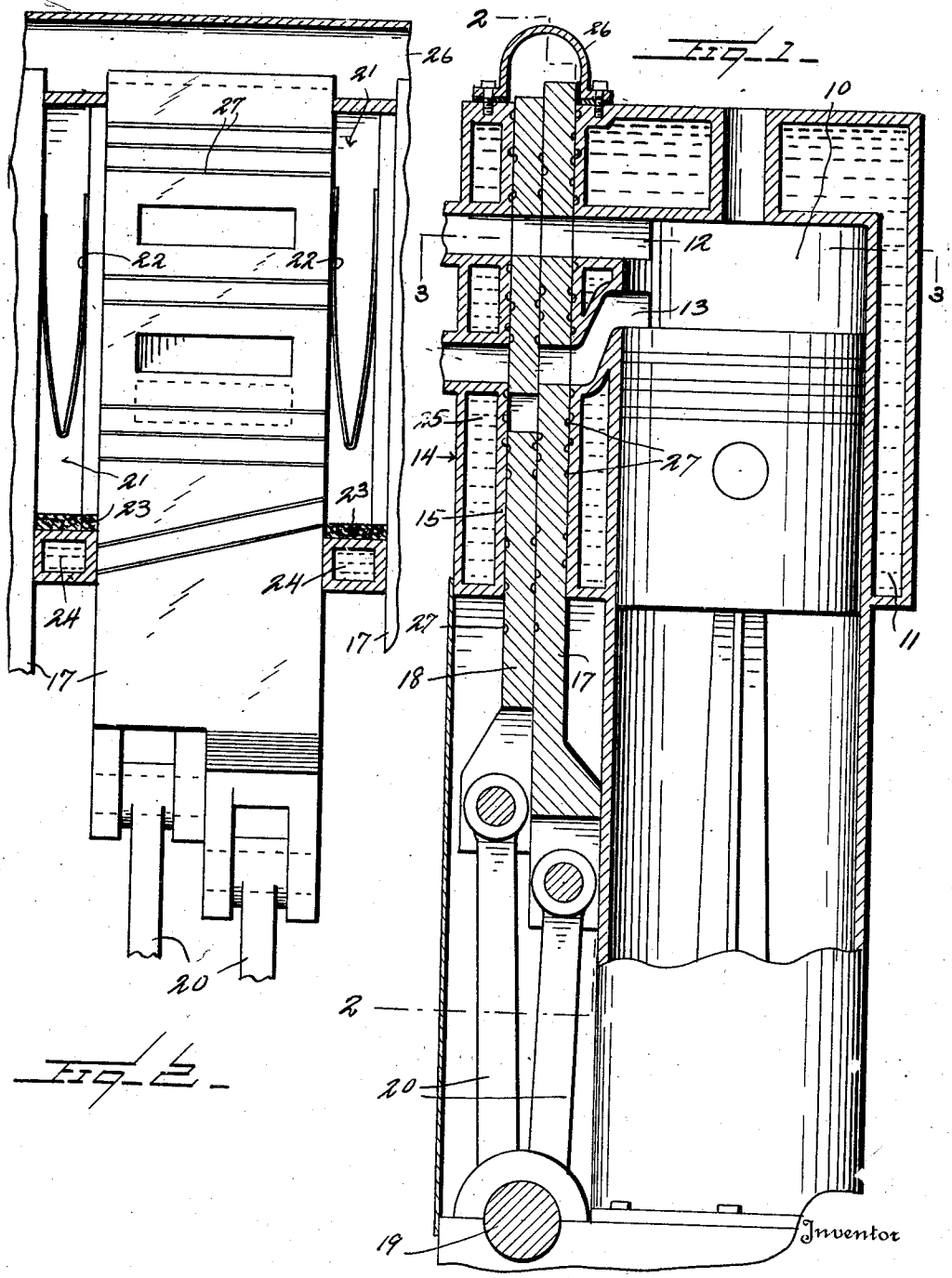
Aug. 11, 1931. G. E. BECKER 1,818,527

SLIDING VALVE FOR INTERNAL COMBUSTION ENGINES

Filed July 18, 1929 2 Sheets-Sheet 1



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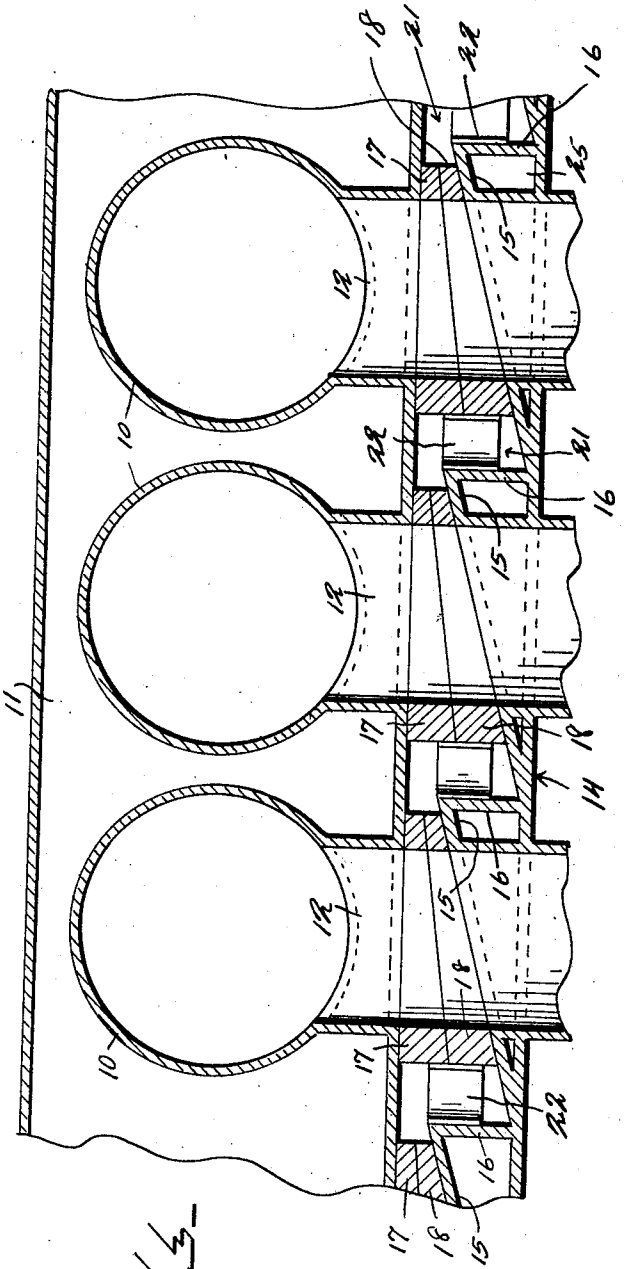


FIG. 3

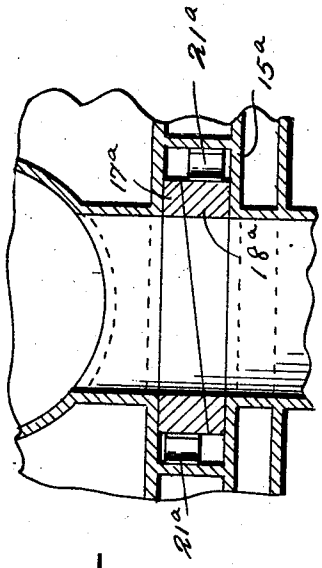


FIG. 4

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UNITED STATES PATENT OFFICE

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SLIDING VALVE FOR INTERNAL COMBUSTION ENGINES

Application filed July 18, 1929. Serial No. 379,267.

This invention relates to internal combustion engines and particularly to those having sliding valves for governing the inlet of fuel to the cylinders and the exhaust of fuel therefrom and the invention particularly relates to that type of engine in which two sliding valves are used, each provided with an exhaust and inlet port, the sliding valves being disposed in pairs and operatively connected to cranks, eccentrics or the like whereby the two valves may be shifted relative to each other to bring their exhaust and inlet ports into coincidence at the proper time.

The general object of the present invention is to provide sliding valves of this character of such form that expansion and wear will be taken care of.

A further object is to provide a construction of this character which will permit the sliding valves to be thoroughly lubricated.

A further object is to form these valves wedge-shaped and provide springs operating to yieldingly urge the valves into the casings in which they operate so that as the valves wear or as they contract, they will be forced further in and in close engagement with each other.

Other objects will appear in the course of the following description.

My invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a vertical section of an engine having the valves constructed in accordance with my invention;

Figure 2 is a fragmentary section on the line 2—2 of Figure 1;

Figure 3 is a cross section on the line 3—3 of Figure 1;

Figure 4 is a section on the line 3—3 of Figure 1 but showing a different form of valve structure; operating on the same principle as the structure shown in Figures 1 to 3.

In these drawings, I have illustrated an ordinary type of engine, but do not wish to be limited thereto. The engine comprises the usual engine block having the cylinders 10 of any desired number, these cylinders being separated by a water jacket 11. Each cylinder is formed with the intake port 12 and the exhaust port 13 which lead through the water jacket and disposed against the face of the engine block is a valve casing 14 which extends downward through the full length of the cylinder and into the crank case. Preferably and as shown in Figure 3, this casing 14 extends across the entire engine block. As illustrated in Figure 3, and as constructed in one form of my invention, the casing 14 is formed with an interior wall 15 opposite each cylinder, this wall 15 being inclined inward, that is, the wall at one end joins the casing 14 and extends inward and then is connected to a wall 16 which extends directly outward and connects with the wall 14 intermediate two cylinders.

Disposed between the wall of the engine block and each inclined wall 15 are the sliding valves 17 and 18 which are wedge-shaped in form so that the valve 17 has a flat face engaging against the wall of the engine block, that is, the wall of the water jacket 11 and an inclined face which bears against the inclined face of the valve 18.

This valve 18 in turn has an inclined face fitting against and at an angle to the inclination of the wall 15. These valves 17 and 18 are reciprocated by any suitable means and I have illustrated for this purpose a cam shaft 19 disposed within the crank case and having connecting rods 20 pivoted to the lower ends of the sliding valves so that these valves are given a differential movement in a manner well-known and not necessarily in a manner to be particularly described.

It will be noted from Figure 3 that the valves 17 and 18 do not extend the full length of the wall 15, but that a space 21 is left between the butt ends of these sliding valves and the adjacent wall 16. In each of these spaces there is disposed a V-shaped spring 22 which bears at one against the wall 16 and at the other end against the corresponding sliding valves so that these springs urge the valves toward the narrow end of the valve space. These V-shaped springs have a width nearly equal to the width of the abutting ends of the valves so

as to bear equally against the latter. A felt packing 23 is disposed at the lower end of this space 21 and below this felt packing 23 there is formed a space 24 connecting with the water jacket 11 by a port, this space in turn communicating with the spaces between the inclined walls 15 and the casing 14 so that the space 25 in front of each pair of sliding valves constitutes a part of the water circulation system. Thus the valves are disposed between the water jackets on the engine block and the water jacket on the valve casing.

While in Figure 3 I have illustrated the valves as being disposed with their larger or butt ends toward the springs and with their narrow ends extending in the same direction, I do not wish to be limited to this as the valves may be reversely disposed as shown in Figure 4, where the butt end of one valve is disposed adjacent the thin end of the other valve. These valves are designated 17*a* and 18*a*. In this case the outer faces of both valves are flat and extend at right angles to a transverse plane cutting through the valves. Under these circumstances the wall 15*a* of the valve casing will be disposed parallel to the face of the cylinder block and not at an angle thereto, as illustrated in Figure 3. Under these circumstances, the springs 21*a* engage the butt ends of each valve of a pair and act to urge the valves in a direction which will cause their expansion against the walls of the valve casing. The valves, whether 17 and 18 or 17*a* and 18*a*, and the faces against which they operate are formed with transversely extending oil grooves 27 extending across the faces of the valves on both sides thereof and above, below and between the ports on the water jacket, and inasmuch as the spaces 21 are filled with oil, it will be obvious that the valves will move in a bath of oil at all times, while at the same time the valves are water-cooled by the water jackets over which the valves operate. The oil which fills the spring spaces is pumped thereto by a small pipe from the engine fan, preferably by the same oil pump (not shown) which furnishes oil for the bearings.

A cap 26 extends over the entire casing and has lateral flanges whereby it is attached to the valve casing by bolts or screws.

I claim:—

1. In an engine, a cylinder having an inlet and an exhaust port, a valve casing extending down parallel to the axis of the cylinder and water jacketed, a pair of reciprocating sliding transversely wedge-shaped valves disposed within said valve casing and narrower than the casing to thereby provide an oil receiving space on each lateral edge of the valve, and each valve having an inlet port and an exhaust port, means for differentially reciprocating said valves, and springs disposed within the oil receiving spaces and bearing against the lateral edges of the valves to thereby urge the valves into wedging engagement with each other and the valve casing, the oil space having means whereby it may be filled with oil and the valve seats having oil grooves extending transversely of the valves and opening upon said oil spaces.

2. In an engine, a plurality of cylinders each having an inlet and an exhaust port, a valve casing extending across the faces of the cylinders, a plurality of pairs of reciprocatable sliding valves, narrower than the valve casing whereby to provide a space laterally of the valves, there being a pair for each cylinder, the valves of each pair having each an exhaust port and an inlet port, means for reciprocating the valves of each pair, said valves being wedge-shaped in cross section, springs disposed within the valve casing laterally of the valves and bearing against the lateral edges of the valves and urging them into wedging engagement with each other and the opposed faces of the cylinders and casing, and means for supplying oil to the interior of the valve casing around said springs, the valves having transverse grooves opening on the lateral edges of the valves to thereby conduct the oil over the faces of the valves.

3. In an engine of the character described, an engine block having a plurality of cylinders, each cylinder having an exhaust port and an inlet port opening upon the face of the block, a valve casing disposed upon the face of the block, a pair of slidable valves for each cylinder and disposed in but narrower than said valve casing, the valves being wedge-shaped in cross section and each valve having an inlet and an exhaust port, a water jacket extending over the valve casing and communicating with the water jacket of the engine block, springs disposed within the valve casing and bearing against the lateral edges ends of the valves and urging the valves into wedging relation to the face of the engine block and the valve casing, and means for maintaining oil within the valve casing, laterally of the lateral edges of the valves, the outer and inner faces of said valves being formed with transversely extending grooves opening into the lateral portions of the valve casing.

In testimony whereof I hereunto affix my signature.

GEORGE E. BECKER.