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REVERSIBLE ROTARY BLOWER OR PUMP

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Fig. 1.

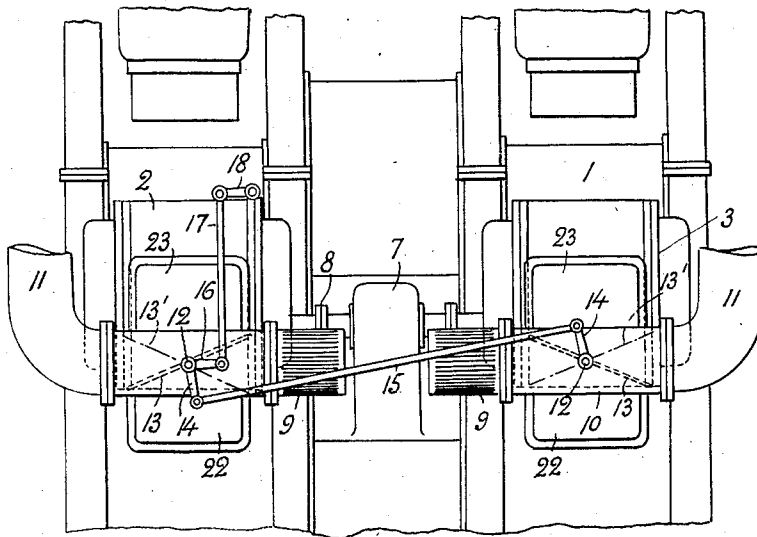
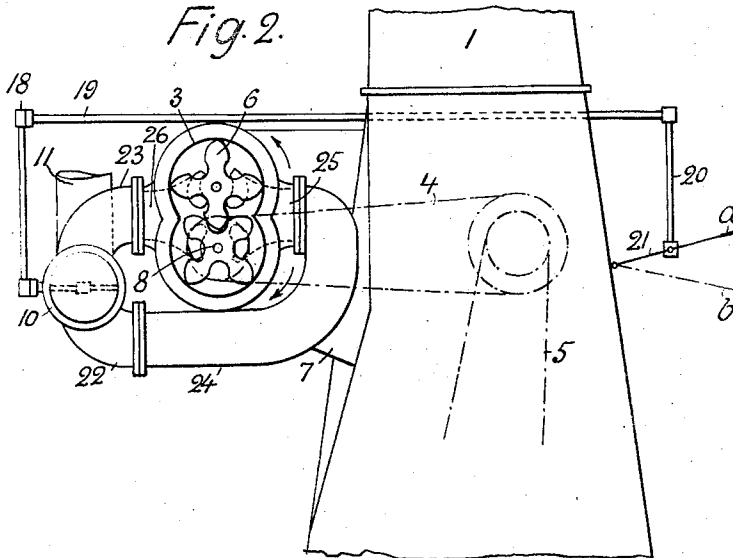


Fig. 2.



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REVERSIBLE ROTARY BLOWER OR PUMP

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My invention relates to rotary reversible blowers or pumps in which the direction of flow through the blower or pump, proper is reversed when the direction of rotation of the blower or pump is reversed. Pumps or blowers of the stated kind are applicable to reversible prime movers such as for instance internal combustion marine engines and connected thereto may serve various purposes, e. g. the circulation of lubricating oil or cooling water or the introduction of combustion or scavenging air into the engine cylinders. The medium forwarded by the pump or blower should however always be forwarded in the same direction, independent of the actual direction of rotation of the engine or blower, as lubricating oil, cooling water, combustion air, and the like must be delivered to the engine in one and the same manner, whether the latter runs in one or the other direction. Devices are known, in which a reversible transmission is employed between the main shaft of the engine and the blower or pump, so that the latter rotates always in the same direction independent of the direction of rotation of the combustion engine, the reversible transmission being reversed simultaneously with the reversal of the internal combustion engine. Instead hereof it has been proposed to use a reversing slide valve controlling the supply and discharge pipes of the pump or blower, so that the medium is forwarded the same way when the slide valve is reversed, whether the blower or pump be running in one or the other direction. The said slide valve devices, which are of a similar kind as those employed in combination with hydraulic transmissions have, however, the defect that the slide valves have a tendency to settle. The fact is, namely, that in a reversible internal combustion engine employed for the propulsion of vessels there are, as a rule, very long periods between the moments where the engine is to be reversed or manœuvred. During these long periods the slide valve remains in a fixed position, and consequently relatively great quantities of impurities, as e. g. dust, oil, pitch and the like, may gather in the space between the slide valve and the bore of its casing, so that it becomes difficult to reverse the slide valve, when finally a manœuvre is to be carried out, because the surfaces which have to slide against each other stick together. The invention has for its object to do away with the said defects connected with the employment of slide valve devices and is mainly characterized in that the blower or pump is connected or combined with one or more compartments, valve housings, or the like, communicating with both the supply and the discharge pipe of the medium to be forwarded and provided with flap-valves, butterfly valves, clack-valves or the like the latter being connected with actuating organs by means of which they may be so shifted by the reversal of the blower or pump that the medium is always forwarded in the same direction. The employment of flap-valves, butterfly valves or clack-valves means an essential technical advantage against the employment of slide valves, as the coacting tightening flats by flap-, butterfly- and clack-valves do not slide against each other during the shifting and consequently do not give risk of sticking or settling. The invention may be performed e. g. by means of a valve housing containing one single shifting flap which is so constructed that in one end position it connects the supply pipe with one side (opening) of the pump proper and the discharge pipe with the other side of the pump, while in its other end position it connects each of the said pipes with the opposite side of the pump. According to another constructional form of the invention two compartments separated from each other are employed, the said compartments surrounding the pump housing proper and each communicating with one side thereof, while they communicate with both the supply and the discharge pipes through openings controlled by valve flaps. The controlling means of the valve flaps may be interconnected by suitable rods or links, so that the reversal of one single member opens at the same time one pair of valve flaps and closes another pair. If in an internal combustion engine a plurality of blowers are employed, the controlling

means of the various flaps or the like may be interconnected, so that the reversal takes place at the same time in all of the blowers. The system of rods or links by which the flaps or valves are controlled may be connected either with a hand lever operated from the engine platform or directly with the reversing means of the engine, e. g. a servo motor device, by which the reversal of the internal combustion engine is performed, so that the flaps or the like are reversed at the same time as the hand lever is moved from ahead to astern, or vice versa. The invention is represented in the drawing, where Fig. 1 is a side elevation of a blower device supplying scavenging or combustion air to the cylinders of an internal combustion engine, Fig. 2 is an end elevation thereof. Referring to the drawing in detail, 1 is the frame of the internal combustion engine. As will appear from Fig. 1, two cylinder units next to the centre of the engine or its chain case are shown, each of them carrying a blower. 2, 3 are the housings of the two blowers, which are both of the construction indicated in Fig. 2 consisting of two pump bodies 6 in the shape of gear wheels and driven from the main shaft (not shown) of the internal combustion engine by chains 4, 5, Fig. 2. The chain 4 runs in a chain case 7 and transmits motion to the shaft 8 of one of the blowers. Each blower is provided with a strainer 9 situated on the suction end of a cylindrical valve casing 10, to the other end of which is connected a pressure pipe 11, through which the air is led to the combustion cylinder. In each valve housing 10 is a flap or butterfly valve 13 mounted in bearings in the valve housing by means of a horizontal shaft 12 perpendicular to the axis of the housing. To each shaft 12 is keyed a lever 14, and these two levers 14 are connected with each other by a tie rod 15. Through a lever 16, tie rods 17, 18, a shaft 19 and tie rod 20 connection is obtained with a reversing hand lever 21. From the valve housing 10 two connecting branches issue, viz the branch 22 at the bottom and the branch 23 at the top. The branch 22 communicates through a bent pipe 24 with the branch 25 of the blower housing, while the branch 23 is directly connected with the other branch 26 thereof. The device acts as follows: In the position represented in the drawing of the flaps 13 corresponding to the position *a* of the reversing lever 21 the blowers run in the direction indicated by the arrows in Fig. 2, and the strainer 9 communicates under the flap 13 through branch 22 and pipe 24 with the branch 25 of the blower housing facing the engine and acting in this case, i. e. by the shown direction of rotation, as a supply branch. During the rotation of the blower the air is pressed through branches 26, 23

into the valve housing 10 above the flap 13, from where it goes through the pressure pipe 11 to the combustion cylinders. When the internal combustion engine is reversed, the reversing lever 21 is moved from position *a* to the position *b* shown in broken lines in Fig. 2. Through the connecting system 14—20 the motion is transmitted to the flaps 13 so as to move them to their opposite end positions indicated by the broken lines 13', Fig. 1. Owing to the reversal of the engine the gear wheel blower is now rotated in the opposite direction to the former one, i. e. oppositely to the direction of the arrows, so that now the branch 26 becomes the suction branch and the branch 25 becomes the pressure branch. Owing to the reversal of the flaps 13 the air is, however, now sucked in through the strainer 9 into the valve housing 10 above the flap 13 and through branches 23, 26 into the blower, from where it is pressed through branch 25, pipe 24 and branch 22 of the valve housing 10 under flap 13 and further through pressure pipe 11 to the combustion cylinder.

I claim:

1. In a reversible rotary blower for supplying air to reversible internal combustion engines, a blower housing having ports therein, a valve housing provided with inlet and discharge fittings, two pipes connected with the valve housing at the opposite sides thereof and communicating respectively with the ports of the blower housing, and a rotatable flap valve arranged in the valve housing and closing communication between the inlet and discharge fittings and arranged to be moved between two end positions, in one of which the valve establishes communication between the inlet and the discharge fittings through the ports of the blower housing in one direction, whilst in the other end position the flap valve establishes communication between the inlet and the discharge fittings through the two ports of the blower housing in the opposite direction.

2. In a reversible rotary blower for supplying air to reversible internal combustion engines, a blower housing having ports therein, a valve housing provided with inlet and discharge fittings, two pipes connected with the valve housing at the opposite sides thereof and communicating respectively with the ports of the blower housing, and a rotatable flap valve arranged in the valve housing located between said pipes and movable between two end positions, in each of which the flap valve divides the valve housing in two compartments, the flap valve in one of said positions establishing communication between the inlet fitting and one port of the blower housing and between the discharge fitting and the other port of the blower housing, whilst said flap valve in the other of said positions establishes communications

between the inlet fitting and the second mentioned port of the blower housing and between the discharge fitting and the first mentioned port of the blower housing.

5 3. An arrangement as claimed in claim 1 in which the flap valve is so arranged that it only in the said two end positions tightens against the inner wall of the valve housing, whilst in the interposed positions it is spaced
10 from said wall.

4. An arrangement as claimed in claim 1 in which the axis of rotation of the flap valve is perpendicular to the longitudinal direction of the valve housing.

15 In testimony whereof I affix my signature.

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