

M. A. TIPS.
ROTARY VALVE.
APPLICATION FILED JAN. 19, 1918.

Patented Nov. 26, 1918.
3 SHEETS—SHEET 1.

1,286,149.

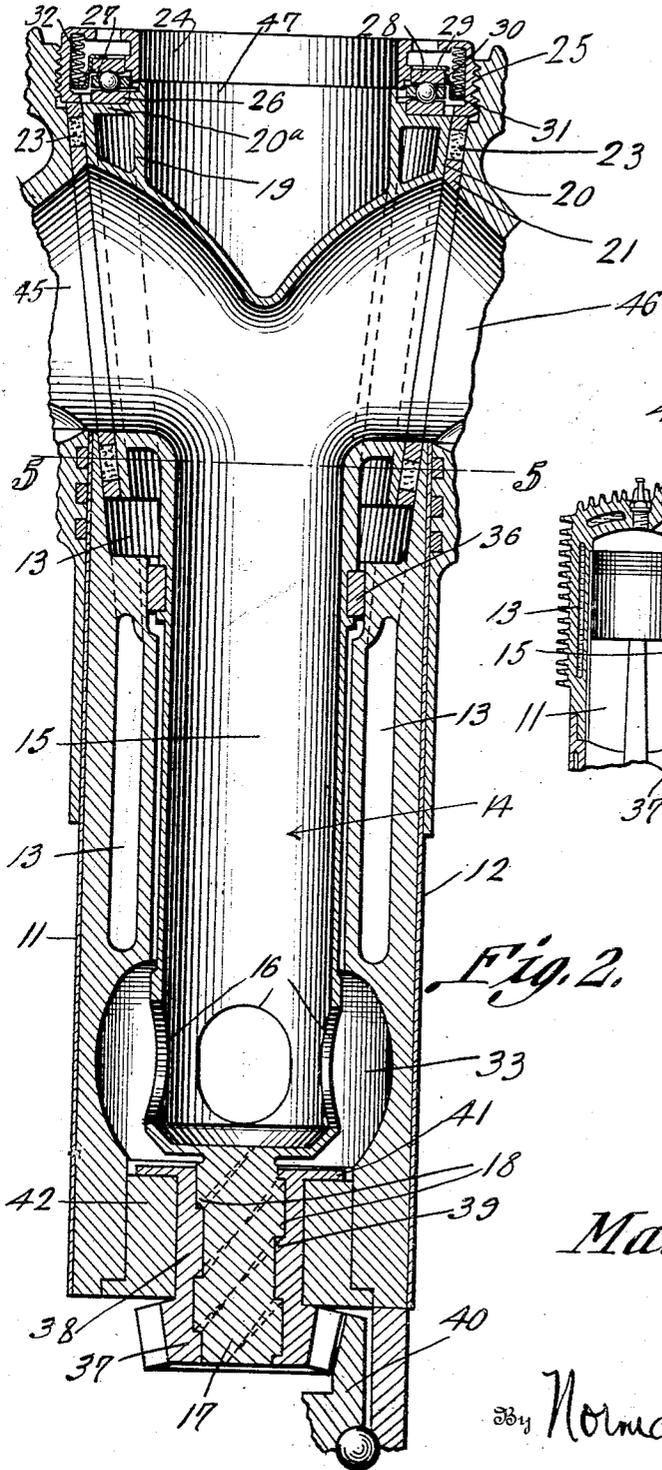


Fig. 2.

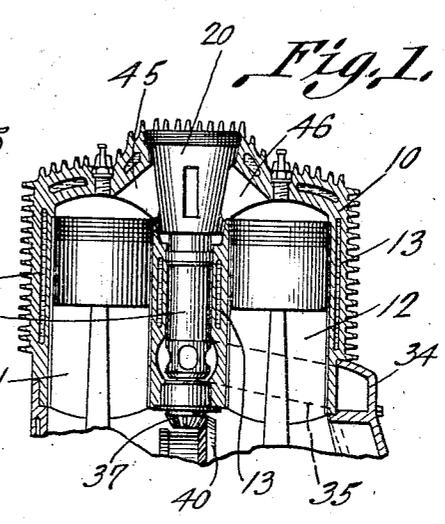


Fig. 1.

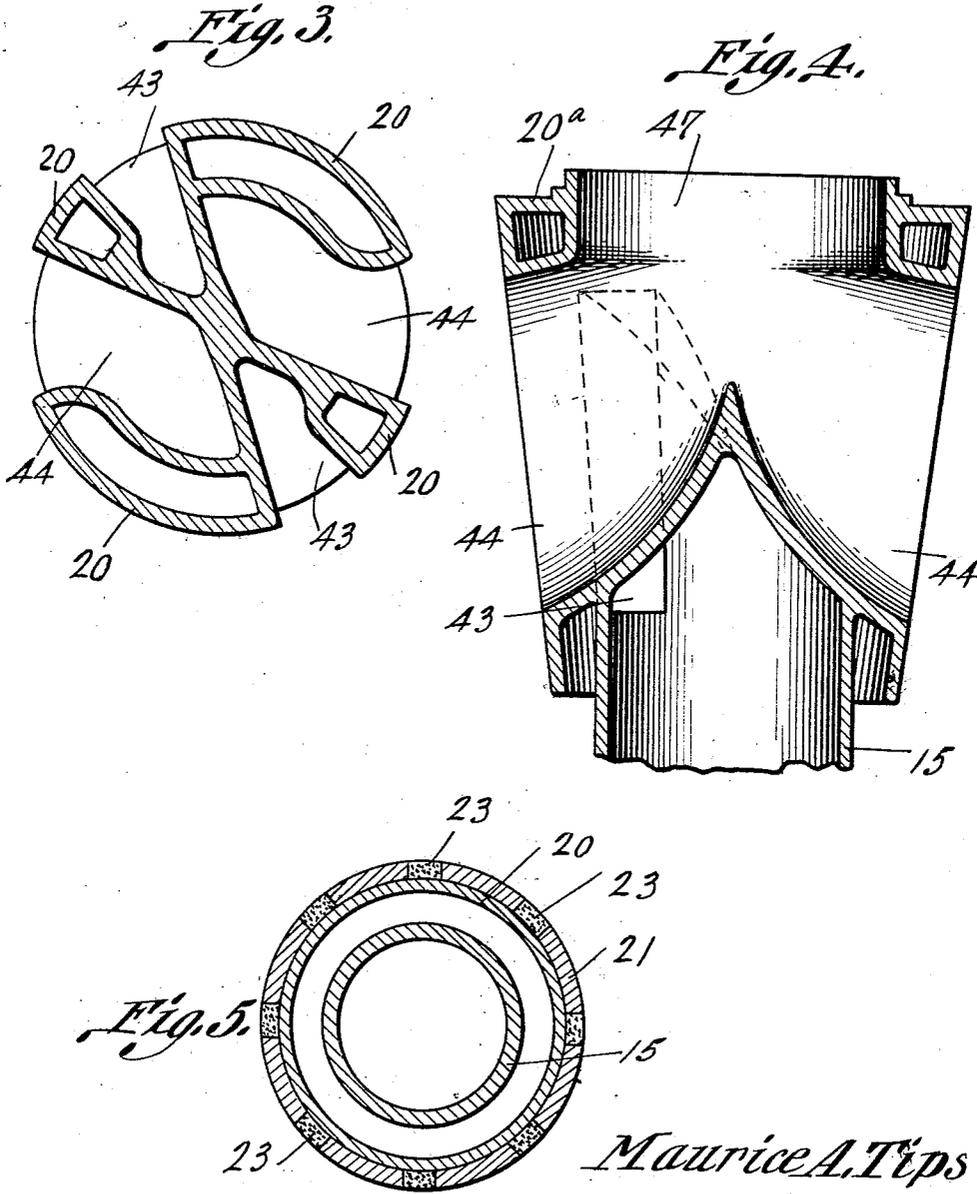
Maurice A. Tips
Inventor

By *Norman J. Whitaker*
his Attorney.

M. A. TIPS.
ROTARY VALVE.
APPLICATION FILED JAN. 19, 1918.

1,286,149.

Patented Nov. 26, 1918.
3 SHEETS—SHEET 2.



Maurice A. Tips
Inventor

By *Norman J. Whitaker*
his Attorney

UNITED STATES PATENT OFFICE.

MAURICE A. TIPS, OF WOONSOCKET, RHODE ISLAND, ASSIGNOR TO TIPS AERO MOTOR COMPANY, INC., OF WOONSOCKET, RHODE ISLAND, A CORPORATION OF RHODE ISLAND.

ROTARY VALVE.

1,286,149.

Specification of Letters Patent. Patented Nov. 26, 1918.

Original application filed October 11, 1917, Serial No. 195,000. Divided and this application filed January 19, 1918. Serial No. 212,798.

To all whom it may concern:

Be it known that I, MAURICE A. TIPS, a subject of the King of Belgium, and a resident of Woonsocket, in the county of Providence and State of Rhode Island, have invented new and useful Improvements in Rotary Valves, of which the following is a specification.

My invention relates to rotary valves and has particular reference to that class of valves adapted for use in connection with internal combustion engines of the rotating cylinder type although not restricted to such use.

An important object of the invention is to provide in a valve of the above mentioned character a means whereby the valve as a whole may be efficiently cooled at all times regardless of the varying conditions under which it will be required to operate.

A further object of the invention is to provide in a valve of the above mentioned character a means whereby what is commonly known as "sticking" of the valve as a result of expansion during its period of actuation will be entirely eliminated.

Another object of the invention is to provide in a valve of the above mentioned character a wear compensating means whereby a perfect seating of the valve may be maintained at all times.

A further object of the invention is to provide in a valve of the above mentioned character a means whereby sufficiently large intake and exhaust ports may be employed to obtain the highest possible efficiency from an engine with which the valve is particularly adapted to be used.

A further object is to provide a valve of the above mentioned character so constructed as to permit the valve to be readily placed into or removed from operating position.

Other objects and advantages of the invention will be apparent from the following description.

This application is a division of my application filed October 11, 1917, for internal

combustion engine, Serial Number 195,898.

In the accompanying drawings forming a part of this specification and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a fragmental transverse sectional view of an engine embodying the preferred form of my invention,

Fig. 2 is a vertical central sectional view of a valve,

Fig. 3 is a horizontal sectional view of Fig. 4,

Fig. 4 is a fragmental longitudinal sectional view of a valve,

Fig. 5 is a horizontal sectional view of Fig. 2 taken on line 5-5,

Fig. 6 is a fragmental transverse sectional view of an engine embodying a modified form of my invention, and,

Fig. 7 is a vertical central sectional view of a valve embodying a modified form of my invention.

In the drawings, attention being called to Figs. 1 to 5 inclusive wherein is shown a preferred form of my invention, the numeral 10 indicates a cylinder block or casting of the rotating type provided with a plurality of cylinders arranged in pairs, a pair of which are shown in Fig. 1 and indicated by the numerals 11 and 12. The cylinder block or casting 10 is provided with suitable water spaces 13 surrounding each of the cylinders, as shown, for the purpose of insuring perfect cooling of the same. Between each pair of cylinders there is arranged a rotary valve indicated as a whole by the numeral 14. This valve comprises an elongated hollow portion 15, one end of which is provided with a plurality of openings 16 and carries a stem 17 preferably formed integral therewith and provided with screw-threads indicated by the numerals 18. The upper portion of the valve 14 is slightly tapered as shown at 19, this tapered portion being provided with a water jacket 20 having communication with the water space 13 carried by the cylinder block or casting 10. The water jacket 20 is adapted

ed to seat upon a tapered sleeve 21 suitably secured within the cylinder block or casting 10. For the purpose of insuring self lubrication to the valve during its period of actuation a plurality of graphite spots 23 are provided which are carried within the sleeve 21.

A flanged ring 24 is carried by the cylinder block or casting 10 and is retained in engagement therewith by means of screw-threads as shown at 25. This ring is adapted to be run down into engagement with the sleeve 21 in order to retain the same in position within the cylinder block or casting 10. Upon the upper portion 20^a of the water jacket 20 there is disposed a wear ring 26 adapted to receive thereupon a ball-thrust bearing 27 which in turn is adapted to receive a second wear ring 28 upon which is disposed a compression ring 29 having a depending flange 30. This depending flange 30 at its lower edge is turned slightly outwardly as shown at 31 and the outwardly turned portion is adapted to receive thereupon a plurality of compressible springs 32 having engagement at one end thereof with the flanged ring 24 as shown.

It will be noted that a gas chamber 33 is provided within the cylinder block or casting 10, the same being connected to a manifold 34 by a suitable passage 35 provided within the cylinder block or casting 10. In order to prevent a communication between the water space 13 and the gas chamber 33 there is provided a suitable packing 36 carried by the elongated portion 15 of the valve 14.

A bevel gear 37 having an elongated sleeve 38 provided with internal screw-threads 39 adapted to engage the screw-threads 18 is loosely mounted upon the stem 17 and adapted for engagement with a master driving gear 40 actuated by the crank shaft, not shown, of an internal combustion engine. The sleeve 38 is provided at one end thereof with an annular flange 41 as shown and is adapted to rotate within a journal 42 carried within the cylinder block or casting 10. This journal or bearing is preferably formed of two semi-circular halves which are placed upon the sleeve 38 in order to permit the sleeve 38, carrying the bevel gear 37, to be readily placed in the position clearly shown in Figs. 1 and 2.

The upper or enlarged end of the valve 14 is provided with diametrically opposed openings 43—43 and 44—44, the openings 43—43 having communication with elongated portion 15 of the valve and serve to direct the explosive charge into the cylinders 11 and 12 through the openings or ports 45 and 46 respectively, while the openings 44—44 open directly into the opened end 47 of the valve and serve to direct the spent

gases from the cylinders 11 and 12 directly into the atmosphere through the openings or ports 45 and 46 respectively.

In considering Figs. 6 and 7 wherein is shown a modified form of my invention it is to be understood that the several elements employed therein and designated by like numerals to those used in describing Figs. 1 to 5 inclusive have not been materially altered or changed from the structure shown in the preferred form of my invention which has been hereinbefore described. It will be noted however, that the elements 24, 26, 27, 28, 29, 30, 31 and 32 of the preferred embodiment of my invention have been slightly modified and rearranged. It will be noted that the flanged ring 24 has been dispensed with and an annular screw-threaded ring 24' has been substituted therefor, which ring is provided upon its periphery with screw-threads having engagement with the cylinder block or casting 10 as shown at 25'. In this instance the annular ring 24' serves only as a means for retaining the tapered sleeve 21 in position within the cylinder block or casting 10 as shown. Upon the elongated hollow portion 15 of the valve there is formed a flange 48 which is encircled by a screw-threaded sleeve 49 having screw-thread engagement with the cylinder block or casting 10 as shown at 50. This screw-threaded sleeve is provided with a substantially deep depression or groove 51 carrying therein a coil spring 52, the lower end of which is maintained in engagement with an annular ring 53 positioned upon a plurality of ball-bearings 54 imposed upon an annular ring 55 carried by a screw-threaded ring 56 maintained in screw-thread engagement with the elongated hollow portion 15 of the valve as shown at 57. It will be noted that a cavity 58 is formed between the elongated hollow portion 15 of the valve and the screw-threaded sleeve 49. This cavity is adapted to receive therein a suitable packing indicated by the numeral 59, which packing is retained therein by means of a beveled face annular ring 60, which ring is retained in position by means of a coil spring 61 imposed upon a shoulder 62 carried by the elongated hollow portion 15 of the valve as shown. It will be readily understood that the beveled face annular ring 60 together with the spring 61 having engagement therewith serves as a means for not only retaining the packing 59 within the cavity 58 but also as a means for maintaining it in a compressed condition. Between the screw-threaded sleeve 49 and the cylinder block or casting 10 there is interposed a suitable packing ring 63, which packing ring together with the packing 59 serves to prevent communication between the water space 13 and the gas chamber 33.

In use, the operation of the device is as follows: On the intake stroke the valve 14 will be moved to such a position as will bring the openings 43—43 into registration with the ports 45 and 46 whereupon the gaseous mixture will enter the gas chamber 33 from the manifold 34 through the passage 35, passing into the elongated portion 15 of the valve through the opening 16, whereupon it will be directed into the cylinders 11 and 12 from the valve through the openings 45 and 46 respectively. At the completion of the intake stroke the openings 43—43 will be moved out of registration with the openings 45 and 46, and these openings, 45 and 46, will remain closed during the compression and working strokes, but at the completion of the working stroke the openings 44—44 will be brought into registration with the ports 45 and 46 whereupon the spent gases will be directed from the cylinders 11 and 12 through the openings 44—44 into the opening 47 and thence directly into the atmosphere. Should the valve 14, due to the heat created by the explosion of the gaseous mixture within the cylinders become expanded, which expansion would tend to produce a sticking of the valve 14, the valve in its entirety would be slightly lifted due to the cam action of the threads 39, carried by the sleeve 38, upon the threads 18 carried by the stem 17. This cam action, it is to be understood, is produced during the actuation of the valve and as a result of the engagement between the bevel gear 37 and the master driving gear 40.

From the foregoing description of the modified form of my invention taken in connection with the disclosure thereof it is apparent that the operation of the valve as a whole is substantially the same as that of the preferred form of my invention, which operation may be readily understood when considering the hereinbefore described structure of the same together with the hereinbefore described operation of the preferred form of my invention.

It is to be understood that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described my invention, what I claim as new and desire to secure and protect by Letters Patent of the United States, is:

1. In a valve for internal combustion engines, the combination with a plurality of engine cylinders adapted for simultaneous cycle function, a distributing valve member adapted to rotate between the cylinders and carrying a set of symmetrically disposed inlet ports and a set of symmetrically disposed exhaust ports, each set of ports being adapted

to simultaneously register with ports in the walls of the cylinders, yielding means adapted to force said tapered member in the direction of its axis, and driving means for said tapered member whereby the same is lifted against said yielding means when the free rotation of the rotary member is prevented.

2. In a valve for internal combustion engines, the combination with a plurality of engine cylinders adapted for simultaneous cycle function, a distributing valve member adapted to rotate between the cylinders and carrying a set of symmetrically disposed inlet ports and a set of symmetrically disposed exhaust ports, each set of ports being adapted to simultaneously register with ports in the walls of the cylinders, resilient means adapted to force said tapered member in the direction of its axis, and driving means for said tapered member comprising a screw-threaded projection on the end of said tapered member and a gear mounted on said screw-threaded projection, said screw-thread being adapted to lift the tapered valve member against the yielding means when the free rotation of the rotary member is prevented.

3. In a valve for a prime mover, the combination with a pair of engine cylinders adapted for simultaneous cycle function and having a gas chamber arranged therebetween, of a distributing valve adapted to rotate between the cylinders, said valve comprising a hollow portion communicating with the gas chamber, a tapered portion communicating with the hollow portion and carrying a set of symmetrically disposed inlet ports and a set of symmetrically disposed exhaust ports, the intake ports being adapted to simultaneously register with ports carried by the cylinder to communicate the gas chamber and cylinders, the exhaust ports being adapted to simultaneously register with the ports carried by the cylinders to direct exhaust gases from the same directly into the atmosphere, yielding means adapted to force said tapered portion in the direction of its axis, and driving means for said tapered portion whereby the same is lifted against the yielding means when the free rotation of the tapered portion is prevented.

4. In a valve for a prime mover, the combination with a pair of engine cylinders adapted for simultaneous cycle function and having a gas chamber arranged therebetween, each of said cylinders being surrounded by a water space, of a distributing valve adapted to rotate between the cylinders, said valve comprising a hollow portion communicating with the gas chamber, a tapered portion communicating with the hollow portion and carrying a set of symmetrically disposed inlet ports and a set

of symmetrically disposed exhaust ports, the intake ports being adapted to simultaneously register with ports carried by the cylinders to communicate the gas chamber and cylinders, the exhaust ports being adapted to simultaneously register with the ports carried by the cylinders to direct exhaust gases from the same directly into the atmosphere, a casing carried by the tapered portion and spaced therefrom, the space afforded between the tapered portion and the casing being in communication with the water space surrounding said cylinders.

5. In a valve for internal combustion engines, the combination with a plurality of engine cylinders adapted for simultaneous cycle function of a distributing valve member adapted to rotate between the cylinders and carrying a set of symmetrically disposed inlet ports, each set of ports being adapted to simultaneously register with ports in the walls of the cylinders, a water jacket provided by and surrounding said distributing valve member, resilient means adapted to force said valve member in the direction of its axis, and driving means for said valve member whereby the same is lifted against said resilient means when the free rotation of the valve member is prevented.

6. In a valve for a prime mover, the combination with a plurality of engine cylinders having a water space arranged therebetween, of a rotary distributing valve, said valve comprising a tapered member carrying a set of symmetrically disposed exhaust ports and a set of symmetrically disposed inlet ports, each set of ports being adapted to simultaneously register with ports in the walls of the cylinders, a casing carried by said tapered member and spaced therefrom, the casing being secured at one end to the tapered member and disengaged therefrom at its other end to establish direct communication between the water space and the space afforded between the tapered member and the casing.

7. In a valve for a prime mover, the combination with a plurality of engine cylinders having a water space arranged therebetween, of a rotary distributing valve, said valve comprising a tapered member carrying a set of symmetrically disposed exhaust ports and a set of symmetrically disposed inlet ports, each set of ports being adapted to simultaneously register with ports in the walls of the cylinders, a casing carried by said tapered member and spaced therefrom, the casing being secured at one end to the tapered member and disengaged therefrom at its other end to establish direct communication between the water space and the space afforded between the tapered member and the casing, resilient means adapted to force said tapered member in the direction

of its axis, and means for rotating said tapered member whereby the same is lifted against the yielding means when the free rotation of the tapered member is prevented.

8. In a valve for a prime mover, the combination with a pair of engine cylinders adapted for simultaneous cycle function and having a gas chamber arranged therebetween, of a distributing valve adapted to rotate between the cylinders, said valve comprising a hollow portion, a tapered portion communicating with the hollow portion and carrying a set of symmetrically disposed inlet ports and a set of symmetrically disposed exhaust ports, the intake ports being adapted to simultaneously register with ports carried by the cylinders to communicate the gas chamber and cylinders, the exhaust ports being adapted to simultaneously register with the ports carried by the cylinders to direct exhaust gases from the same, yielding means interposed between said gas chamber and said tapered member said yielding means being adapted to force said tapered member and hollow portion in the direction of an axis common to both the tapered member and hollow portion, and driving means for said tapered member and hollow portion whereby said tapered member is lifted against said yielding means when the free rotation of the tapered member is prevented.

9. In a valve for a prime mover, the combination with a pair of engine cylinders having a gas chamber and a water space arranged therebetween, of a rotary distributing valve, said valve comprising a hollow portion having one end arranged within the water space and its other end arranged within the gas chamber and communicating therewith, the hollow portion being adapted to contact with the water confined within the water space, packing means surrounding said hollow portion to prevent communication between the water space and gas chamber, yielding means adapted to force the hollow portion in the direction of its axis, and yielding means whereby said valve is lifted against said yielding means when the free rotation of the valve is prevented.

10. In a valve for a prime mover, the combination with a pair of engine cylinders having a gas chamber and a water space arranged therebetween, of a rotary distributing valve, said valve comprising a hollow portion having one end arranged within the water space and its other end arranged within the gas chamber and communicating therewith, the hollow portion being adapted to contact with the water confined within the water space, packing means surrounding said hollow portion to prevent communication between the water space and gas chamber, a tapered portion communicating with the hollow portion and carrying a set

of symmetrically disposed inlet ports and a set of symmetrically disposed exhaust ports, the intake ports being adapted to simultaneously register with ports carried by the cylinders to communicate the gas chambers and cylinders, the exhaust ports being adapted to simultaneously register with the ports carried by the cylinders to direct exhaust gases from the same directly into the atmosphere, yielding means adapted to force the valve in the direction of its axis, and driving means whereby said valve is lifted against said yielding means when the free rotation of the valve is prevented.

MAURICE A. TIPS.