

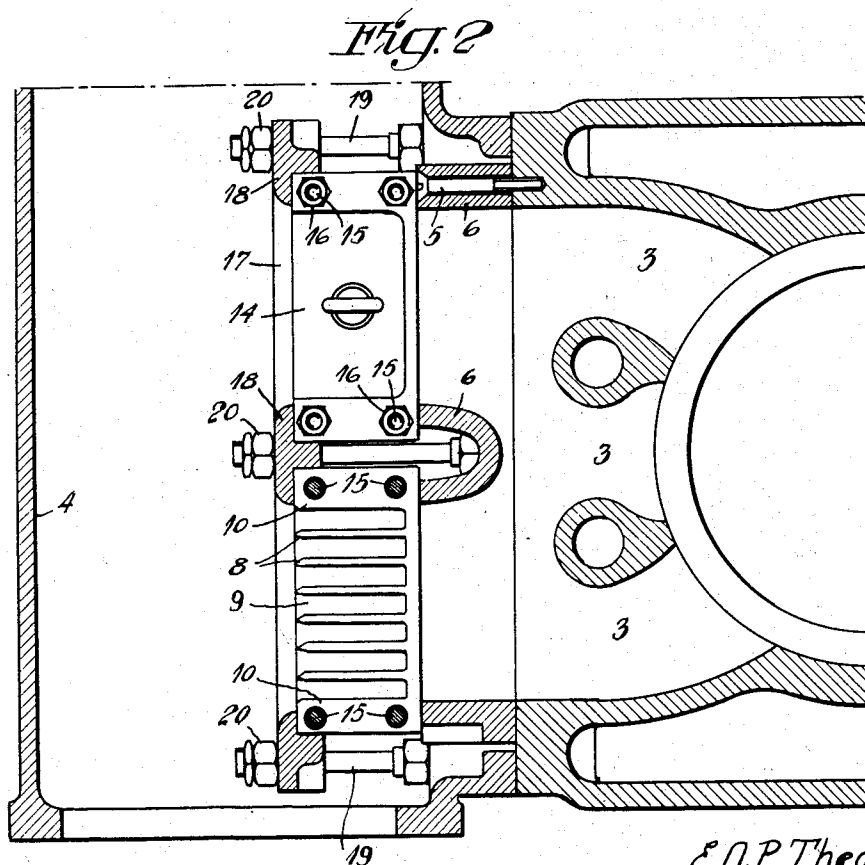
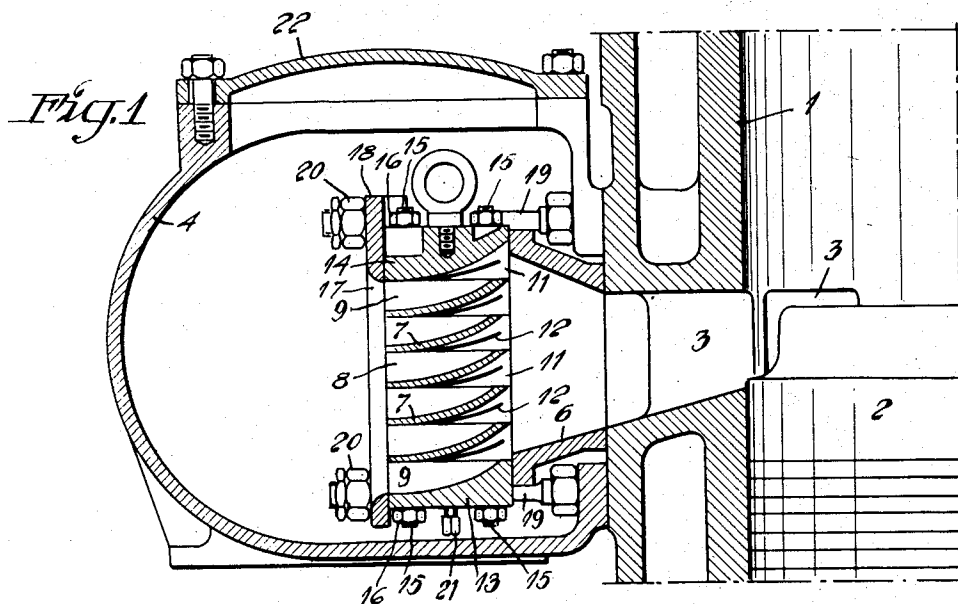
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AUTOMATICALLY OPERATING SCAVENGING VALVE FOR TWO-STROKE CYCLE INTERNAL COMBUSTION ENGINES APPLICABLE ALSO TO COMPRESSORS AND THE LIKE

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AUTOMATICALLY-OPERATING SCAVENGING VALVE FOR TWO-STROKE CYCLE INTERNAL-COMBUSTION ENGINES APPLICABLE ALSO TO COMPRESSORS AND THE LIKE

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For the removing of the combustion gases from the working cylinder of two-stroke cycle internal combustion engines scavenging valves have been proposed comprising a springy valve plate. Such valves as these, after the piston has uncovered the openings of the working cylinder for the ejection of the combustion gases from the cylinder and when the pressure in the said cylinder has been reduced to an amount below that of the scavenging air contained in the crank casing or a special receiver, are opened automatically by the scavenging air and are subsequently closed automatically after the performance of the scavenging operation. Scavenging valves of this construction are in many respects more suitable than mechanically actuated scavenging valves. As is well known, the scavenging by means of fresh air ought to commence when the pressure of the combustion gases in the working cylinder is equal to or somewhat lower than the pressure of the scavenging air. For that reason an adjustment of the mechanically actuated scavenging valves must be effected for the said purpose and it is not always certain that the proper adjustment is selected. In scavenging valves of the kind stated above the opening of the valve is effected automatically at the moment stated and for that reason it is always sure that the valve operates in such manner that an effective scavenging is produced. When automatically operating valves are used the working cylinder, as is the case also when mechanically actuated valves are provided, is charged, after the performance of the scavenging operation, with fresh air under pressure and consequently contains a greater quantity of oxygen, for which reason a greater quantity of fuel may be admitted and burned thereby increasing the horse power of the engine.

This invention relates to plate shaped elements by means of which automatically operating scavenging valves, applicable also to compressors or the like, may be made up. The said elements are so constructed that when put together a spacious passage for air is provided, which is so located, that the air in the straightest possible path passes from the receiver or the like into the cylinder, in order that no reducing of the pressure of the scavenging air worth mentioning may

take place. The said object is gained by the plate shaped elements being provided in their one surface with a row of parallel slot shaped openings, which are located side by side and to which the air is led by curved guides in the body of the element, and in their opposite side with a recess, which extends along the said row of openings and has a curved bottom, substantially parallel with the said guides. For the constituting of a composed scavenging valve the said elements are placed on or at the side of each other in such manner, that the openings of each element are continued by the recess of the neighboring element. A springy valve plate is located between each two co-operating elements, which thus is common for the openings and for which when opened the curved bottom of the recess constitutes a bearing surface, so that it is not subjected to any abrupt bending operation which would result in the valve plate being broken.

A characteristic feature of the invention also consists in the scavenging valve, composed as stated above, being common to a plurality of admission cylinder ports for the scavenging air and preferably being so located that it is protected against the action of the hot combustion gases.

A scavenging valve composed of a plurality of plate shaped elements and spring valve plates in accordance with the invention is shown in the accompanying drawing, in which:

Fig. 1 is a vertical section of the valve and the adjacent part of the working cylinder of the engine, the working piston being shown in side view, and

Fig. 2 is a horizontal section of the working cylinder and the receiver containing the scavenging air; the figure shows in a plan view the scavenging valve and one of its elements. The valve is shown placed at the side of one of the working cylinders of a multicylinder engine.

1 is the working cylinder and 2 its piston. The admission ports for the scavenging air are designated by 3. The outlet opening (not shown) for the combustion gases is arranged in the ordinary manner. 4 is the receptacle or the receiver containing the scavenging air, which receiver, as usual, is common to the working cylinders. Scavenging air of suitable pressure is accumulated in

the receiver either by a special pump or by the working cylinders which then at their lower side of the working pistons are adapted to compress the scavenging air. An intermediate plate 6 provided with openings for the scavenging air is fixed to the cylinder by means of screws 5, the said plate serving as a carrier of the scavenging valve. The said valve consists of two sets of plates 7. The plates of the one set are shown in a vertical section in Fig. 1 and the uppermost plate of the set is shown in a plan view in Fig. 2. The said plates are curve shaped and provided in one of its sides, according to the drawing the upper side, with transversal ribs or flanges 8, between which passages 9 for the scavenging air are provided. The top edges of the flanges 8 are flush with the wider end flanges 10 of the plates, which flanges 10 extend downwards below the curve-shaped plate and to the level of the lowermost part of the plates 7 respectively thus enclosing a transversal passage 11 extending along the whole plate 7. The said plates are piled up as shown in Fig. 1. Between the plates 7 plates 12 of a springy metal are jammed which act as valves and are adapted in closed position to cover the channels 9 of the plates 7 respectively and in open position to connect the channels 9 with the channels 11 respectively. Plates 7 and spring plates 12 are held between a bottom plate 13 and a top plate 14, connected by means of screw bolts 15 and nuts 16. In the bottom plate 13 channels 9 are provided equal to the channels 9 of the plates 7. The shape of the lower side of the top plate 14 is equal to the shape of the lower side of the plates 7 and provided with a channel 11, which as the valve is open constitutes a continuation of the channels 9 of the next subjacent plate 7. The set of plates thus composed, constituting one section of the scavenging valve, and the section composed by a second set of plates of the same construction are jammed between the plate 6 and a plate 18 provided with openings 17, common to the valve sections respectively. The said plate 18 is fixed by means of screw bolts 19, connected with the receiver and provided with nuts 20. For the fixing of the position of the valve sections respectively a set screw 21 is provided, screwed into the plate 13 and bearing against the bottom wall of the receiver. The valve sections are put into the receiver and removed from the same through an opening in the wall of the receiver provided with a cover 22.

The scavenging valve operates in the following manner. Piston 2 uncovers at the end of its working stroke the outlet port for the combustion gases and the ports 3 for the scavenging air in the usual manner. As soon as the pressure in the working cylinder has been so reduced through the escaping of combustion gases, that it is lower than the pressure of the air contained in the receiver 4, the said air opens the valve plates 12 and passes through the channels 7, 11 and the ports 3 into the cylinder and ejects the remaining combustion gases. Consequently, the opening of the scavenging valve is effected automatically at the proper moment. After the scavenging operation has been performed and the pressure in the working cylinder is substantially equal to the pressure in the receiver, the valve plates 12 will be closed by the elastic force of the plates. The curve shape of the lower side of the plates 7 is so adapted, that the springy plate 12, while being opened, successively bears against the said side, as shown in Fig. 1, in which the springy plates 12 are shown in open position. Owing to the fact that a suitable curve shape has been imparted to the said bearing surface for the springy plate 12, the said plate will not be subjected to any abrupt bending dangerous for the durability of the same.

In the special form of execution of the scavenging valve shown in the drawing and described above the channels 9 as well as the springy valve plates 12 are located in the natural or straight current direction from the receiver to the working cylinder. Owing to this fact a few or no pressure reducing whirls in the air current are created.

As perceived from the drawing, the scavenging valve is common to all ports 3, which simplifies the construction considerably. The distance of the scavenging valve from the cylinder is so great, that the air remaining in the space between the valve and the cylinder after each scavenging operation protects the valve against the hot combustion gases.

The invention may, evidently, be modified in some respects, without exceeding the limits of the same.

I claim:

1. Plate shaped element for scavenging valves for two-stroke cycle internal combustion engines and for valves for compressors and the like, provided in its one surface with a row of parallel slot shaped openings, which are located side by side and to which the air is led by a diagonally extending guide in the body of the element, and in its opposite side with a recess extending along the said row of openings and having a curved bottom in order that, as a number of such elements are placed on or at the side of each other, the openings of each element may be continued by the recess of the neighboring element and a springy valve plate may be common to the openings, for which valve plate when opened the bottom of the recess constitutes a bearing surface.

2. Scavenging valve for two-stroke cycle internal combustion engines and for valves for compressors and the like comprising a plurality of plate shaped elements, each provided in its one surface with a row of parallel slot shaped openings, which are located side by side and to which the air is led by a diagonally extending guide in the body of the element, and in its opposite side with a recess extending along the said row of openings and having a curved bottom, said plates being so related to each other that the openings of each element are continued by the recess of the neighbouring element, and a springy valve plate located between adjacent elements and common to the openings, for which valve plate when opened the bottom of the recess constitutes a curve-shaped bearing surface.
3. The combination of an admission valve as claimed in claim 2, the passage for scavenging air of a two-stroke cycle internal combustion engine and a plurality of admission ports provided for the scavenging air in the working cylinder of the engine, said valve being common to the said ports.
4. The combination of an admission valve as claimed in claim 2, the passage for scavenging air of a two-stroke cycle internal combustion engine, and a plurality of admission ports provided for the scavenging air in the working cylinder of the engine, said valve being common to the said ports and located at such a distance from the same, that an air quantity is confined between the valve and the said ports sufficient to protect the valve against the action of the hot gases of combustion.
- In testimony whereof I have hereunto affixed my signature.
- EDVIN OSSIAN PARCIVAL THEGE.