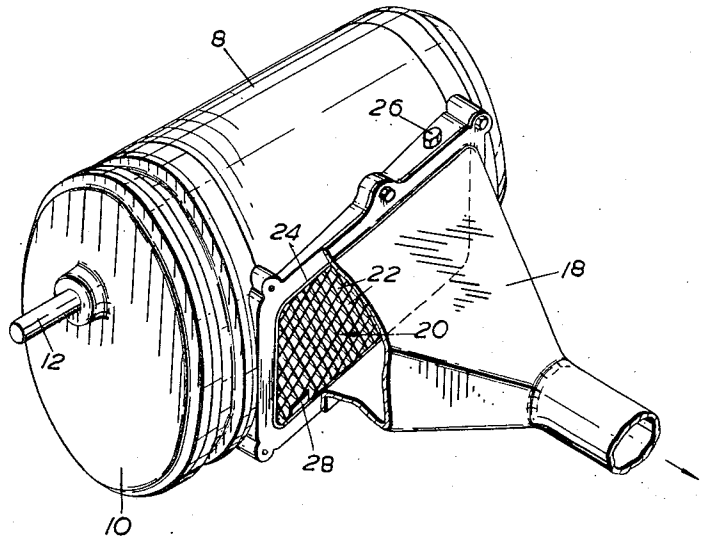
Jan. 26, 1954 C. L. DENSHAM 2,667,046

COOLER FOR GAS LEAVING ROOTS BLOWERS

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FIG. 1.



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FIG. 2.

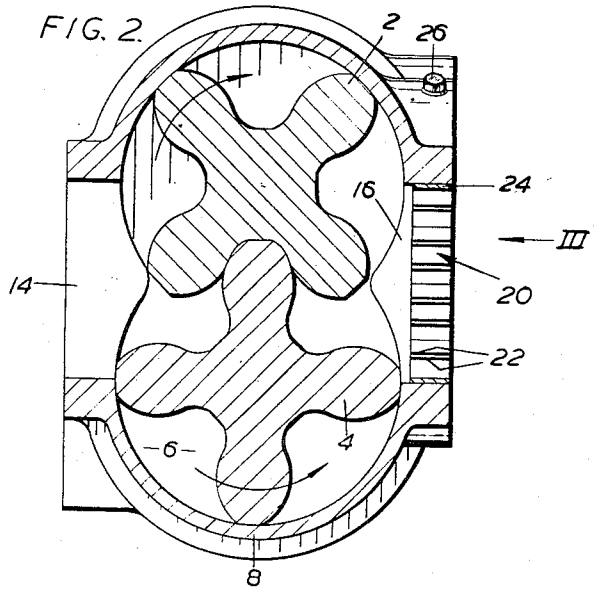
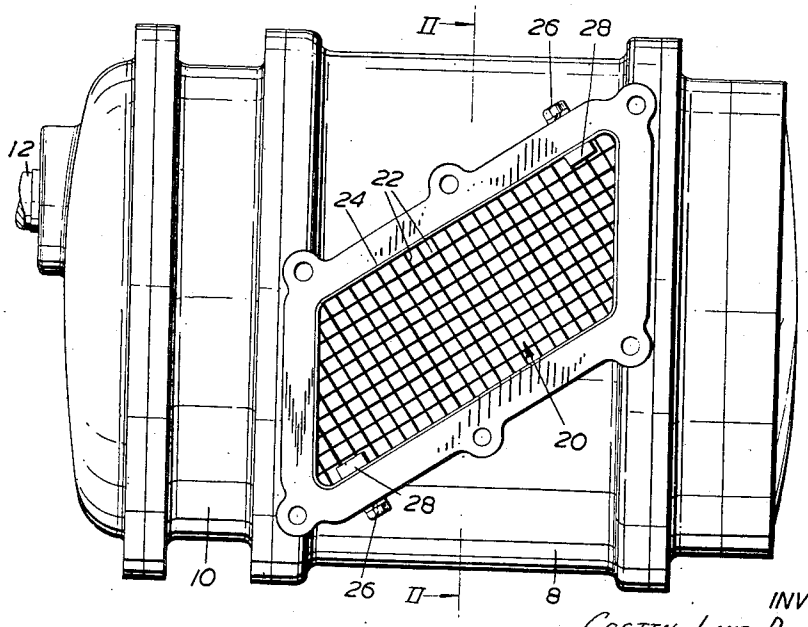


FIG. 3.



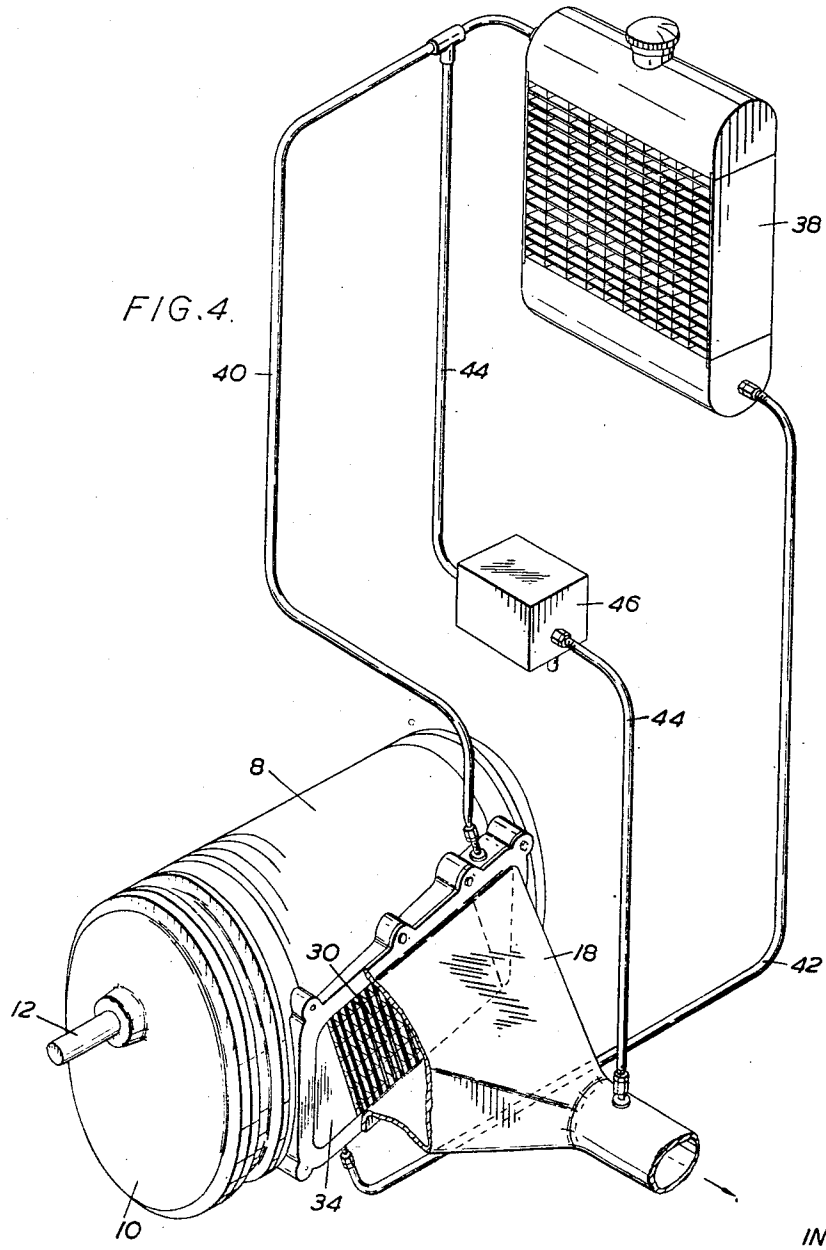
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FIG. 4.



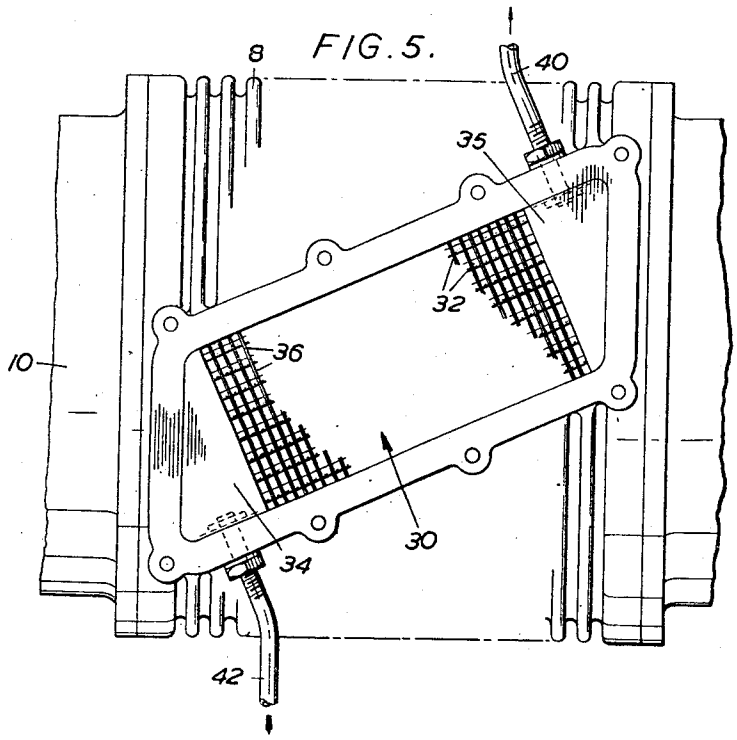
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FIG. 5.



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UNITED STATES PATENT OFFICE

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COOLER FOR GAS LEAVING ROOTS BLOWERS

Costin Lane Densham, Horley, England, assignor to Wade Engineering Limited, Horley, England, a British company

Application March 3, 1952, Serial No. 274,614

Claims priority, application Great Britain March 7, 1951

2 Claims. (Cl. 62—135)

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This application is a continuation-in-part of my application Serial No. 227,849 filed May 23, 1951, now abandoned.

This invention relates to Roots blowers.

It is an object of the invention to provide an efficient cooler for gas leaving a blower.

It is a further object to improve the output of a blower by means interposed in the path of the effluent gas.

It is a further object to provide a Roots blower which will have a high output of cool air.

A cooling system for a Roots blower according to this invention, comprises an evaporator for a volatile liquid located in the path of the gases leaving the blower and connected to a condenser external to the blower and outlet ducting. It is preferred to provide a balance pipe between the outlet duct of the blower and the cooling system so that the pressure within the cooling system varies in accordance with the pressure of gases leaving the blower. In this way the boiling point of the liquid in the evaporator is caused to vary to some extent with the output of the blower and hence the cooling system provides for regulation of the temperature of the compressed gases over a wider range of pressures.

In order to provide the minimum disturbance of the gas flow of the gases leaving the blower it is desirable that the evaporator shall be located in the region where the gas flow conditions are confused and it has been found preferable to arrange the evaporator within the casing of the blower. Both the evaporator and the condenser may have the form of coiled, finned tubes or any other convenient form of heat exchanger tubing. As the volatile liquid, methyl alcohol may be used for example.

The provision of an evaporator or any other form of grid or perforated plate in the discharge passage of a Roots blower near the outlet from the blower chamber serves to improve the performance of the blower as compared with the performance when the grid or plate is omitted. I believe that this is due to the damping of pulsations in the gas leaving the blower. This is an important feature of this invention.

Commonly a Roots blower has a casing which defines the blower chamber and has an outlet port leading into an outlet duct which is attached to the casing and forms the remainder of the discharge passage. The grid of plate may be placed across the duct provided that it is within a few inches of the outlet from the chamber, but preferably the grid or plate is set in the port in the casing.

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A grid for this purpose may be built up of strip metal arranged edge-on to the flow along the passage, or of other solid-sectioned members.

The accompanying drawings show preferred embodiments of this invention. In these drawings:

Figure 1 is a perspective view of one embodiment;

Figure 2 is a section through the blower casing on the line II—II in Figure 3;

Figure 3 is an elevation of the blower casing seen in the direction of the arrow III in Figure 2.

Figure 4 is a perspective view of a second embodiment; and

Figure 5 is an elevation similar to Figure 3.

The principal part of the first embodiment shown in Figures 1 to 3, is a Roots blower comprising two four-lobed rotors 2 and 4, each turning in a chamber 6 within a casing 8. The rotors are geared together by gear wheels in an extension 10 of the casing and are driven by a shaft 12. They serve to draw gas through an inlet port 14 and expel it through an outlet port 16. An outlet duct 18 is bolted to the casing 8 over the port 16 and has a section which changes gradually from the shape of the port 16 to circular.

A grid 20 is fitted into the port 16. This grid is built up of intersecting thin brass strips 22 set in a frame 24. The whole grid is held in place by two bolts 26 which enter tapped holes in small blocks 28 brazed on to the frame 24.

The second embodiment shown in Figures 4 and 5 differs from the first in the replacement of the grid 20 by an evaporator 30 comprising tubes 32 extending between headers 34 and 35 and intersected by fins 36. The headers are connected to a condenser 38 of similar type by flow and return pipes 40 and 42. Thus, during the running of the device, liquid evaporated in the evaporator 30, is passed over through the flow tube 40 as vapour to the upper part of the condenser 38, and liquid condensed in the condenser 38 will return to the bottom of the evaporator 30, through the return pipe 42.

To ensure that the liquid in the condenser does boil throughout a wider varying range of pressures in the outlet duct 18 than would be the case if the cooling system were entirely isolated from the outlet duct, the pipe 40 is connected to the outlet duct 18 by a balance pipe 44 which is provided with a vapour trap 46 of any convenient kind. In this way the pressure within the cooling system is maintained at the same value as the pressure in the outlet duct 18 so that as the pressure in the outlet duct rises, the

pressure in the cooling system and hence the boiling point of the liquid in the evaporator **30** also rises. The balance pipe **44** may be taken to any convenient point in the cooling system. The vapour trap **46** contains a movable piston or diaphragm which transmits pressure but prevents vapour from the cooling system passing into the outlet duct **18** and hence being lost.

I claim:

1. A Roots blower having a casing defining an outlet port, an outlet duct leading from said outlet port, a grid-like evaporator in said outlet port, a condenser external to said casing and outlet duct, and pipe connections between said evaporator and condenser whereby vapour produced by evaporation of a volatile liquid in the evaporator travels to the condenser where it is condensed and whence condensed liquid returns to the evaporator.

2. A gas compressor and cooler as claimed in claim 1 in which the cooling system is subjected to the pressure in the outlet duct through a pipe connection and vapour trap.

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