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FLUID FLOW CONTROL HOUSING

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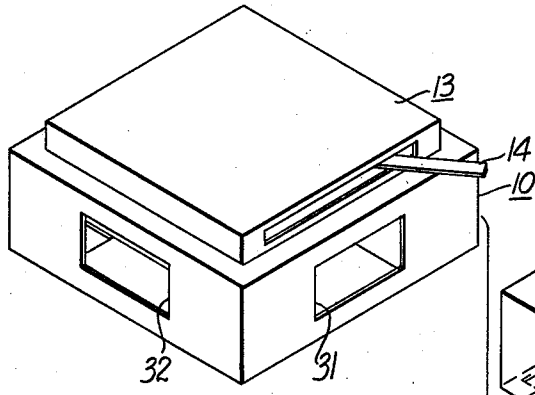


Fig. 1

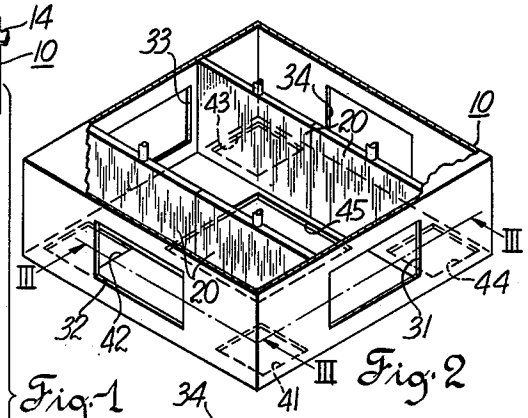
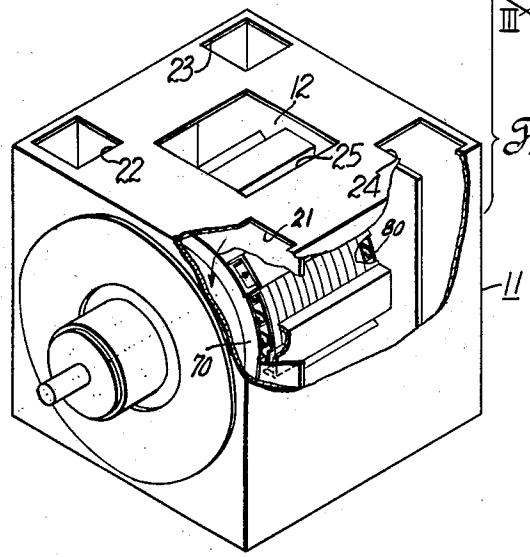


Fig. 2



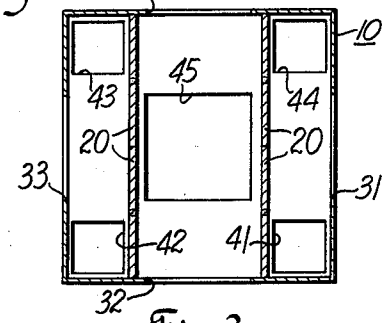


Fig. 3

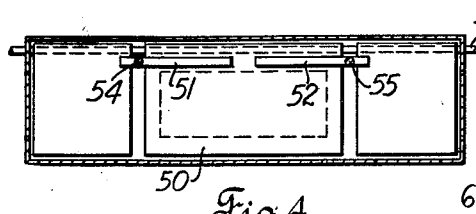


Fig. 4

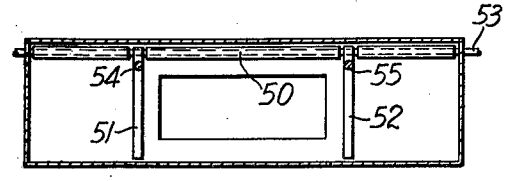


Fig. 5

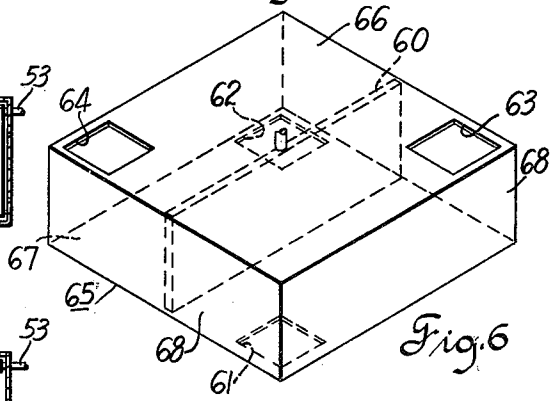


Fig. 6

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FLUID FLOW CONTROL HOUSING

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This invention relates to fluid flow control housings, particularly to housings that reverse the direction of fluid flow.

There are many flow systems wherein fluid is circulated into and out of a structure. Usually this fluid is utilized in a heat exchange capacity as for cooling. An example is an air cooled motor. Many of these motor installations, particularly of a partially enclosed type, have a fluid housing in communication with the motor housing for directing the flow of air. The fluid housing may be an integral part of the motor housing or it may be a separate structure adapted to take a particular position in relation to the motor housing either by direct contact or by proper duct work for conduit connections. Regardless of the form of the fluid housing its function is to determine a path for the air as it is carried into and out of the motor housing. A portion of the fluid housing passes air to the motor housing from the atmosphere and another portion of the fluid housing receives the air after it leaves the motor housing and passes it to the atmosphere. Among the advantages of utilizing a fluid housing for controlling the direction of the flow of fluid is that the relative positions of the external flow paths to each other are not dictated by the particular configuration of the motor and motor housing. The use of a fluid housing with appropriate construction allows the supply and exhaust fluid stream to be directed in a manner that avoids cross circulation and communication between the exhausting and receiving streams in the atmosphere. Another advantage is that the location of the ports in communication with the atmosphere may be more fully based on maintenance and convenience requirements.

While the use of a typical fluid housing enables an initial choice in the locaiton of the ports exhausting and receiving air from the atmosphere, after the ports are located they are not easily changeable. That is, the inlet ports will always be inlet ports and the outlet ports will always be outlet ports. Even though the most desirable arrangement may be selected, many situations arise which result in the existence of a temporary inconvenient or dangerous condition. For example, when it becomes necessary to change filters in these flow systems it is necessary to stop the operation of the motor so that dirt does not enter the motor while the filter is removed. Also, when it is necessary to work in the immediate area of the fluid housing, the motor may have to be stopped so that the personnel may work conveniently or safely.

In some prior art housings the intake and discharge ports open upward so that the possibility of interference with work projects and personnel is decreased to some degree. However, this construction eliminates a large part of the advantage previously mentioned inherent in using a multidirectional distribution of inlet and outlet ports so as to prevent cross circulation. Also, with all but the smallest motors it often makes it more difficult to observe and replace filters.

In the fluid housing of this invention the ports in communication with the atmosphere are reversible so that each can be alternately operated as an inlet port or an outlet port. This reversal is accomplished by utilization of an easily movable baffle or baffles that selectively determine different internal flow paths. When the inlet filters become plugged or dirty the flow paths to the fluid housing from the atmosphere can be reversed.

Therefore, by placing filters on the initial outlet ports the dirty filters can be replaced while the motor is running without the risk of admitting dirt into the motor. Also, in some installations the reversal of the flow direction may be utilized for cleaning the filters without actual removal. Similarly, the direction may be reversed when the particular direction of the flow path is inconvenient or dangerous to personnel working in the affected area.

An object of this invention is to provide a new and improved means for reversing the fluid flow direction into and out of a fluid housing.

Another object of this invention is to accomplish the reversal of the fluid flow direction in a single housing structure without the utilization of complex, cross connected, valved conduits.

Another object is to provide a new and improved fluid control housing capable of reversing fluid flow direction.

FIG. 1 is an exploded, idealized oblique view of a motor housing with an attached fluid flow control housing embodying this invention;

FIG. 2 is an oblique view of the fluid flow control housing, shown in FIG. 1, with its external walls shown as plane surfaces and with the baffles in a first position;

FIG. 3 is a cross sectional top view of the fluid flow control housing taken along the plane III—III—III of FIG. 2 but with the baffles in a second position;

FIG. 4 is an end view of a fluid flow control housing of another embodiment of this invention with the baffles in a first position taken with one wall, the facing wall, removed;

FIG. 5 is the same end view as FIG. 4 with the baffles in a second position; and

FIG. 6 is an oblique view taken similarly to FIG. 2 of another embodiment of this invention.

While there are many usable variations and combinations of this invention, the preferred embodiment is one adapted for use with a common type of motor housing. The preferred embodiment is illustrated in FIGS. 1, 2 and 3.

As shown in FIG. 1, a fluid flow control housing has a plurality of ports in communication with atmosphere and with ports in a motor housing for forming several flow paths through the fluid housing connecting the atmosphere to the motor housing. The motor housing encloses a motor and has means for drawing the cooling air through the motor and exhausting it out of the motor housing into the fluid housing. Directing means consisting of baffles and means for rotating the baffles are provided within the fluid housing to enable selection and determination of the flow paths.

Referring to FIGS. 1 and 2, a fluid flow control housing **10** is attached to a motor housing **11** which encloses a motor **12**. The motor housing has four intake ports **21**, **22**, **23** and **24** for drawing fluid into an exhaust port **25** and for exhausting fluid out of the motor housing.

The fluid flow control housing has a plurality of ports in its walls comprising: fluid ports **31**, **32**, **33** and **34**; discharge ports **41**, **42**, **43** and **44**; and receiving port **45**. Discharge ports **41**, **42**, **43** and **44** directly communicate with intake ports **21**, **22**, **23** and **24**, respectively, of the motor housing. Likewise, receiving port **45** of the fluid housing directly communicates with exhaust port **25** of the motor housing. The intake and exhaust ports of the motor housing are selectively connectable through the discharge and receiving ports of fluid housing **10** to one or more of fluid ports **31**, **32**, **33** and **34** by the rotation of baffles **20** which are rotatably mounted in the fluid housing. The baffles are rotated by the operation of a controlling means **13** which consists in part of a control lever **14**.

In the operation of a fluid housing embodying this invention, referring to FIG. 1, motor **12** enclosed by

motor housing **11** drives blowers **70** and **80** that draw fluid, which in this embodiment is air, into one end of the motor through discharge ports **41** and **42**, and into the other end of the motor through discharge ports **43** and **44**. The air is circulated (normally for cooling purposes) through the windings and structure of the motor, passed out of the motor at its center portion, and exhausted from the motor housing through exhaust port **25** into the fluid housing through receiving port **45**. The air is appropriately directed within the motor and motor housing by internal duct work and channels as shown.

In the preferred embodiment, shown in FIGS. 1, 2 and 3, fluid flow control housing **10** provides two distinct flow systems. The first flow system is illusrated in FIGS. 1 and 2 when baffles **20** are in a first position. In this position discharge ports **41** and **42** are connected to fluid port **32**; discharge ports **43** and **44** to fluid port **34**; and receiving port **45** to fluid ports **31** and **33**. Hence, air is drawn into the fluid housing through fluid ports **32** and **34** and is discharged to atmosphere through fluid ports **31** and **33**.

To form the second flow system, shown in FIG. 3, the baffles are placed in a second position. In this position discharge ports **41** and **44** are connected to fluid port **31**; discharge ports **42** and **43** to fluid port **33**; and receiving port **45** to fluid ports **32** and **34**. Hence, air is drawn into the fluid housing through fluid ports **31** and **33** and is discharged to atmosphere through fluid ports **32** and **34**.

FIGS. 4 and 5 are end views of another embodiment of this invention similar in operation to that shown in FIGS. 1, 2 and 3. In these views the facing wall (equivalent to the wall containing fluid port **32**, as shown in FIGS. 1, 2 and 3) is removed so that the internal structure of the fluid housing may be viewed.

In this embodiment the baffles operate as two sets, a first set consisting of baffle **50** and a parallel baffle hidden from view in the orthographic projection because it is located directly behind baffle **50**, and a second set consisting of baffle **51** and a parallel baffle **52**. The first set of baffles is perpendicular to the second set and both are readily rotatable as described.

In operation the baffles are rotated about a horizontal axis by means of support shafts **53**, **54** and **55**. A fourth support shaft for rotating the hidden baffle is also not visible because it is located directly behind support shaft **53**. Support shaft **53** supports baffle **50**, support shaft **54** supports baffle **51**, support shaft **55** supports baffle **52** and the hidden support shaft supports the hidden baffle. The baffles are slotted at the line of intersection between the baffles so that they may be rotated. The slots are exaggerated in the drawings for purposes of clarity.

FIG. 4 shows the baffles in a first position: that is, the first set of baffles is in a vertical position and the second set of baffles is in a horizontal position. This first position of the baffles determines a first flow system equivalent to that shown in FIGS. 1 and 2 in which discharge ports **41** and **42** are connected to fluid port **32**, discharge ports **43** and **44** to fluid port **34**, and receiving port **45** to fluid ports **31** and **33**.

By rotating the support shafts 90° the baffles may be placed in a second position as shown in FIG. 5. In the second position the first set of baffles is in a horizontal position and the second set of baffles is in a vertical position thereby determining a second flow system equivalent to that shown in FIG. 3 in which discharge ports **41** and **44** are connected to fluid port **31**, discharge ports **42** and **43** to fluid port **33**, and receiving port **45** to fluid ports **32** and **34**.

A modification of the fluid housing of this invention is shown in FIG. 6. This particular fluid housing can be used in direct attachment with an appropriately designed motor housing or it can be used in a conduit network to reverse the inlet and outlet flow directions of

fluid through the conduits. A discharge port **63**, and a receiving port **64** are located on a top wall **66** of a fluid flow control housing **65**. A first fluid port **61** and a second fluid port **62** are located on a bottom wall **67**. Some or all of the ports may be located on the side walls **68** of the fluid housing and still function the same as hereinafter described. A baffle **60** is shown in a first position (thereby determining and selecting a first flow system) whereby discharge port **63** communicates with first fluid port **61**, and receiving port **64** communicates with second fluid port **62**. By rotating baffle **60** 90° to a second position (thereby determining and selecting a second flow system), discharge port **63** communicates with second fluid port **62**, and receiving port **64** communicates with first fluid port **61**. Thus, with the baffle in the first position, first fluid port **61** is an outlet port and second fluid port **62** is an inlet port. With the baffle in the second position, first fluid port **61** and second fluid port **62** are operationally reversed and first fluid port **61** is an inlet port and second fluid port **62** is an outlet port. The rotation of the baffle may be accomplished by any suitable means.

In the description of this invention, air has been indicated as being the probable fluid. However, the invention is not necessarily limited to the use of air and it is apparent that obvious changes may be made to adapt this invention for other fluids. Also, the manner and means of applying the invention have been shown in certain expressed embodiments but there are many modifications, variations and applications possible without departing from the spirit or exceeding the scope of the invention.

Having now particllarly described and ascertained the nature of my said invention and the manner in which it is to be performed, I declare that what I claim is:

1. An air housing comprising:

a rectangular top wall, a rectangular bottom wall, and a first and second pair of parallel side walls with said pairs perpendicular to each other, said walls intersecting to form a housing chamber;

baffles;

means for movably mounting the baffles within the housing chamber with said baffles movable to a spaced apart first position parallel to the first pair of side walls to divide the housing chamber into a side, center, and side chamber and movable to a spaced apart second position parallel to the second pair of side walls to divide the housing chamber into another side, center, and side chamber;

a first set of four ports located in the bottom wall with each located to communicate with only a side chamber and each adjacent a different corner of the bottom wall; a port centarlly located in the bottom wall; and

a second set of four ports each located in a wall to communicate with only a side chamber when the baffles are parallel to one pair of side walls and to communicate with only a center chamber when the baffles are perpendicular to said one pair of side walls.

2. An air housing comprising:

a top wall, bottom wall, and side walls intersecting to form a housing chamber;

a plurality of baffles;

means for movably mounting said baffles within the housing chamber with said baffles movable to a first position to divide the housing chamber into a first, second, and third chamber with said second chamber located between said first and third chamber, and to a second position substantially perpendicular to the first position to divide the housing chamber into a fourth, fifth, and sixth chamber with said fifth chamber located between said fourth and sixth chamber;

a first port located in a wall of the housing to be in communication with only the first chamber when the baffles are in the first position and with only the fourth

chamber when the baffles are in the second position;

a second port located in a wall of the housing to be in communication with only the first chamber when the baffles are in the first position and with only the sixth chamber when the baffles are in the second position;

a third port located in a wall of the housing to be in communication with only the third chamber when the baffles are in the first position and with only the sixth chamber when the baffles are in the second position;

a fourth port located in a wall of the housing to be in communication with only the third chamber when the baffles are in the first position and with only the fourth chamber when the baffles are in the second position;

a fifth port located in a wall of the housing to be in communication with only the second chamber when the baffles are in the first position and with only the fifth chamber when the baffles are in the second position;

a sixth port located in a wall of the housing to be in communication with only the first chamber when the baffles are in the first position and with only the fifth chamber when the baffles are in the second position;

a seventh port located in a wall of the housing to be in communication with only the second chamber when the baffles are in the first position and with only the sixth chamber when the baffles are in the second position;

an eighth port located in a wall of the housing to be in communication with only the third chamber when the baffles are in the first position and with only the fifth chamber when the baffles are in the second position; and

a ninth port located in a wall of the housing to be in communication with only the second chamber when the baffles are in the first position and with only the fourth chamber when the baffles are in the second position whereby the sixth, seventh, eighth and ninth ports are selectively connectable by positioning the baffles to a port in a group of ports consisting of the first, second, third, and fourth ports and to the fifth port.

3. An air housing comprising:

a square top wall, a square bottom wall parallel to the top wall, and a first, second, third, and fourth side wall intersecting the top and bottom walls to form a housing chamber;

four baffles;

means for movably mounting said baffles within the housing chamber, with said baffles generally perpendicular to the bottom and top walls and each rotatble about an axis generally perpendicular to the top and bottom wall, said axes each located at a different intersection of four lines, said lines each generally parallel to a different side of the top wall at a distance of substantially one-fourth of the length of a side of of the top wall, said baffles each rotatable about its respective axis to a first position to divide the housing chamber into a first, second, and third chamber with said second chamber located between said first and third chamber, and to a second position generally perpendicular to the first position to divide the housing chamber into a fourth, fifth, and sixth chamber with said fifth chamber located between said fourth and sixth chamber;

a first discharge port for exhausting air from the housing located in the bottom wall of the housing to be in communication with only the first chamber when the baffles are in the first position and with only the fourth chamber when the baffles are in the second position;

a second discharge port for exhausting air from the housing located in the bottom wall of the housing to be in communication with only the first chamber when the baffles are in the first position and with only the sixth chamber when the baffles are in the second position;

a third discharge port for exhausting air from the housing located in the bottom wall of the housing to be in communication with only the third chamber when the baffles are in the first position and with only the sixth chamber when the baffles are in the second position;

a fourth discharge port for exhausting air from the housing located in a wall of the housing to be in communication with only the third chamber when the baffles are in the first position and when only the fourth chamber when the baffles are in the second position;

a receiving port for receiving air into the housing located in the center of the bottom wall of the housing to be in communication with only the second chamber when the baffles are in the first position and with only the fifth chamber when the baffles are in the second position;

a first air port located in the first side wall of the housing to be in communication with only the first chamber for receiving air into the housing when the baffles are in the first position and with only the fifth chamber for exhausting air from the housing when the baffles are in the second position;

a second air port located in the second side wall of the housing to be in communication with only the second chamber for exhausting air from the housing when the baffles are in the first position and with only the sixth chamber for receiving air into the housing when the baffles are in the second position;

a third air port located in the third side wall of the housing to be in communication with only the third chamber for receiving air into the housing when the baffles are in the first position and with only the fifth chamber for exhausting air from the housing when the baffles are in the second position; and

a fourth air port located in a wall of the housing to be in communication with only the second chamber for exhausting air from the housing when the baffles are in the first position and with only the fourth chamber for receiving air into the housing when the baffles are in the second position.

4. An air housing for controlling air flow in a motor cooling system of the type having a motor housing enclosing the motor, said motor housing having a retangular top wall, internal duct work, and a first, second, third, and fourth intake port each located in the top wall adjacent a different corner of the top wall and an exhaust port centrally located in the top wall, and said motor and motor housing having means for drawing air through the motor from the intake ports and exhausting the air through the exhaust port, said air housing comprising:

a top wall, a bottom wall juxtaposed the motor housing top wall, and side walls intersecting the top and bottom walls to form a housing chamber;

a plurality of baffles;

means for movably mounting the baffles within the housing chamber with said baffles each movable to a first cooperating position to divide the housing chamber into a first, second, and third chamber with said second chamber located between said first and third chamber, and to a second cooperating position generally perpendicular to the first position to divide the housing chamber into a fourth, fifth, and sixth chamber with said fifth chamber located between said fourth and sixth chamber;

a first discharge port located in the bottom wall of the air housing to connect the first intake port to only the first chamber when the baffles are in the first position and to only the fourth chamber when the baffles are in the second position;

a second discharge port located in the bottom wall of the air housing to connect the second intake port to only the first chamber when the baffles are in the first

position and to only the sixth chamber when the baffles are in the second position;

a third discharge port located in the bottom wall of the air housing to connect the third intake port to only the third chamber when the baffles are in the first position and to only the sixth chamber when the baffles are in the second position;

a fourth discharge port located in the bottom wall of the air housing to connect the fourth intake port to only the third chamber when the baffles are in the first position and to only the fourth chamber when the baffles are in the second position;

a receiving port located in the bottom wall of the air housing to connect the exhaust port to only the second chamber when the baffles are in the first position and to only the fifth chamber when the baffles are in the second position;

a first air port located in a wall of the air housing to be in communication with only the first chamber for receiving air into the air housing when the baffles are in the first position and with only the fifth chamber for exhausting air from the air housing when the baffles are in the second position;

a second air port located in a wall of the air housing to be in communication with only the second chamber for exhausting air from air housing when the baffles are in the first position and with only the sixth chamber for receiving air into the air housing when the baffles are in the second position;

a third air port located in a wall of the air housing to be in communication with only the third chamber for receiving air into the air housing when the baffles are in the first position and with only the fifth chamber for exhausting air from the air housing when the baffles are in the second position; and

a fourth air port located in a wall of the air housing to be in communication with only the second chamber for exhausting air from the air housing when the baffles are in the first position and with only the fourth chamber for receiving air into the air housing when the baffles are in the second position.

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