

April 17, 1945.

R. L. LINCOLN

2,373,969

COMBINED CENTRIFUGAL FAN AND DUST COLLECTOR

Filed March 5, 1943

2 Sheets-Sheet 1

Fig. 1.

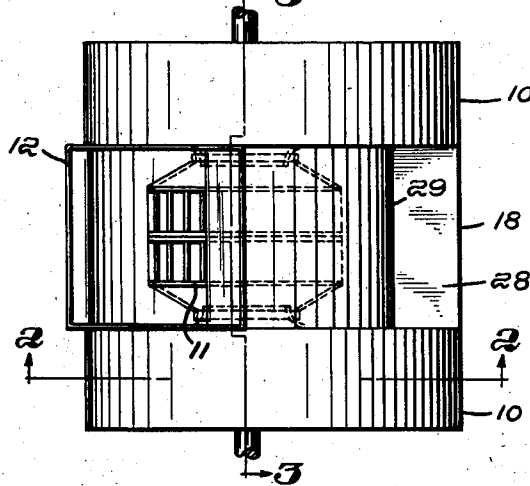


Fig. 2.

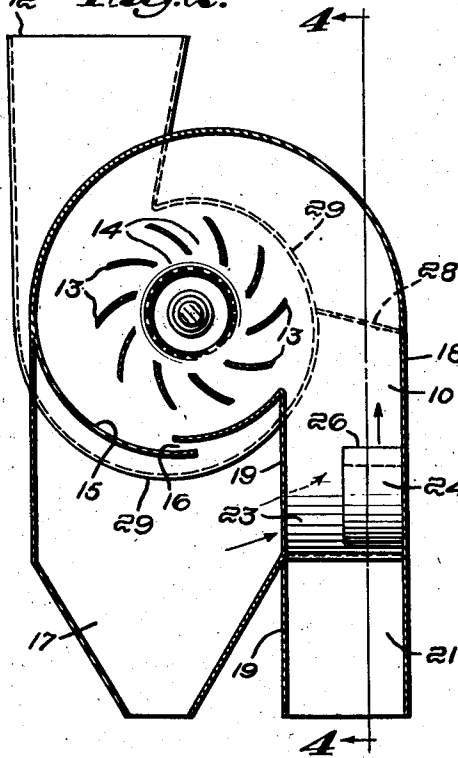
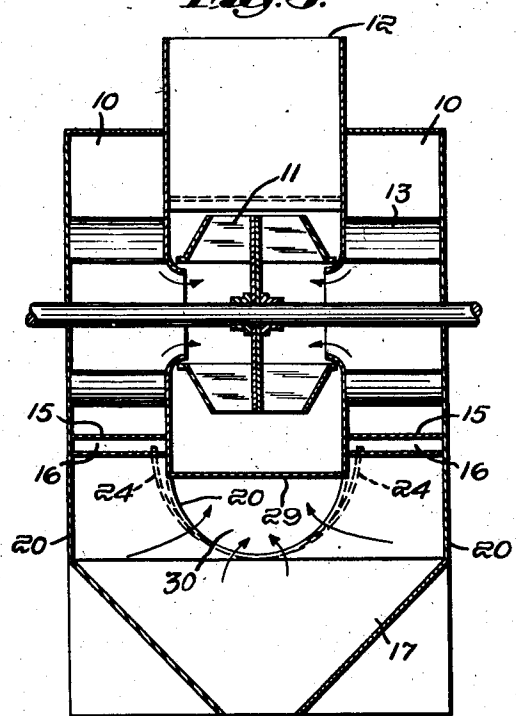


Fig. 3.



Inventor:
Roland L. Lincoln,
by Robert J. Palmer
Attorney

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R. L. LINCOLN

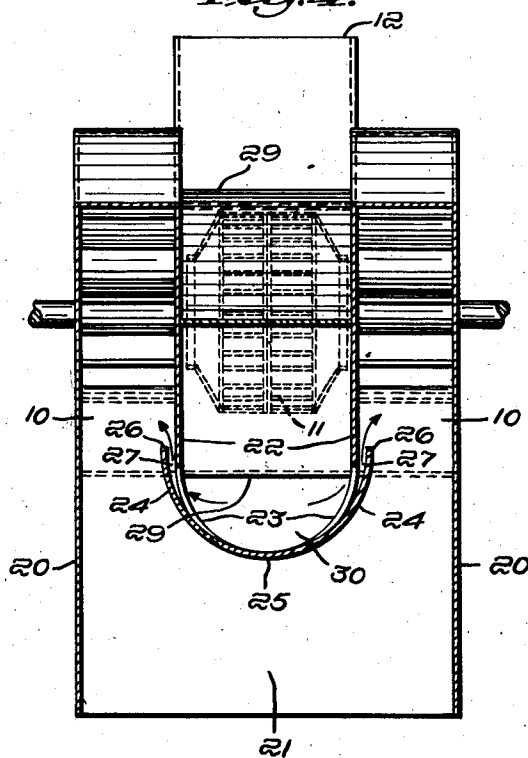
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2 Sheets-Sheet 2

Fig. 4.



Inventor:
Roland L. Lincoln
by Robert J. Palmer
Attorney

UNITED STATES PATENT OFFICE

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COMBINED CENTRIFUGAL FAN AND DUST COLLECTOR

Roland L. Lincoln, Dover, Mass., assignor to B. F. Sturtevant Company, Boston, Mass.

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2 Claims. (Cl. 183-37)

This invention relates to centrifugal fans combined with dust collectors and relates more particularly to centrifugal fans having double, involute inlets, with built in dust collectors.

Centrifugal fans having double, involute inlets are commonly used as induced draft fans, in steam power plants, for example. It is usual to connect separate collectors to the inlets of such fans for receiving the cinders and fly ash which would have a corrosive effect upon the fan blades.

There is very little space available in such plants for the usual dust collectors and for the connecting duct work used therewith and it is a feature of this invention that a dust collector is built into a centrifugal fan thus conserving space yet without detracting from the efficiency of the fan.

An object of the invention is to combine a centrifugal fan and a dust collector into a single, efficient, space saving unit.

The invention will now be described with reference to the drawings, of which:

Fig. 1 is a plan view looking downwardly upon one embodiment of this invention;

Fig. 2 is a sectional elevation taken along the lines 2-2 of Fig. 1;

Fig. 3 is a sectional view taken along the lines 3-3 of Fig. 1, and

Fig. 4 is a sectional view taken along the lines 4-4 of Fig. 2.

The double inlet fan illustrated, has the two involute inlets 10 on opposite sides of the wheel 11 and has the usual outlet 12.

The involute inlets 10 contain the deflector baffles 13 which are arranged centrally around the axial inlets 14 to the wheel 11. These baffles serve to cause the dust laden gas to make abrupt changes of direction to pass into the axial inlets 14 and thereby to cause the solid particles entrained in the gas to be thrown against the outer walls 15 of the involute inlets 10 whereupon they are skimmed off by the tangential skimming passages 16 and discharged into the hopper 17 forming the lower portion of the fan.

The usual double inlet, induced draft fan has involute inlets which are separate and distinct and which are not interconnected in the fan. In such a fan, the gas entering the two inlets is split outside the fan and supplied separately into the two inlets, as illustrated by Fig. 1 of the H. F. Hagen Patent No. 1,846,863.

According to a feature of this invention, the air splitter is built into such a double inlet fan and not only serves as an air splitter within the fan but provides ejectors communicating with the interior of a dust hopper built into the fan,

which induce dust free gas from the hopper into the fan inlets.

The outer, vertical wall 18 interconnects the involute inlets 10 and forms one side of an inlet passage 21 which is common to the inlets 10, the wall 19 forming the opposite inner wall of this passage, and the side walls 20 of the involute inlets 10 forming the side walls of the passage.

As illustrated best by Figs. 2 and 4, the inner halves of the lower ends of the inner walls 22 are interconnected by the cylindrical segment 23 which extends from the wall 19 downwardly into the passage 21 and forms a splitter for dividing the gas entering the passage 21 into two streams for entry into the involute inlets 10.

A larger substantially cylindrical segment 24 having a lower wall 25 extends from the segment 23 to the wall 18 and has the upper portions 26 which are spaced from and which overlap the lower ends of the walls 22 to form the ejector nozzles 27, one extending into each of the involute inlets 10. The segment 24 also serves as a splitter in the same way as the segment 23 does and in addition provides the ejector nozzles 27.

The ejector nozzles 27 connect with the interior of the hopper 17 and serve through the induction action of the gas entering the inlets 10, to maintain a negative pressure in the hopper so that the passage of dust into the hopper through the skimming passage 16 is expedited, and gas from the hopper is recirculated through the fan.

The upper wall 28 extends between the inner walls 22 of the involute inlets 10 and from the outer wall 18 to the outlet scroll 29 and forms with the outlet scroll 29 between the involute inlets 10, the upper boundary walls of a passage 30 of which the cylindrical wall 25 is the lower boundary and into which the hopper 17 between the involute inlets 10, opens at its right hand side, facing Fig. 2 of the drawings.

Thus there being no boundary wall between the interior of the hopper and the passage 30 between the involute inlets 10, the passage of gas through the involute inlets 10 through the action of the fan wheel 11, draws gas from the hopper through the passage 30 and the ejector nozzles 27.

The splitter sheets forming ejector nozzles are located in otherwise unused space between the involute inlets. The hopper extending under the fan wheel requires but little, if any, more space than that from a practical installation view point which is required by the fan alone. The result is that an efficient dust collector is arranged in

available, previously unused spaces in and around a fan and this without detracting from the efficiency of the fan. In fact the overall efficiency of the combination is even higher than those of the prior separator fan and dust collectors due to the elimination of duct work, duct work elbows, and to the extremely short passages provided.

While one embodiment of the invention has been described for the purpose of illustration, it should be understood that the invention is not limited to the exact apparatus and arrangement of apparatus illustrated as modifications thereof may be suggested by those skilled in the art without departure from the essence of the invention.

What is claimed is:

1. A fan having inner and outer walls forming opposed involute inlet passages, lower walls connected to said outer walls and forming a dust hopper extending cross-wise said fan and passages below same, means in said passages forming tangential skimmers discharging into said hopper, other walls connected to said outer walls and forming a common supply passage for said inlet passages, and means in said supply passage forming a splitter sheet connected to said inner walls for dividing the gas from said common passage into two streams and for guiding same into said inlet passages and forming a dividing wall separating said hopper from said passages, said sheet having portions extending into said inlet passages between said inner and outer walls and

forming with said inner walls ejector nozzles in said inlet passages communicating through said dividing wall with the interior of said hopper for inducing through the flow of gas through said inlet passages, the flow thereinto of dust free gas from said hopper.

2. A fan having inner and outer walls forming opposed involute inlet passages, lower walls connected to said outer walls and forming a dust hopper extending cross-wise said fan and passages below same, means in said passages forming tangential skimmers discharging into said hopper, other walls connected to said outer walls and forming a common gas supply passage for said inlet passages, and means in said supply passage forming a curved splitter sheet connected to said inner walls for dividing the gas from said common passage into two streams and for guiding same into said inlet passages and forming a dividing wall separating said hopper from said passages, said sheet having portions joining smoothly with said inner walls and having other portions extending into said inlet passages between said inner and outer walls and forming with said inner walls ejector nozzles in said inlet passages communicating through said dividing wall with the interior of said hopper for inducing through the flow of gas through said inlet passages, the flow thereinto of dust free gas from said hopper.

ROLAND L. LINCOLN.