Aug. 28, 1951 R. M. FLANAGAN 2,565,764

PUMP

Original Filed Jan. 9, 1945 2 Sheets-Sheet 1

Fig. 1

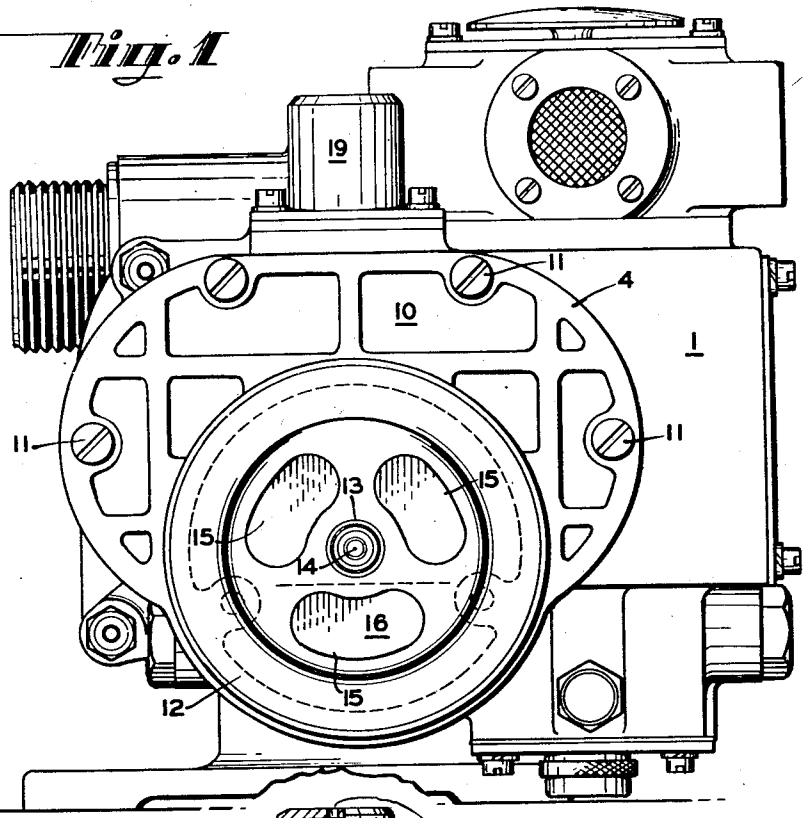
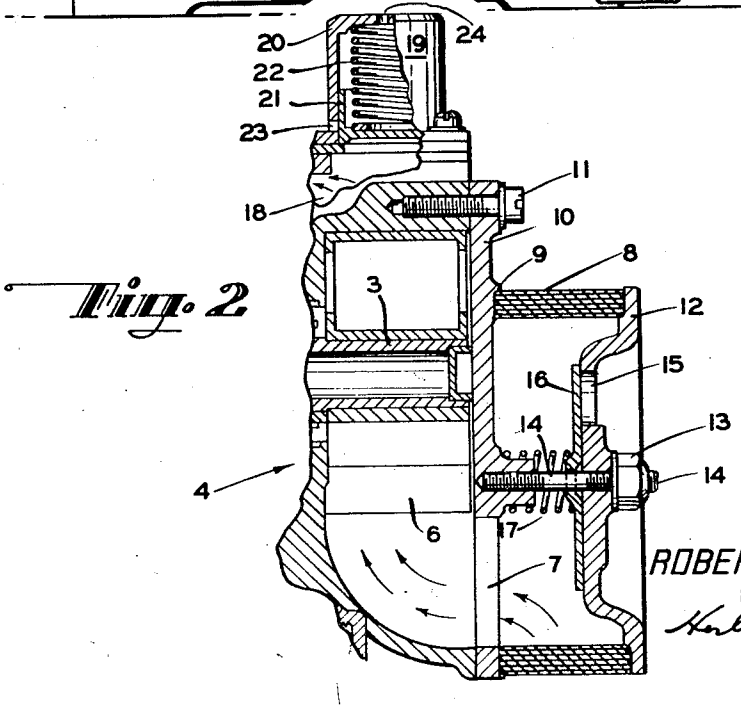


Fig. 2



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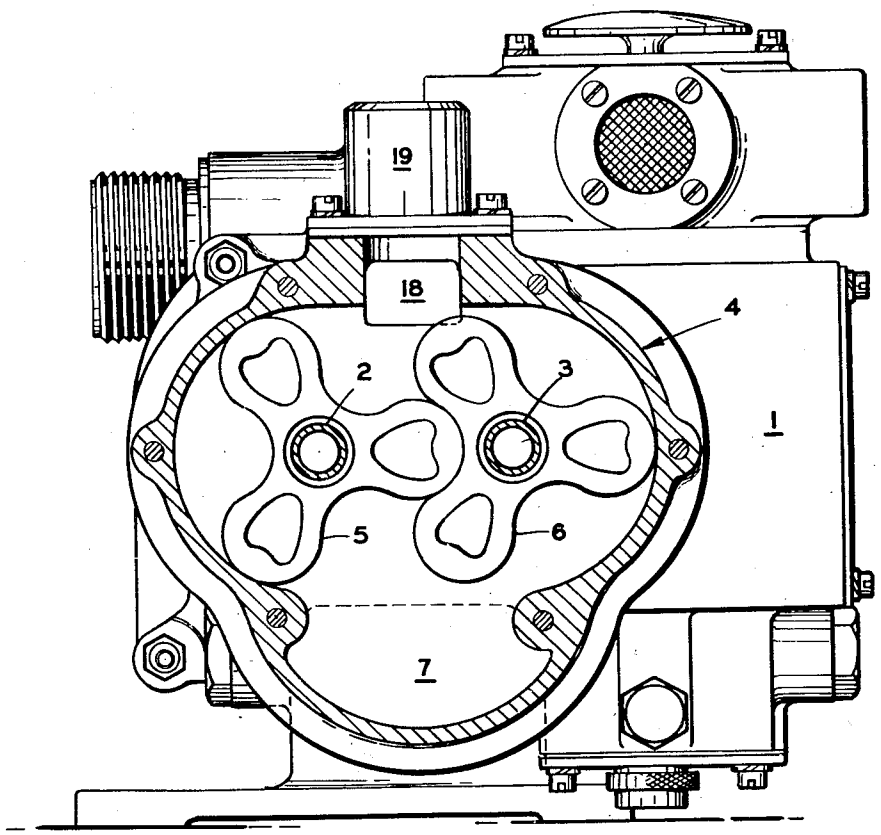
Original Filed Jan. 9, 1945 2 Sheets-Sheet 2

Fig. 3



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2,565,764

UNITED STATES PATENT OFFICE

2,565,764

PUMP

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Original application January 9, 1945, Serial No. 572,017. Divided and this application December 23, 1946, Serial No. 717,837

3 Claims. (Cl. 230—47)

1

The present application is a division of my copending application Serial No. 572,017 filed January 9, 1945, now Patent No. 2,542,863, February 20, 1951 and relates to an improved pump mechanism.

An object of the invention is to provide a novel air pump arrangement, including a novel tubular air filter at the inlet of the pump.

Another object of the invention is to provide at one end of the novel tubular air pump filter an emergency valve arranged so as to open in the event passage of air through the filter becomes obstructed.

Another object of the invention is to provide novel means for mounting the tubular filter at the inlet of the air pump.

These and other objects and features of the invention are pointed out in the following description in terms of the embodiment thereof which is shown in the accompanying drawing. It is to be understood, however, that the drawing is for the purpose of illustration only, and is not designed as a definition of the limits of the invention, reference being had to the appended claims for this purpose.

Figure 1 is an end view of the device illustrating the pump mechanism.

Figure 2 is a fragmentary sectional view of the pump mechanism of Figure 1 and with certain parts broken away to better illustrate the mechanism.

Figure 3 is an interior end view of the pump mechanism of Figure 1 with the end plate broken away.

Referring to the drawing of Figure 1, there is provided a main casting 1 in which there is housed as explained in detail in the aforenoted parent application, improved mechanism for controlling the operation of inflatable elements for preventing the accumulation of ice on airfoil surfaces of aircraft.

There is further carried by the latter casting 1 a suitable electric motor, not shown, for driving the aforenoted control mechanism together with the novel pump mechanism forming the subject matter of the present application.

The electric motor drives shafts 2 and 3 of a Roots type blower, indicated generally by the numeral 4, and having affixed to the respective shafts 2 and 3 impeller elements 5 and 6, as shown in Figure 3.

Air passes into the pump 4 through an air inlet 7 which opens from a cylindrical or tubular filter 8 formed of a suitable fibrous material. The air is drawn through the tubular filter 8 into the pump 4.

2

One end of the tubular filter 8 is positioned in a suitable seat 9 formed in an end plate 10 of the pump 4. The end plate 10 is fastened to the casting 1 by bolts 11. The opposite end of the tubular filter 8 is held by a plate 12 secured in position by a nut 13 on a center bolt 14. The center bolt 14 is screw threadedly engaged in the end plate 10. Valve openings 15 are provided in the plate 12. The latter valve openings 15 are controlled by a flap valve 16 slidably mounted on the center bolt 14 and biased in a direction for normally closing the valve openings 15 by a spring 17 positioned between the end plate 10 and the flap valve 16. At such times as the tubular filter 8 may become obstructed to the passage of air, the valve 16 will be drawn open so as to permit the passage of air to the pump 4 through the openings 15.

It will be thus seen that air will be drawn by the pump 4 through the opening 7 and forced under pressure of the pump 4 into an outlet passage 18 as shown in Figure 2 and leading to a control valve mechanism explained in the aforenoted parent application.

Opening from the outlet passage 18 is a pressure regulating valve 19 including a valve cap 20, a sleeve type valve 21, biased under the force of a spring 22 into a position closing an air outlet port 23 controlled by the sleeve valve 21. The sleeve valve 21 is biased by the air pressure in the passage 18 at one end of the valve 21 against the force of the spring 22. Atmospheric pressure is applied to the valve 21 at the other side through a port 24. Thus the valve 21 is biased by the pressure in the passage 18 so as to open the port 23 for decreasing the air pressure in the passage 18. The valve 21 is arranged to maintain the air pressure within a predetermined differential pressure range.

It will be readily seen from the foregoing that the tubular or cylindrical filter 8 provides a novel air filter at the inlet of the pump 4 which includes a novel emergency flap valve 16 compactly arranged in the tubular filter 8 for opening the air inlet 7 of the pump 4 directly to atmosphere in the event of obstruction to the filter 8.

Although only one embodiment of the invention has been illustrated and described, various changes in the form and relative arrangements of the parts, which will now appear to those skilled in the art, may be made without departing from the scope of the invention. Reference is, therefore, to be had to the appended claims for a definition of the limits of the invention.

What is claimed is:

1. The combination, comprising, a housing,

pumping elements mounted within said housing, said housing having an air inlet opening and an air outlet opening, a cylindrical air filter element positioned at the exterior of said housing so as to surround the air inlet opening, said filter element having an exterior surface exposed to atmosphere, and means for mounting said element at said position, said last mentioned means including a valve biased by said pumping elements to open an end of said cylindrical element for permitting the passage of air to said air inlet upon said cylindrical filter element becoming obstructed to passage of air through said filter element.

2. The combination, comprising, a housing, pumping elements mounted within said housing, said housing having an air inlet opening and an air outlet opening, a cylindrical air filter element positioned at the exterior of said housing so as to surround the air inlet opening, said filter element having an exterior surface exposed to atmosphere, a plate, said plate having valve openings formed therein, a stem projecting from said housing for fastening said plate at one end of said cylindrical filter element in such a manner as to secure the opposite end of said cylindrical filter element to said housing in the aforementioned position, said pumping elements arranged to draw air from the atmosphere through said filter element and into said air inlet opening, a flap valve slidably mounted on said stem within said cylindrical air filter, spring means biasing

said flap valve in a direction for closing said valve opening, and said pumping elements arranged to bias said flap valve to an open position so as to permit air to be drawn from the atmosphere through said valve opening upon an obstruction to passage of air from the atmosphere through said filter element.

3. The combination, comprising, a housing, pumping elements mounted within said housing, said housing having an air inlet opening, an air filter element positioned at the exterior of said housing so as to surround said air inlet opening, said filter element having an exterior surface exposed to atmosphere so that said pumping elements may draw air from the atmosphere through said filter element, and means operable upon the obstruction of said filter element to provide air flow through said inlet.

ROBERT MICHAEL FLANAGAN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
511,798	Rankine	Jan. 2, 1894
1,352,876	Coffman	Sept. 14, 1920
2,014,507	Price	Sept. 17, 1935
2,176,324	Bretzlaff et al.	Oct. 17, 1939
2,285,997	Mino	June 9, 1942
2,542,863	Flanagan	Feb. 20, 1951