United States Patent

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[54] ADJUSTABLE SPEED AIR DRIVE-AIR SWEEP FOR AIR CONDITIONER

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[52] **U.S. Cl.** **98/94**

[51] **Int. Cl.** **E06b 7/084**

[58] **Field of Search** 98/40, 94

[56] **References Cited**

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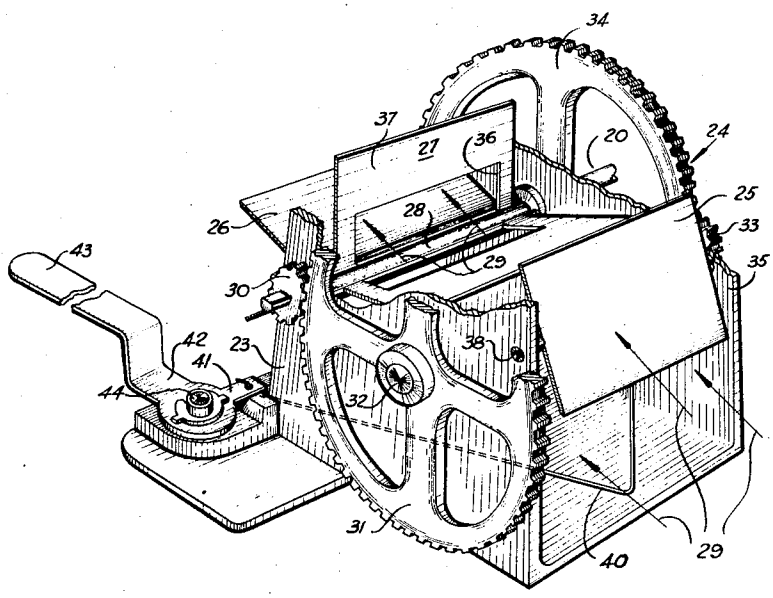
[57] **ABSTRACT**

A variable directing apparatus for a fluid stream that may be used, for example, to direct air emerging from a room air conditioner. The apparatus includes movable directing means for changing the direction of the fluid stream and a fluid propelled rotatable device in a portion of the fluid stream for moving the directing means. The apparatus also has an adjustable fluid blocking device for blocking the stream to the rotatable device to a desired degree so as to regulate the speed of rotation of the rotatable means and thus the speed of movement of the movable fluid directing device.

13 Claims, 4 Drawing Figures



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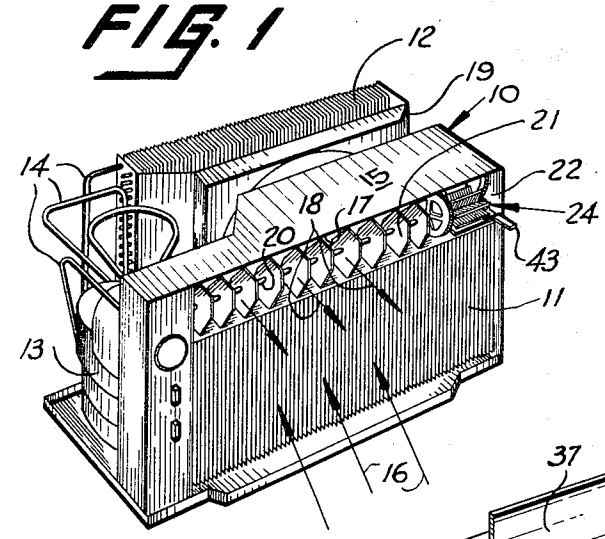
2 Sheets-Sheet 1

FIG. 1



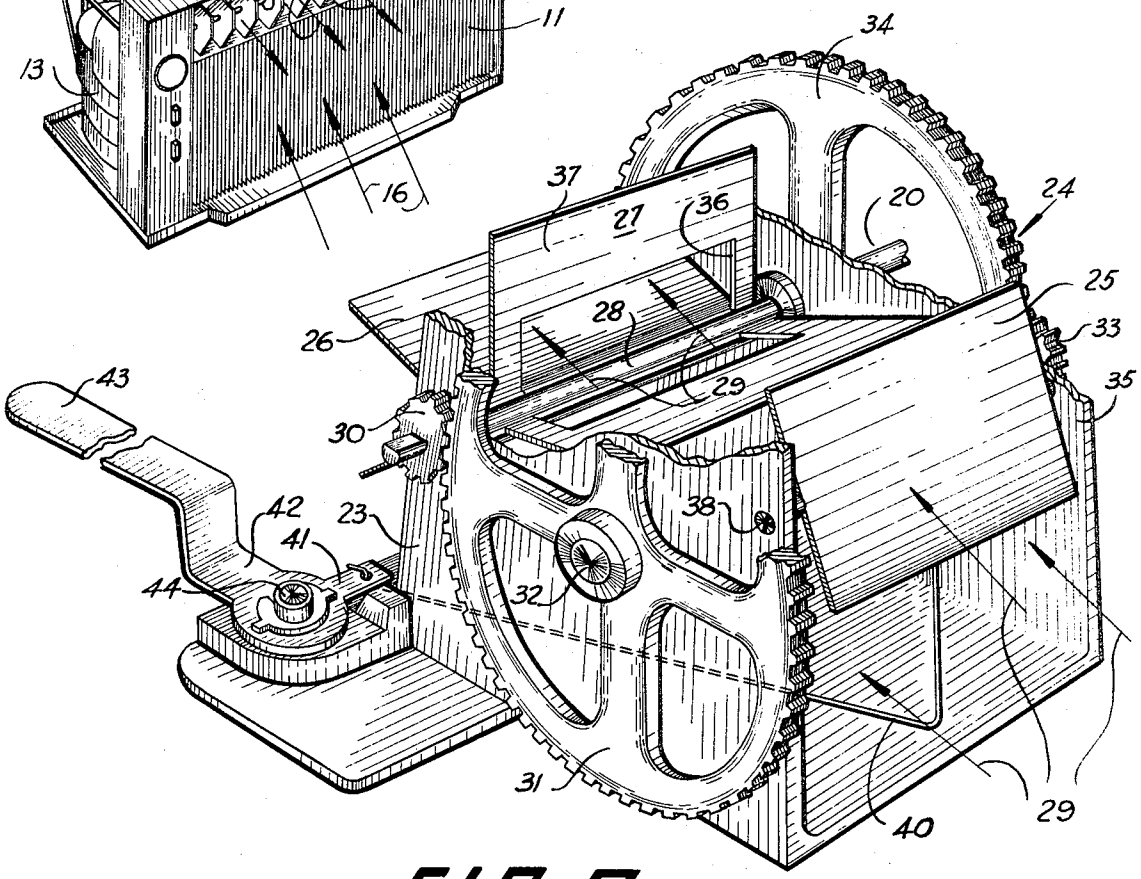


FIG. 2

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FIG. 3

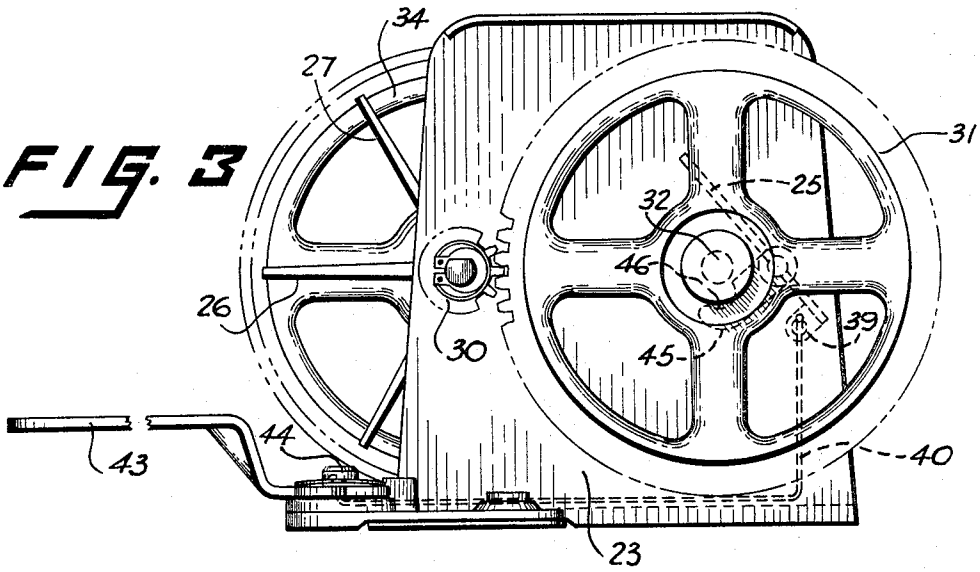
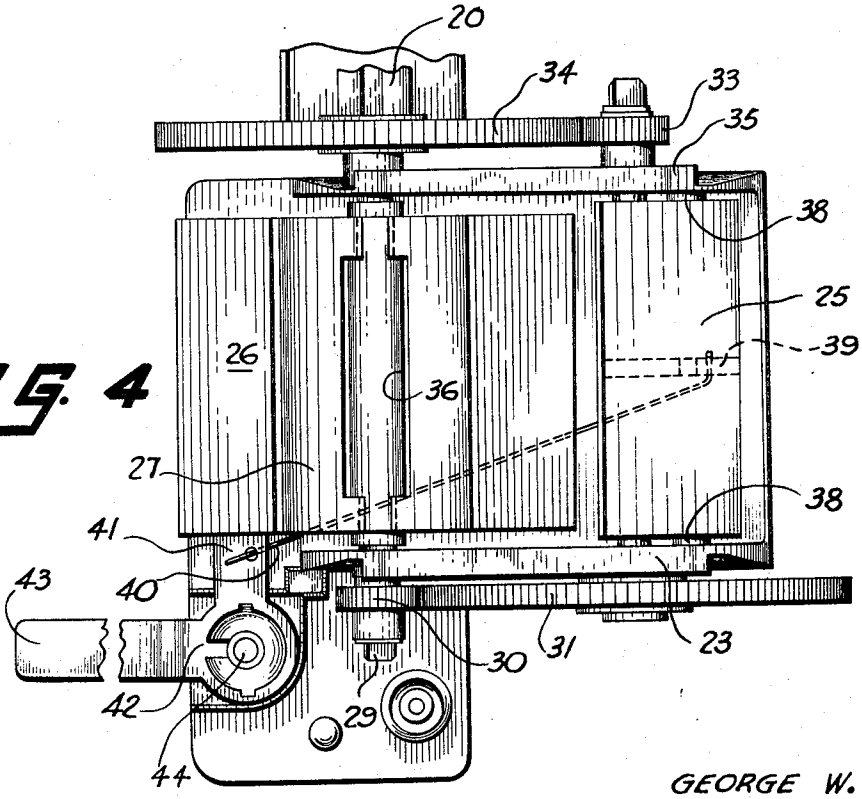


FIG. 4



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ADJUSTABLE SPEED AIR DRIVE-AIR SWEEP FOR AIR CONDITIONER

BACKGROUND OF THE INVENTION

Such apparatus as room air conditioners and the like ordinarily provide a blast of air that is directed in a fixed direction into an enclosure such as a room. This invention provides a device for changing the direction of the air so as to sweep the room or other space so that the effect is very much like an oscillating fan.

FIELD OF THE INVENTION

One of the features of this invention is to provide a variable directing apparatus for a fluid stream in which the direction of the stream is continually changed by using the energy of a portion of the stream itself, together with means for partially or completely blocking this portion of the stream to control the rate of change, or to stop it entirely.

Another feature of the invention is to provide a brake means in conjunction with the above apparatus for locking the fluid directing apparatus against movement when the blocking device is in full blocking position.

THE DRAWINGS

FIG. **1** is a perspective view of a room air conditioner with the housing and the decorative front omitted.

FIG. **2** is a fragmentary enlarged perspective view of a portion of the apparatus of FIG. **1** as viewed from the interior of the conditioner toward the front thereof.

FIG. **3** is a side elevational view of the apparatus of FIG. **2**.

FIG. **4** is a plan view of the apparatus of FIG. **3**.

DESCRIPTION OF THE DISCLOSED EMBODIMENT

The air conditioner **10** of FIG. **1** which is here shown with the decorative front and enclosing housing removed comprises an evaporator **11**, condenser **12**, compressor **13** and interconnecting tubing **14**. In addition, the interior of the conditioner **10** is divided by a baffle structure **15** to provide a cool air flow section in which air is drawn through the finned evaporator **11** inwardly from the room as indicated by the arrows **16** and exhausted outwardly through a long narrow outlet **17** extending most of the way across the top of the front of the conditioner. This outlet **17** constitutes means defining a flowing fluid stream as indicated by the incoming stream **16** and by the chilled outgoing stream from the outlet **17** as indicated by the arrows **18**.

In addition, the rear condenser which is arranged to be cooled by exterior air is arranged in its own baffle structure **19** so that exterior air can be forced over the condenser **13** for dissipating the heat extracted from the room being conditioned. As is customary, separate motor operated blower and fan (not shown) are used to set up the evaporator and condenser air streams respectively.

Ordinarily, the chilled emerging air **18** which is directed back into the room flows in one general direction. However, in the structure illustrated here, there is provided movable fluid directing means for changing the direction of the emerging stream **18** on movement of the directing means. As illustrated, the fluid directing means comprises a rotatable shaft **20** within the outlet chamber **17** on which is mounted a series of spaced inclined but parallel disks **21**. As the shaft **20** is rotated the inclination of the parallel disks **21** to the axis of the horizontal shaft **20** causes the direction of the air stream **18** to be changed continually during the rotation.

In a separate outlet chamber portion **22** at one end of chamber **17** there is positioned a fluid propelled rotatable means **24** which uses a portion of the emerging stream **18** that flows through this outlet chamber portion **22** to rotate the shaft **20** so that the energy of the air stream itself is used to operate the fluid directing means embodied in the shaft **20** and the spaced inclined disks **21**. In addition, the device **24** includes an adjustable fluid braking means **25** here embodied as a flat plate for blocking the auxiliary stream in the chamber **22** to a selected variable degree thereby to regulate the speed of rotation of the device **24** and thus the speed of rotation of the fluid directing means **21**.

The rotatable device **24** includes a series of radially extending paddles **26** and **27** angularly spaced about a shaft **28**. Air flowing outwardly from the outlet chamber portion **22** as indicated by the arrows **29** in FIG. **2** strikes the paddles **26** and **27** successively to rotate the shaft **28** in a counterclockwise direction as viewed from the left of FIG. **2**. This air induced rotation of the shaft **28** operates through a gear train that reduces the speed so that even though the shaft **28** will be operated rapidly the shaft **20** will rotate much more slowly. Thus the gear train includes a small gear **30** mounted directly on the end of the paddle shaft **28** and the gear **30** meshes with a much larger gear **31** mounted on one end of the cross shaft **32** for rotation thereof with this cross shaft carrying another small gear **33** which in turn meshes with another large gear **34** which is mounted directly on the adjacent end of the fluid directing shaft **20**. To provide the proper mounting of these various gears and shafts as well as the other portions of the operating structure there is provided a vertical wall **23** and a spaced second vertical wall **35** so that the two walls **23** and **35** are substantially parallel. The successive paddles **26** and **27** are positioned between these walls and the shafts **28** and **32** extend therebetween.

Certain of the series of paddles **26** and **27** are provided with fluid permeable opening means for permitting direct impingement of the fluid indicated by the arrows **29** in FIG. **2** on successive paddles by way of these openings. Thus in FIG. **2** two types of paddles are illustrated, with the one type **26** being solid and the other type **27** being provided with a transverse opening **36** located adjacent the axle or shaft **28**. With this arrangement the air flowing outwardly through the outlet chamber portion **22** can strike the solid paddles **26** and exert force thereon by flowing through the openings **36** in the paddles **27** that contain these openings. In addition, of course, the air will strike the solid portions **37** of the paddles **27** above their openings **36**. The result is that the paddles **26** and **27** in the full set are acted upon successively as they are rotated into vertical position so that the rotation of these paddles with their mounting shaft **28** rotates the shaft **20** and disks **21** to change continually the direction of flow of the chilled air **18**. Because of the provision of the gear train **30, 31, 33** and **34** the paddles **26** and **27** can rotate at relatively high speed with the shaft **20** and disks **21** rotating at much slower speed. In order to regulate the speed of rotation of the shaft **20** and thus the rate that the air stream **18** is deflected through its full path of movement the previously mentioned flat plate **25** is provided. This plate as is indicated in FIG. **2** is in position to block to the desired degree the auxiliary air stream **29** flowing outwardly forwardly from the auxiliary outlet chamber **22**. In order to accomplish this the plate **25** is mounted on stub shafts **38** at each end of the plate with each stub shaft being held in a corresponding side wall **23** and **35** as shown in FIG. **4**. The plate therefore is arcuately movable with these shafts **38** from a substantially vertical position where essentially all air flow to the paddles **26** and **27** is blocked to a generally horizontal position where very little of the air flow is blocked. In FIGS. **2** and **3** the flat plate **25** is shown in intermediate position.

In order to move the plate **25** through its entire range of positioning the lower edge of the plate is provided at about its midpoint with a rearwardly extending eyelet **39**. Engaging this eyelet is one end of a wire **40** which extends downwardly as shown in FIG. **4** to engage one end **41** of a right-angled bell crank **42** whose other end **43** extends forwardly from the air conditioner **10** as shown in FIG. **1** to provide an operating handle means. With this arrangement the bell crank **42** can be rotated by its handle end **43** about its mounting stud **44** to position the barrier plate **25** as desired and thus regulate the rate of rotation of the angled spaced disks **21** and thus the rate of oscillation of the emerging air stream **18**.

Extending forwardly of the plate **25** is a projecting brake **45** which is in the form of a lever fixed at generally right angles to the plate **25**. This brake has on its upper surface a generally semicircular braking cavity **46** which when the barrier plate **25** is in vertical or substantially complete blocking position engages the bottom half of cross shaft **32** and locks this shaft against rotation. This, of course, locks the air directing means shaft **20** and disks **21** thereon against rotation.

The provision of the opening **36** in alternate paddle wheels **27** permits air to pass therethrough to impinge on the surface of the next paddle **26** which would otherwise be masked by the upstream paddle. This permits a more compact drive mechanism as a greater effective surface area of the paddles subjected to the air stream is presented to the stream under practically all operating conditions. As noted earlier, when plate **25** is moved to substantially horizontal position it provides substantially no blocking action to the air stream **29**. The speed of operation of the fluid stream directing apparatus is reduced by raising the plate **25** from its horizontal position to mask the paddles **26** and **27** which, of course, are upstream of the plate. The masking effect of the plate **25** is effective to greater and greater degrees as the plate is moved toward the vertical since the plate not only blocks air flow to the paddles themselves but also blocks the openings **36** which are adjacent the axis of rotation of the paddle structure.

Having described the invention, the embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In a variable directing apparatus for a fluid stream having means for defining a flowing fluid stream, movable fluid directing means for cyclically changing the direction of said stream on movement of said directing means, and fluid propelled rotatable means in said stream for moving said directing means due to a fluid force-caused rotation of said rotatable means, the improvement comprising adjustable means for adjustably regulating the speed of rotation of said rotatable means by said fluid stream and thus the movement of said fluid directing means.

2. The apparatus of claim **1** wherein said directing means comprises means rotatable with said fluid propelled rotatable means.

3. The apparatus of claim **2** wherein said rotatable means is provided with spaced paddles positioned in said fluid stream for rotating said rotatable means and thus said directing means.

4. The apparatus of claim **3** wherein certain of said paddles define fluid permeable opening means for permitting direct impingement of said fluid stream by way of said openings on successive paddles.

5. The apparatus of claim **4** wherein said paddles are arranged in radiating series around an axis and said opening means provided adjacent said axis.

6. The apparatus of claim **1** wherein said blocking means comprises an adjustable deflector movable between extreme positions of a position of substantially complete blocking of the air flow to said rotatable means for preventing substantial rotation thereof and a substantially non-blocking position to permit full impingement of said fluid stream portion on said fluid propelled rotatable means.

7. Variable directing apparatus for a fluid stream, comprising: means for defining a flowing fluid stream; movable fluid directing means for changing the direction of said stream on movement of said directing means; fluid propelled rotatable means in said stream for moving said directing means due to the fluid force-caused rotation of said rotatable means; adjustable fluid blocking means for blocking said stream to said rotatable means to a selected variable degree thereby to regulate the speed of rotation of said rotatable means and thus the movement of said fluid directing means, said blocking means comprising an adjustable deflector movable between extreme positions of a position of substantially complete blocking of the air flow to said rotatable means for preventing substantial rotation thereof and a substantially non-blocking position to permit full impingement of said fluid stream portion on said fluid propelled rotatable means; and a brake means operatively engaging said rotatable means when said blocking means is in its substantially complete blocking position for locking the rotatable means against rotation.

8. The apparatus of claim **7** wherein there are provided operating handle means on said directing apparatus accessible from the exterior thereof for said adjusting of the fluid blocking means and interconnecting apparatus between said handle means and said adjustable fluid blocking means and said brake means for applying said brake means upon movement of said fluid blocking means to substantially completely blocking position.

9. The apparatus of claim **8** wherein certain of said paddles are provided with fluid permeable opening means for permitting direct impingement of said fluid on successive paddles.

10. The apparatus of claim **1** wherein said rotatable means is provided with spaced fluid flow responsive means positioned in said fluid stream for rotating said rotatable means and thus said directing means.

11. The apparatus of claim **1** wherein said adjustable means comprises adjustable fluid blocking means having an operating handle adjacent said movable fluid directing means for blocking said stream to said movable means to a selected variable degree thereby to regulate the speed of movement of said movable means and thus the movement of said fluid directing means.

12. In a variable directing apparatus for a fluid stream having means for defining a flowing fluid stream, movable fluid directing means for changing the direction of said stream on movement of said directing means, and fluid propelled movable means in said stream for moving said directing means due to a fluid force-caused movement of said movable means, the improvement comprising adjustable fluid blocking means for blocking said stream to said movable means to a selected variable degree thereby to regulate the speed of movement of said movable means and thus the movement of said fluid directing means; and means for dividing said stream into separate portions and directing one portion to said fluid directing means and the other portion to said movable means, said fluid blocking means being disposed to control the flow of only said second stream portion.

13. In a variable directing apparatus for a fluid stream having means for defining a flowing fluid stream, movable fluid directing means for changing the direction of said stream on movement of said directing means, and fluid propelled movable means in said stream for moving said directing means due to a fluid force-caused movement of said movable means, the improvement comprising: adjustable fluid blocking means for blocking said stream to said movable means to a selected variable degree thereby to regulate the speed of movement of said movable means and thus the movement of said fluid directing means; and means for dividing said stream into separate portions and directing one portion to said fluid directing means and the other portion to said movable means, said fluid directing means and movable means being disposed in side-by-side relationship.

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