O. A. MORRIS.

VALVE FOR INTERNAL COMBUSTION ENGINES.

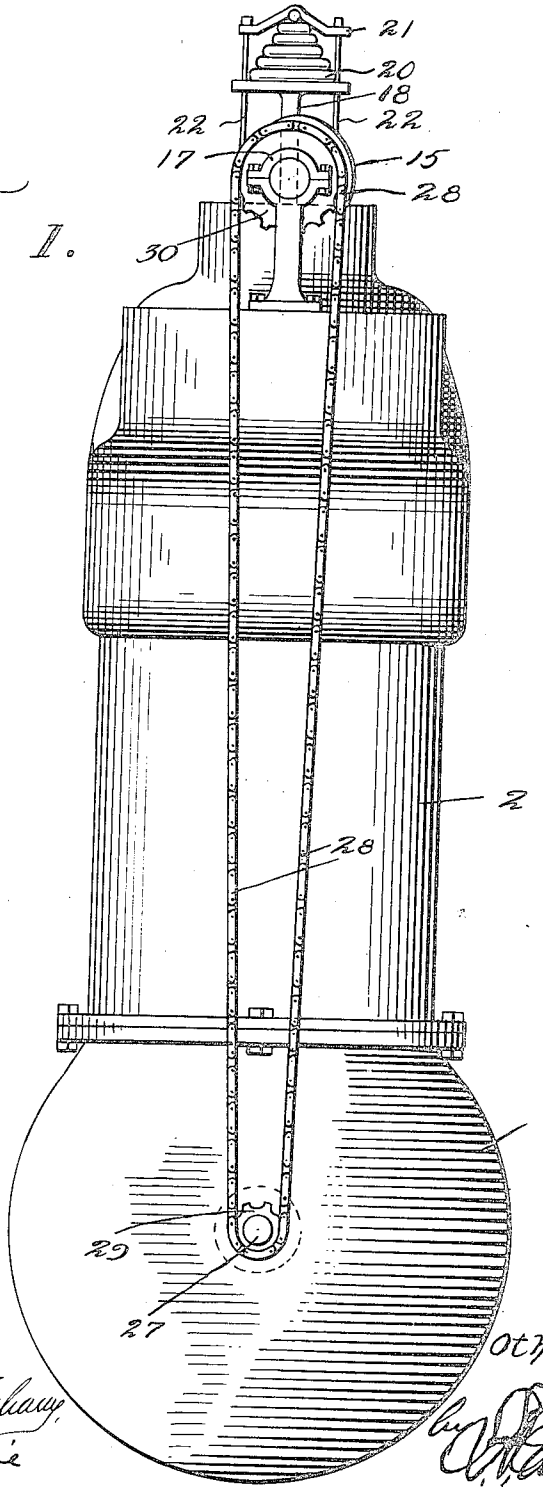
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1,081,689.

Patented Dec. 16, 1913.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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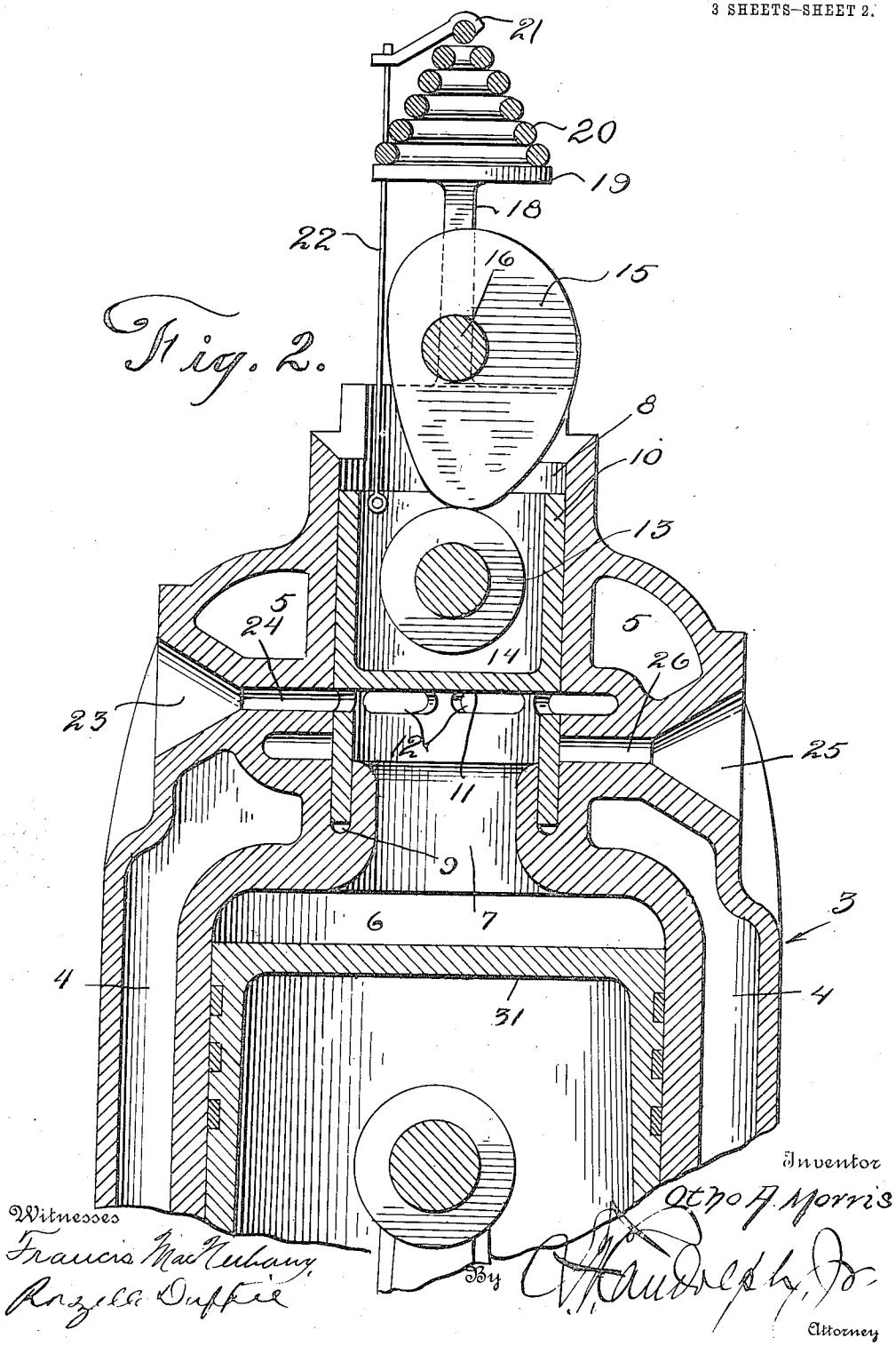
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3 SHEETS—SHEET 2.

Fig. 2.



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3 SHEETS—SHEET 3.

Fig. 3.

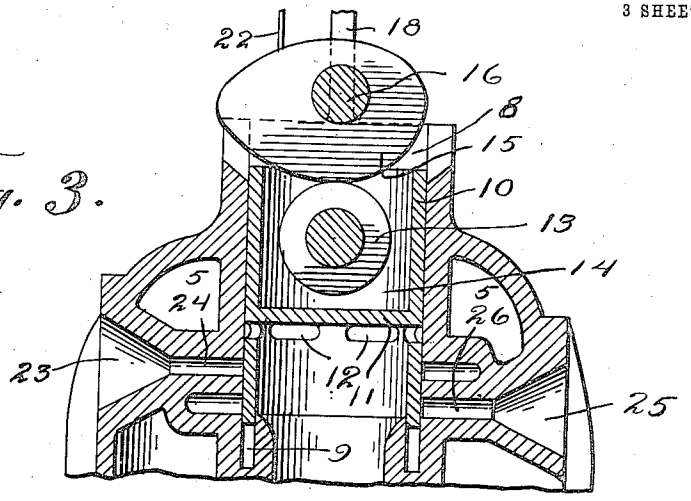
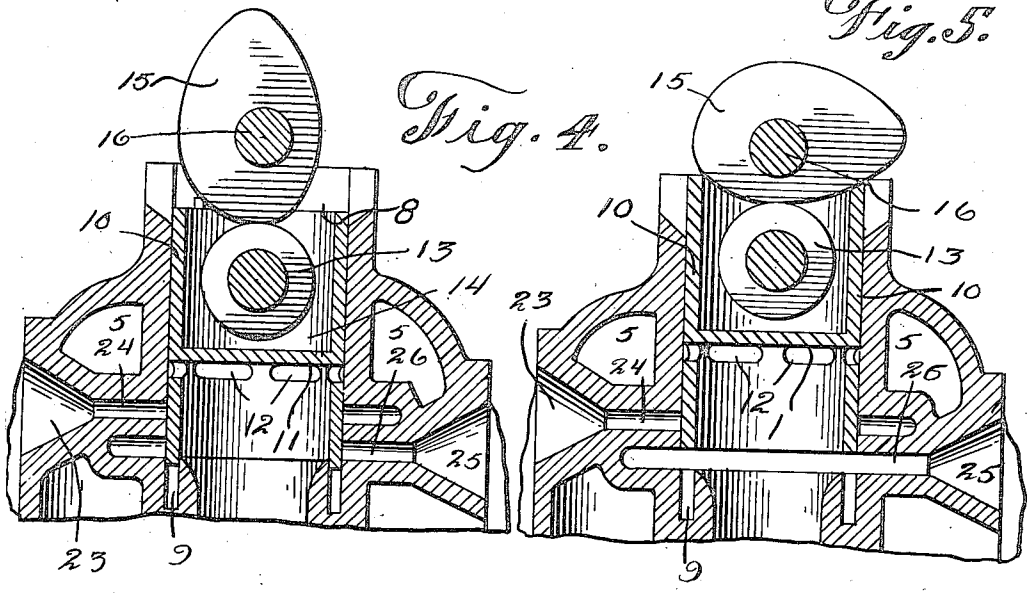


Fig. 5.

Fig. 4.



Witnesses

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UNITED STATES PATENT OFFICE.

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VALVE FOR INTERNAL-COMBUSTION ENGINES.

1,081,689. Specification of Letters Patent. Patented Dec. 16, 1913.

Application filed November 20, 1912. Serial No. 732,582.

To all whom it may concern:

Be it known that I, OTHO A. MORRIS, a citizen of the United States, residing at San Antonio, in the county of Bexar and State of Texas, have invented certain new and useful Improvements in Valves for Internal-Combustion Engines, of which the following is a specification.

This invention comprehends certain new and useful improvements in internal combustion engines and relates more particularly to an improved type of valve for the same.

The primary object of the invention resides in the provision of a novel form of piston sleeve valve, which, instead of being a drain upon the efficiency of the engine as is now the case with the common type of puppet valves, will actually furnish power to the crank shaft.

Another and more specific object of the invention is the provision of a reciprocatory piston sleeve valve, which, during the power and exhaust strokes of the piston, will assist in driving, through the medium of a cam, the crank shaft of an engine.

Another object of the invention is the provision of a valve of this type, so designed that on the intake stroke, fresh cool gases will be drawn around those portions of the cylinder and valve which tend to become overheated, and on the exhaust stroke, the burned gases will tend to warm the walls surrounding the intake.

With these and other objects in view, which will become more apparent as the description proceeds, the invention consists in certain novel features of construction, combination and arrangement of parts, as will be hereinafter fully described and claimed.

For a complete understanding of my invention, reference is to be had to the following description and accompanying drawings, in which,

Figure 1 is a side elevation of an engine embodying my improvements, Fig. 2 is a vertical sectional view, showing the parts as they are arranged at the beginning of the intake stroke of the piston, Figs. 3, 4 and 5 are fragmentary sectional views showing the piston sleeve valve and cam in the positions which they assume at the beginning of the compression, power, and exhaust strokes, respectively.

In the following description and accompanying drawings, similar parts will be referred to and designated by like reference characters.

Referring to the drawings by numerals, 1 designates the crank case and 2 the cylinder casing of an engine embodying my improvements. The casing 2 incloses the cylinder casting 3 which is provided with the cooling passages 4 and 5. The interior of the cylinder casting 3 is provided with the piston chamber 6, which communicates, by means of the reduced passage 7, with the valve chamber 8, said valve chamber being cylindrical and of a diameter greater than the diameter of the passage 7 but smaller than that of the chamber 6. The bottom wall of the valve chamber 8 is formed with the annular recess 9 into which the inner end of the cylindrical piston sleeve valve 10 is adapted to project. The sleeve valve is open at both ends and is divided intermediate its ends by the partition 11 into an upper and lower compartment. The walls of the valve 10 are formed adjacent the under side of the partition 11, with a plurality of elongated openings 12, the purpose of which will be hereinafter explained. A roller 13 is journaled upon the shaft 14 in the upper compartment of the valve sleeve 10 and bears against the somewhat egg-shaped cam 15. This cam is rigidly secured to the cam shaft 16, which extends horizontally across the outer end of the valve chamber 8 and which is supported in the bearings 17 carried upon the upper edge of the casing 2.

A standard 18 is mounted upon the outer edge of the valve chamber 8 and supports a platform 19 upon which is positioned a helical expansive spring 20. The convolutions of the spring 20 gradually decrease in diameter as they extend outwardly and the outermost one supports a yoke 21, to the ends of which are attached the depending connecting rods 22. The lower ends of the rods 22 are connected to the interior of the valve sleeve 10, whereby the roller 13 is always held in contact with the cam 15.

The cylinder casting 3 is provided upon one side with an intake port having a funneled mouth 23 which communicates with the circumferential channel 24; and upon the other side with an exhaust port having the funneled mouth 25, which communicates with the annular channel 26. The channels 24 and 26 extend entirely around the valve

chamber 8 and are positioned intermediate the contracted passage 7 and the outer end of the said chamber. If desired, the exhaust port which is positioned intermediate the intake port and the piston chamber 6, may be made somewhat larger than said intake port in order to permit of the ready escape of the burned gases.

In the operation of my improved valve, the cam shaft 16 is driven at half the speed of the crank shaft 27 through the medium of any suitable gearing, such as the chain 28 and sprocket wheels 29 and 30. As shown in Fig. 2, when the piston 31 is at the beginning of the intake stroke, the valve 10 is in its innermost position, at which time the openings 12 register with the intake channel 24, the cam being in the position shown. The cam 15 is proportioned so as to have a quarter of its periphery corresponding to each stroke of the piston, and is designed so as to produce a quick opening and closing of the intake and exhaust ports. As the piston 31 descends, the cam 15 is slowly revolved so as to allow the expansive spring 20 and connecting rods 22 to lift the piston sleeve valve 10. When the piston reaches the end of the intake stroke and is about to begin the compression stroke, the valve 10 and cam 15 are in the position indicated in Fig. 3, at which time the intake and exhaust ports are closed. It will be noted that the cam has made a quarter of a revolution and that the valve 10 has moved outwardly so as to bring the openings 12 out of registration with the intake channel 24. When the compression stroke of the piston is completed and the charge is about to be fired, the cam and valve have been moved to the positions indicated in Fig. 4. It will be noted that the periphery of the cam is such as to cause a very slight, if any, movement of the valve 10 between the time the ports have been closed at the beginning of the compression stroke and the beginning of the power stroke. At the end of the power stroke, the radius of the cam 15 is such as to permit of a quick outward movement of the valve 10, in order that the exhaust port may be quickly uncovered.

It will be noted that during the various strokes of the cycle, the spring 20 and rods 22 hold the roller 13 always in contact with the periphery of the cam 15. It will be further appreciated that during the power stroke of the piston, the compressed gases act against the partition 11, tending to force the sleeve valve outwardly, whereby the cam 15 is rotated and power transmitted to the crank shaft through the gearing heretofore described. I consider this feature of my invention as being of extreme importance. The fresh cool gases passing in through the intake mouth 23, channel 24, and openings 12 cool the walls surrounding these openings, the inner end of the valve 10, and the walls of the contracted passage 7. It will thus be seen that those parts of the engine which usually becomes overheated, will be maintained at a relatively low temperature. The exhaust gases passing through the contracted passage 7, channel 26, and mouth 25 of the exhaust passage, tend to heat the walls surrounding these parts and counter-balance the effect of the cool incoming gases. My design thus produces an ideal condition, whereby the incoming gases are heated and the exhaust gases employed to so warm certain parts of the engine as to properly heat the fresh gases.

While I have shown and described the preferred embodiment of my invention, I do not wish to be limited to this exact construction and arrangement of parts, but may make such changes as will fall within the scope and spirit of the invention.

Having thus described my invention what I claim is:—

1. In an internal combustion engine, a working cylinder having an opening formed in the head thereof, a valve chamber formed around said opening, said valve chamber being formed with intake and exhaust ports, a piston sleeve valve slidable within the valve chamber to open and close the ports, the piston sleeve valve being formed with a diaphragm against which the exploded gases act to drive the valve outwardly and open the exhaust port, and means for forcing the valve inwardly.

2. In an internal combustion engine having a cylinder formed with an opening in the head thereof, a valve chamber surrounding said opening, the valve chamber being formed with intake and exhaust ports, a sleeve valve slidable within the valve chamber to open and close the ports, a diaphragm formed within the valve against which the exploded gases act to force the valve outwardly and open the exhaust port, a roller journaled within the sleeve valve adjacent its outer end, a cam positively driven from the crank shaft of the engine and means for holding the roller in engagement with the periphery of the cam, the outward movement of the valve caused by the explosion of the gases serving to rotate the cam.

3. In an internal combustion engine, a working cylinder having an opening formed in the head thereof, a valve chamber surrounding the opening, the valve chamber being in the form of a cylindrical casing open at each end and formed intermediate its ends with intake and exhaust ports, a sleeve valve slidable within the valve chamber to open and close the ports, said valve being formed with a diaphragm which divides it into inner and outer compartments, a roller journaled within the outer compartment, a

cam shaft extending across the outer end of the valve chamber, means for positively driving the cam shaft from the crank shaft of the engine, a cam rigid with the cam shaft and means for holding the roller in engagement with the periphery of the cam, the outward movement of the valve due to the force of the exploded gases causing the cam to be partially rotated whereby power is imparted to the crank shaft.

In testimony whereof I affix my signature in presence of two witnesses.

OTHO A. MORRIS.

Witnesses:
FREDERICK SCHOFIELD,
CHAS. M. DICKSON.