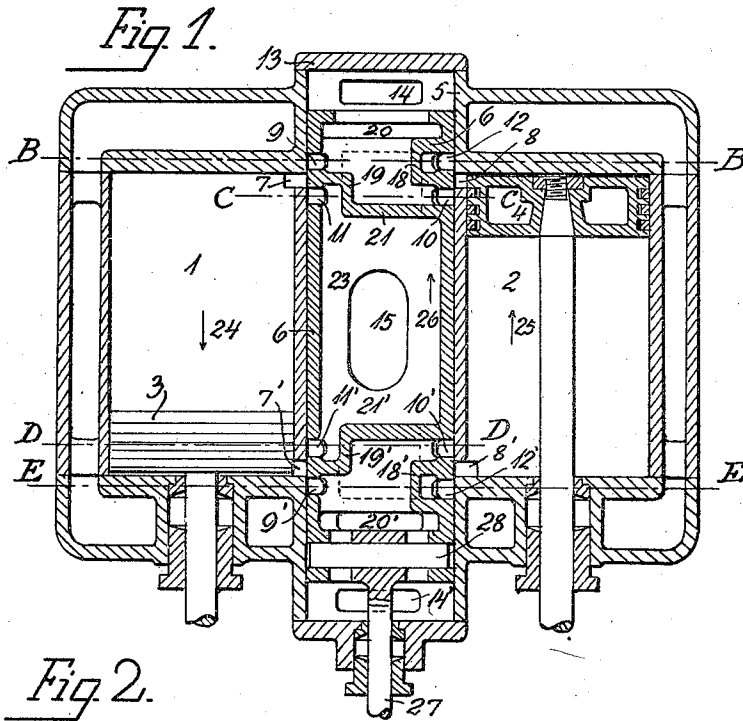
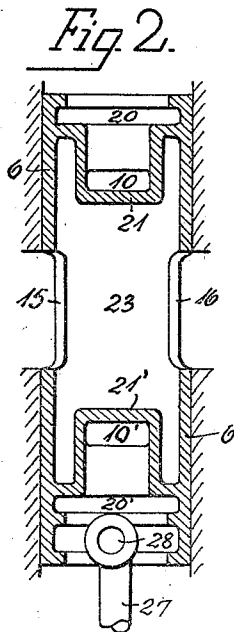
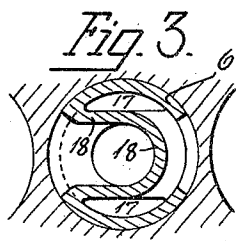
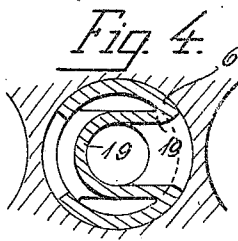
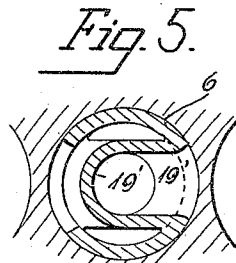
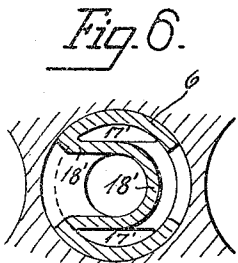


Jan. 9, 1923.

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FILED DEC. 6, 1921.

1,441,508.

2 SHEETS—SHEET 1.



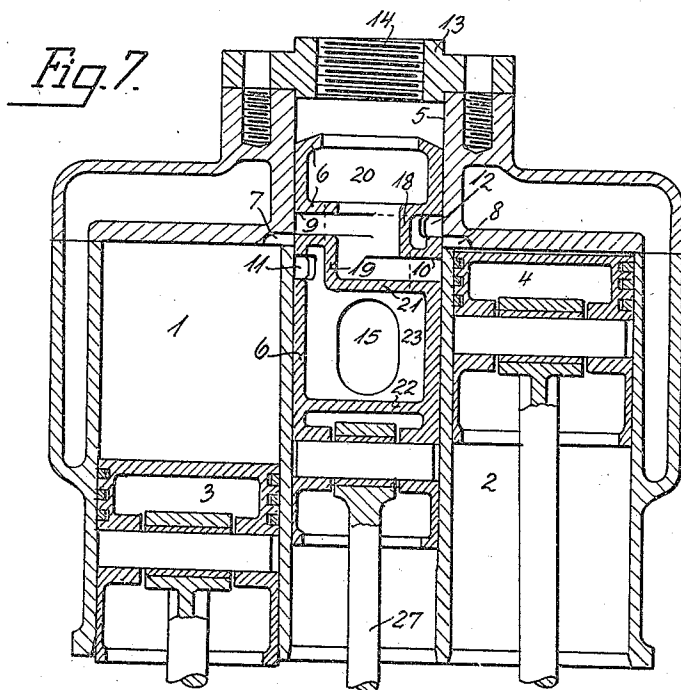
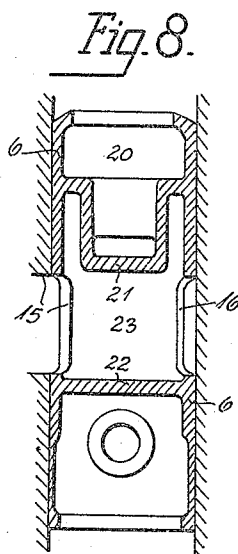
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

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CYLINDRICAL SLIDE VALVE.

Application filed December 6, 1921. Serial No. 520,373.

To all whom it may concern:

Be it known that we, ANTON MARIUS JENSEN, mechanical engineer, and KNUD PETERSEN BRÆNDSTRUP, manager, subjects of the King of Denmark, residing at Lyngbyvej 93A, Copenhagen, and Nordre Fasanvej 90, Copenhagen, Denmark, have invented certain new and useful Improvements in Cylindrical Slide Valves, of which the following is a specification.

This invention relates to a cylindrical slide-valve for vacuum pumps, compressors, and other piston machines having two cylinders, the pistons of which are reciprocated by cranks displaced 180° from each other.

In such machines it is well known to use a common cylindrical slide-valve, which is reciprocated in a slide-valve box situated between the cylinders and which simultaneously opens the admission to one cylinder and exhausts from the other cylinder.

In the known cylindrical slide-valves of this kind, the admission and the exhaust channels of the slide-valve or the channels from the cylinders to the valve box, or both sets of channels, are curvilinear and consequently have a great length. The result therefore is that the medium distributed by the slide-valve is throttled through these channels and meets with a great deal of resistance. If the channels of the slide-valve are curvilinear, the slide-valve is difficult to manufacture, and the stroke of the slide-valve must be long. If the channels of the cylinders are curvilinear, the clearances of the cylinders are increased, whereby the efficiency of the engine is reduced.

The present invention has for its object to remove these drawbacks.

According to the invention this is obtained by dividing the chamber of the slide-valve into sections by means of horseshoe-shaped ribs and by partitions, in such a manner, that its admission channel for any one of the cylinder ends is in the same plane at right angles to the axis of the slide-valve as its exhaust channel for the adjacent end of the other cylinders.

The result is hereby obtained that the slide-valve stroke is reduced to a minimum, and that the admission channels and exhaust channels of the slide-valve as well as the channels between the cylinders and the slide-valve become rectilinear with a mini-

um of length, so that the manufacture of the cylinders and the slide-valve box is rendered very inexpensive.

In the accompanying drawings like numerals show corresponding parts throughout and in which:—

Fig. 1 is a longitudinal section through two double-acting cylinders having a common slide-valve,

Fig. 2 is a longitudinal section through the slide-valve,

Fig. 3 is a cross-section through the slide-valve along the line B—B in Fig. 1,

Fig. 4 is a cross-section through a slide-valve along the line C—C in Fig. 1,

Fig. 5 is a cross-section through the slide-valve along the line D—D in Fig. 1,

Fig. 6 is a cross-section through the slide-valve along the line E—E in Fig. 1,

Fig. 7 is a longitudinal section through two single-acting cylinders with a common cylindrical slide-valve, and

Fig. 8 is a longitudinal section through the slide-valve according to Fig. 7.

1 and 2 are the two working cylinders, and 3 and 4 are their pistons. 5 is a slide-valve box arranged between the cylinders 1 and 2, and 6 is a cylindrical slide-valve located in said box. 7 and 7' are channels, interconnecting the cylinder 1 and the slide-valve box 5, and 8 and 8' are channels interconnecting the cylinder 2 and the said box. 9 and 9' are admission channels leading from the box 5 to the channels 7 and 7', respectively, and 10 and 10' are admission channels leading from the box 5 to the channels 8 and 8', respectively. The channels 9 and 10 are interconnected through an upwardly open chamber 20 in the upper end of the slide-valve 6, while the ports 9' and 10' are interconnected through a downwardly open chamber 20' in the lower end of the slide-valve. The said two chambers 20 and 20' form admission chambers, which are separated from a central exhaust chamber in the slide-valve by means of partitions 19 and 21, and 19' and 21', respectively. 11 and 12, and 11' and 12' are the exhaust channels of the slide-valve from the channels 7 and 8, and 7' and 8', respectively. The channels 11 and 12 are connected through suitable channels 17, Fig. 3, with the exhaust chamber 23, and the channels 11' and 12' are connected with the exhaust chamber 23 by means of

similar channels 17', Fig. 6. 13, Fig. 1, is a cover on the slide-valve box, and 14 and 14' are the admission channels of the same.

15 is the exhaust channel from the exhaust chamber 23 in the slide-valve. 16, Fig. 2, is an opening arranged opposite the channel 15 in order to balance the slide-valve. 18 and 18', Figs. 3 and 6, and 19 and 19', Figs. 4 and 5, are horseshoe-formed ribs, or partitions, which divide the chambers 20 and 20' of the slide-valve in such a manner, that the admission channels 9 and 9' into the cylinder 1 may be arranged in one and the same horizontal plane as the exhaust channels 12 and 12' for the cylinder 2, and so that the exhaust channels 11 and 11' for the cylinder 1 may be arranged in one and the same horizontal plane as the admission channels 10 and 10', respectively, for the other cylinder 2. The valve-rod 27 may be connected with the slide-valve by means of a head 28 or in any other suitable manner and is engaged by an eccentric, not shown, the center line of which forms 90° with the center line of either of the two cranks.

The operation of the machine is as follows:

Suppose that the two pistons of the machine, which for instance represents a vacuum pump have just finished their movement in the directions of the arrows 24 and 25, respectively, and reached their dead centers as shown, whereby further operation will cause air to be sucked into the cylinder 1 through channels 7 and 9, chamber 20, and admission channel 14, while air is being compressed at the other side of the piston 3, whereby the said air is discharged through channels 7' and 11', channel 17', exhaust chamber 23, and exhaust channel 15. At the underside of the piston 4 air was simultaneously sucked in through channel 8', admission channel 10', chamber 20' and admission channel 14', and air was compressed over the upper face of the piston 4, which air is exhausted through channel 8, exhaust channel 12, channel 17, exhaust chamber 23 and exhaust channel 15.

When the pistons 3 and 4 move from the position shown in Fig. 1 in the opposite directions as indicated by the arrows 24, 25, respectively, the exhaust channels 11 and 12' of the slide-valve will open for the compressed air from the upper end of the cylinder 1 and from the lower end of the cylinder 2, respectively, while the admission channels 10 and 9' will open for the admission of air to the upper end of the cylinder 2 and to the lower end of the cylinder 3, respectively. The said channels 11 and 12', and 10 and 9' will not interrupt the admission to and the exhaustion from the said end of said cylinders, until the pistons have reached their opposite dead centers.

The construction shown in Figs. 7-8 differs only from the construction shown in Figs. 1-6 that the pistons 1 and 2 and therefore the slide-valve 6 are single-acting.

The construction according to Figs. 7 and 8 does not show the chamber 20', and the cylinders 1 and 2 as well as the slide box are open at their lower ends. The slide-valve acts in a manner similar to the working operation of the slide-valve according to the construction shown in Figs. 1-6.

We claim as our invention:

1. A pump comprising two cylinders having rectilinear openings at each end; a double-acting piston in each cylinder adapted to mutually reciprocate in said cylinders; a slide-valve box for said pistons mounted between said cylinders; and a circular slide-valve adapted to reciprocate in said slide-valve box, said slide-valve having a plurality of rectilinear admission and exhaust channels at each end thereof, a central exhaust chamber, admission chambers at each end thereof and horseshoe-shaped partitions in said admission chambers enclosing exhaust channels to said exhaust chamber.

2. A cylindrical slide-valve for two cylinders having a central exhaust chamber having an exhaust channel at each end thereof and on the same side; an admission chamber at each end of said valve having two admission channels at opposite sides of said chamber; and a horseshoe-shaped partition forming an exhaust channel in each of said admission chambers, being in communication with said exhaust chamber and at opposite sides of said exhaust channels.

In testimony whereof we affix our signatures.

ANTON MARIUS JENSEN.
KNUD PETERSEN BRÆNDSTRUP.

Witnesses:

CARL MEMMINGSEN,
HENRIK WOLFF.