable fume exhaust fan apparatus as defined in claim 1, wherein said vertically-adjustable means for supporting said pivot bolt comprises a pedestal support, a winch device carried on the pedestal support and pulley cable means extending from the winch device and to the pivot bolt and the balance piece of the clamp ring assembly.

4. A portable fume exhaust system for exhausting fumes to a discharge area comprising in combination, a main exhaust conduit and supporting means in communication with the discharge area, a flexible conduit connected at its first end to said exhaust conduit in air-tight relationship, a coupling member at the second end of said flexible conduit, a fan head having a cylindrical impeller section and a reduced diameter connecting section secured to said impeller section, coupling means at the end of said connecting section remote from said impeller section and cooperating with and secured to the coupling member at the second end of the flexible conduit, a fume intake formed at the end of said impeller section remote from said connecting section, a pair of bladed exhaust fans within said impeller section, support means mounting said exhaust fans in axial alignment within said impeller section, a pair of electric motors individually connected to said exhaust fans, a pair of control switches,

electric wiring interconnecting one of said electric motors with one of said switches and the other of said motors with the other of said switches, a common power input wire connected to both of said switches, a balance piece secured to said fan head and extending parallel to the axis of said fan head and having a series of adjusting holes formed therein, means clamping said balance piece to said fan head, a pivot bolt selectively engageable with one of said adjusting holes for supporting said fan head, and vertically adjustable means supporting said pivot bolt to selectively vary the height of said fan head.

5. The structure according to claim 4 wherein the means supporting the pivot bolt comprises a vertically adjustable telescopic shaft selectively secured in pivotal relation to one of said adjusting holes, a C-clamp, and clamping means rigidly securing said C-clamp to said adjustable telescopic support shaft for clamping said fan head to a support.

6. A portable fume exhaust system according to claim 4 wherein said vertically adjustable means for supporting

said pivot bolt comprises a pedestal support, a winch device carried on the pedestal support and pulley and cable means extending from the winch device to the pivot bolt and the balance piece for supporting the fan head at selected vertical locations.

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