Sept. 17, 1929. L. J. O'CONNOR 1,728,768

VENTILATING DEVICE

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Fig. 2

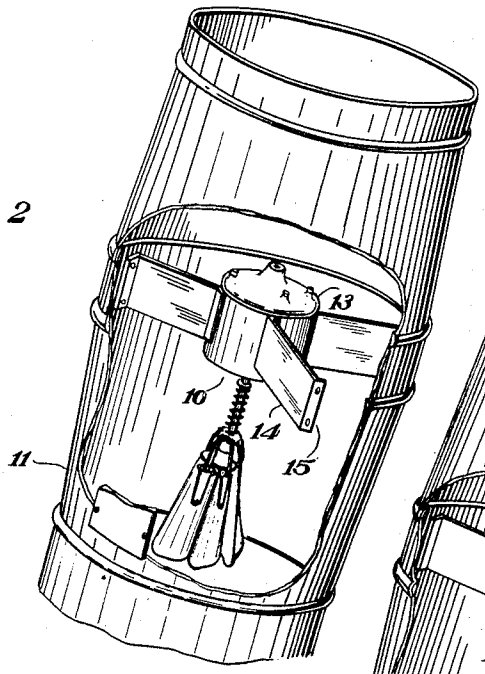


Fig. 1

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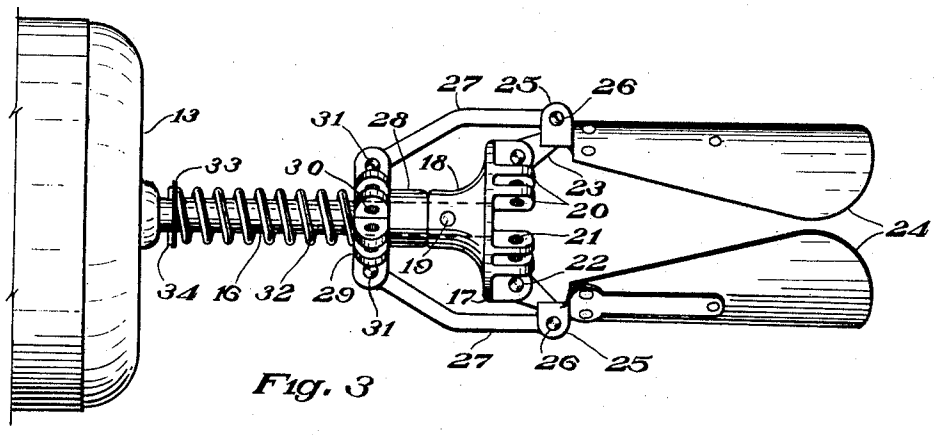


Fig. 3

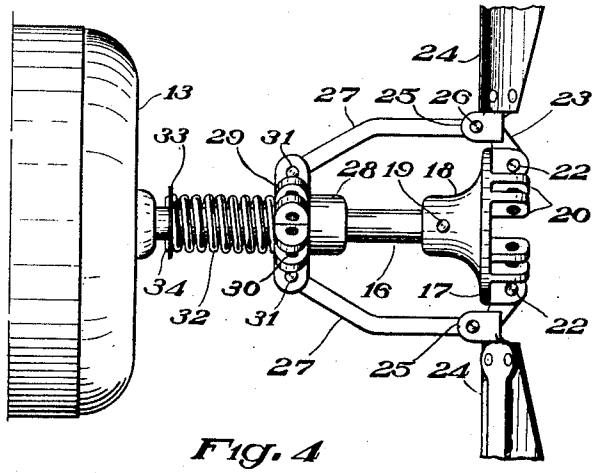


Fig. 4

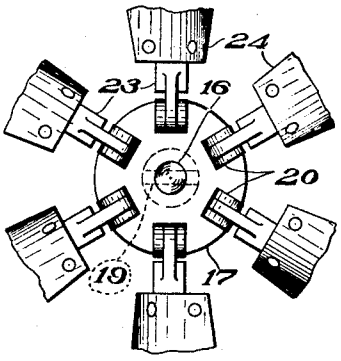


Fig. 5

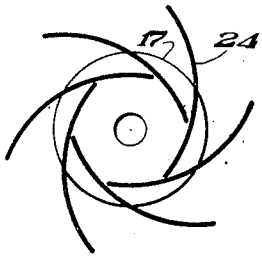


Fig. 7

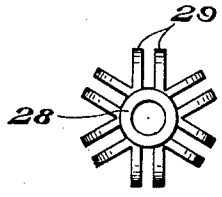


Fig. 6

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Patented Sept. 17, 1929 1,728,768

UNITED STATES PATENT OFFICE

LEO J. O'CONNOR, OF CANTON, OHIO, ASSIGNOR OF ONE-FOURTH TO WILLIAM ISLER, OF CANTON, OHIO

VENTILATING DEVICE

Application filed September 26, 1928. Serial No. 308,556.

This invention relates to ventilating devices capable of permitting either forced or natural flow of air through a conduit.

The invention is illustrated as applicable to the cold air inlet pipes of hot air furnaces, but it may also be utilized in connection with exhaust or inlet stacks and other conduits wherein it is desirable to permit an air flow under natural conditions in accordance with well-known laws of physics, or stimulate the air flow by artificial means, as conditions may require.

When the usual fan in the cold air inlet to a hot air furnace is not in operation, the flow of air by gravity to the hot air chamber of the furnace is seriously impeded due to the obstruction offered by the fan. Various remedial devices have heretofore been proposed, illustrative of which is the patent to Miles 1,508,813, granted September 16, 1924. It is a purpose of the present invention to eliminate dampers, which are not always reliable in action, and to provide a simplified and economical construction whereby power means situated in a conduit may be utilized to supplement the natural flow of air, but which when out of operation will not impede the natural flow of air.

More specifically, it is an object of this invention to provide in a conduit a collapsible fan for forcing air therethrough, whereby when the fan is idle and in collapsed condition, a minimum obstruction is offered to the free or natural flow of air.

Other objects and attendant advantages will be later on referred to or become obvious from the following detailed description of one chosen practical embodiment of my invention; but it is to be understood that the same is by way of example only.

In the further disclosure of this invention, reference is had to the accompanying drawings, constituting a part hereof, wherein:

Fig. 1 is a perspective view of the return or cold air pipe of a hot air furnace, parts being broken away for clearness of illustration;

Fig. 2 is a fragmentary view similar to Fig. 1, showing the fan in collapsed inoperative condition;

Fig. 3 is a side elevation of the motor driven fan unit in inoperative condition; only two of the fan blades being shown, for clearness;

Fig. 4 is a similar view showing the fan in operating condition;

Fig. 5 is a fragmentary front elevation showing the blades operatively mounted on the carrier;

Fig. 6 is a detail view of the collar;

Fig. 7 is a diagrammatic front elevation showing the fan blade assembly when the fan is in collapsed condition.

In the drawing I have illustrated a motor driven fan unit designated generally as 10, mounted in the return or cold air inlet pipe 11 leading to a conventional hot air furnace fragmentarily shown at 12. The conduit 11 as shown is substantially vertical, but it is to be noted the invention in practice is readily applicable to horizontal or other inlet pipes.

The fan unit 10 comprises an electrically driven motor 13 of any preferred type secured centrally within the conduit through the instrumentality of brackets 14 having feet 15 secured by any suitable means to the motor and conduit respectively.

Referring to Figs. 3 to 5, there is shown the usual projecting motor shaft 16. Terminally mounted on the shaft 16 is a blade carrier 17 having boss 18 by means of which the carrier 17 may be fixedly secured to the shaft as by pin 19 passing through the boss and shaft, see Fig. 5.

Formed upon the carrier 17, as shown, are equi-spaced ears 20 arranged in pairs, having aligned openings 21 for the reception of pivot pins 22 for pivotally mounting blade carrier arms 23 between each pair of respective ears. Rigidly secured to each arm 23 is a fan blade 24. Rearwardly offset on arms 23 are spaced ears 25, to which are pivotally secured, as at 26, terminal portions of links 27.

Loosely and slidably mounted on shaft 16 is a collar 28 having spaced pairs of ears 29 provided with aligned openings 30 for the pivotal connection of the other ends of links 27, as at 31.

Surrounding shaft 16 is a coil spring 32 having one end abutting a washer 33, which

is free to slide on the shaft, but the inward movement of which is limited by a cotter pin 34 or the like. The other end of the coil spring 32 is in free abutting engagement with the collar 28. It is worthy of note that when the motor is idle, the collar 28 is forced outwardly under the action of the spring, as shown in Fig. 3, with the resultant swinging of the blades to the collapsed position.

When the motor is started, the centrifugal action on the blades will cause them to assume the operative position shown in Figs. 1 and 4, which position will be maintained so long as the motor is operating, the tension of the spring 32 when under compression as in Fig. 4 being insufficient to overcome the centrifugal force to which the blades are subjected.

It will be noted that the portion of the conduit housing the fan unit 10 is of enlarged cross-sectional area, this enlargement being sufficient to compensate for the slight obstruction to the free flow of air offered by the unit when idle, thus insuring free flow of air when operating under natural or gravity flow.

The operation will be apparent from the foregoing. When the fan is idle, it is automatically collapsed due to action of the spring, and when in this position offers a minimum obstruction to the free or gravity flow of air, this slight obstruction being compensated for by the slight enlargement of the conduit at this point. When it is desirable to operate the furnace under forced draft, the fan automatically assumes operative position upon starting of the motor.

The invention is susceptible of various modifications, as for example, a manually collapsible fan unit may be employed, or a non-collapsible fan whose blades may be individually pivotally mounted for positioning parallel to the air flow to offer a minimum obstruction when idle, without departing from the spirit of the invention.

I claim:

1. In an air circulating device, the combination of an air conduit, a driven fan in said conduit, and means whereby said fan is collapsed when idle to permit natural air flow through the conduit.

2. The structure defined in claim 1, wherein said conduit includes an enlarged portion, said fan being positioned within said portion, for the purpose described.

3. In an air circulating device, the combination of an air conduit, a driven fan in said conduit, and means automatically collapsing said fan when operation is ceased to permit natural air flow through the conduit.

4. In an air circulating device, the combination with an air conduit, of a driven fan in said conduit, and means collapsing said fan when idle and permitting automatic return to operative position when said fan is operated.

5. In an air circulating device, the combination with an air conduit, of a driven fan in said conduit, said fan being self collapsing when the fan is idle and self opening when the fan is operated, whereby normal air flow through the conduit is permitted when the fan is idle.

6. In an air circulating device, the combination of an air conduit, a driven fan therein and resilient means to collapse said fan when idle, whereby to permit normal flow of air through the conduit.

7. In combination with an air conduit, a driven fan therein, the blades of said fan being pivotally mounted, spring actuated self-acting means collapsing said blades about said pivots when the fan is idle, said last means permitting return of said blades to operative position by centrifugal action when the fan is started.

8. In an air circulating device, the combination of an air conduit, a driven shaft in said conduit, fan blades pivotally secured on said shaft and occupying a position substantially perpendicular to the axis of the shaft when the latter is running at normal speed, and means for collapsing the blades to a position substantially parallel with the axis of the shaft when the speed of the shaft has fallen below a predetermined minimum.

9. A structure as defined in claim 8, in which the last-named means comprises a coil spring.

10. In an air circulating device, the combination of an air conduit, a driven shaft in said conduit, a fan blade carrier secured to said shaft, fan blades pivotally secured to said carrier and occupying a position substantially perpendicular to the axis of the shaft when the latter is running at normal speed, and means mounted on said shaft for collapsing the blades to a position substantially parallel with the axis of the shaft when the speed of the shaft has fallen below a predetermined minimum.

11. A structure as defined in claim 10, in which the last-named means comprises a coil spring.

In testimony whereof I affix my signature.

LEO J. O'CONNOR.