Oct. 20, 1931. J. F. BLESER 1,828,353

INTERNAL COMBUSTION MOTOR

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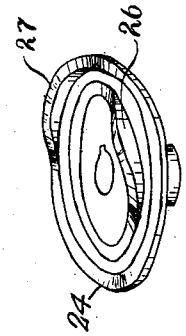

FIG 6

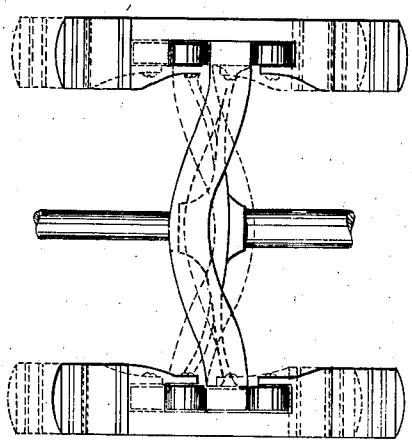

FIG 5

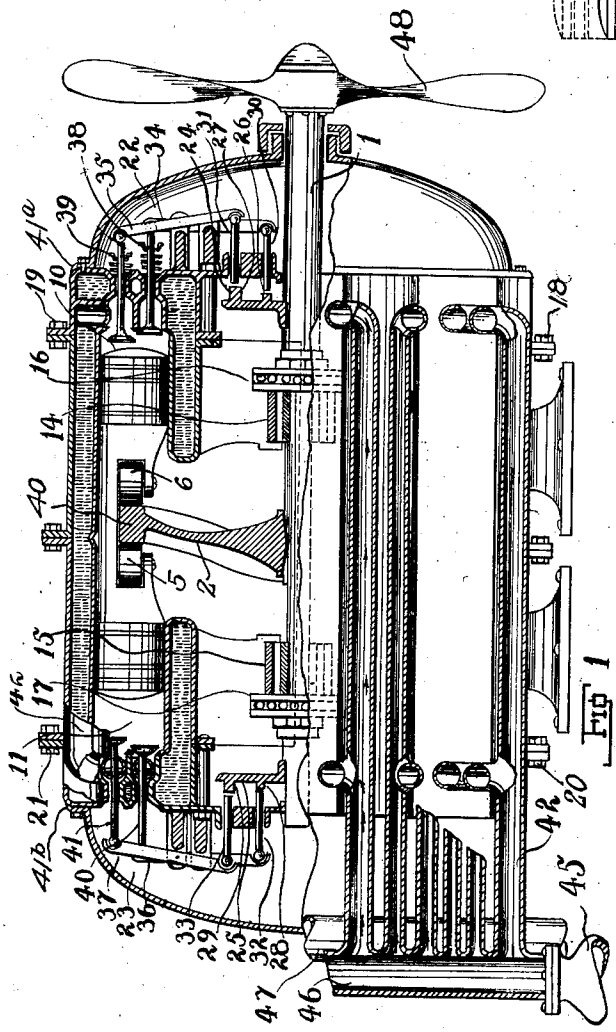

FIG 1

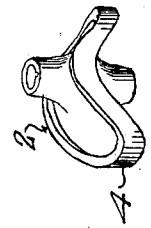

FIG 7

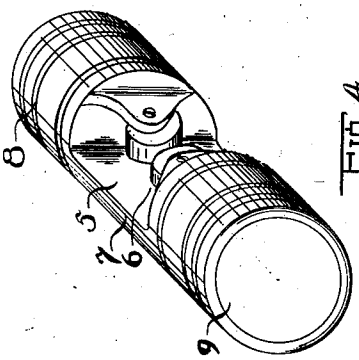

FIG 4

Joseph F. Bleser
INVENTOR.
BY: A. B. McCall.
ATTORNEY

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Fig. 3

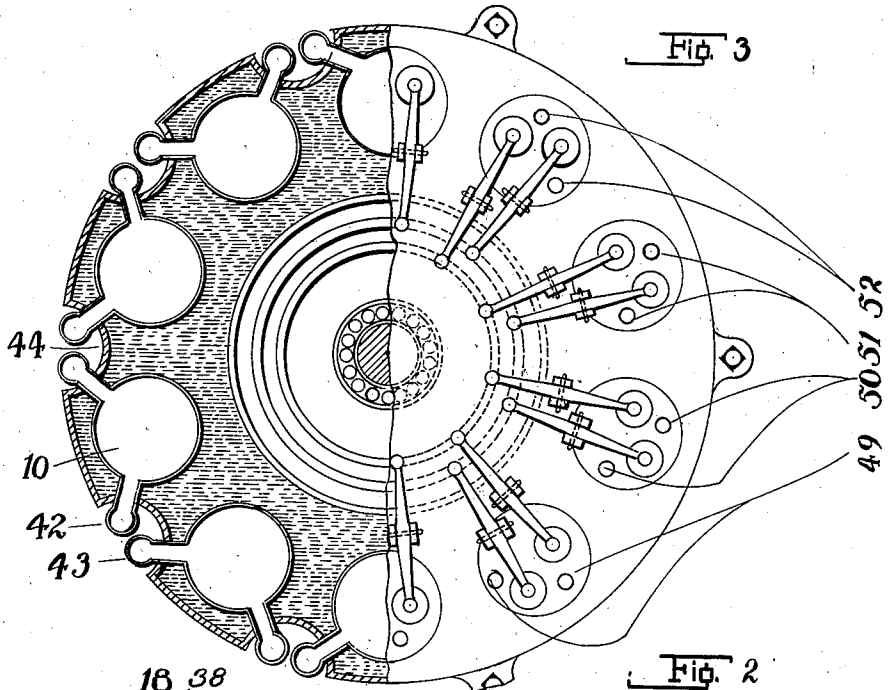
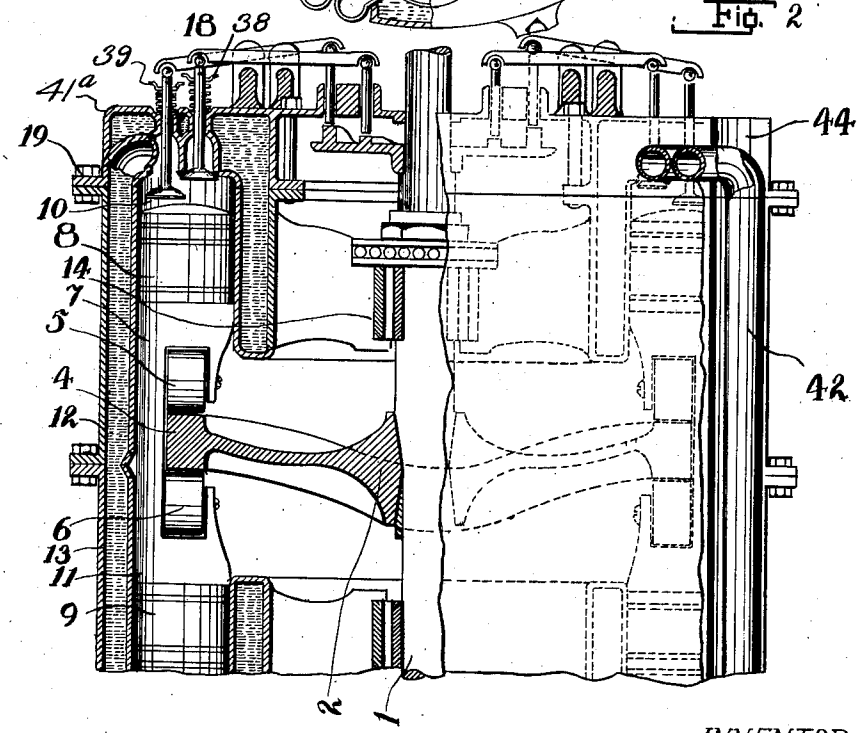


Fig. 2



INVENTOR:
Joseph F. Bleser
BY: A. B. McCall
ATTORNEY.

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INTERNAL COMBUSTION MOTOR

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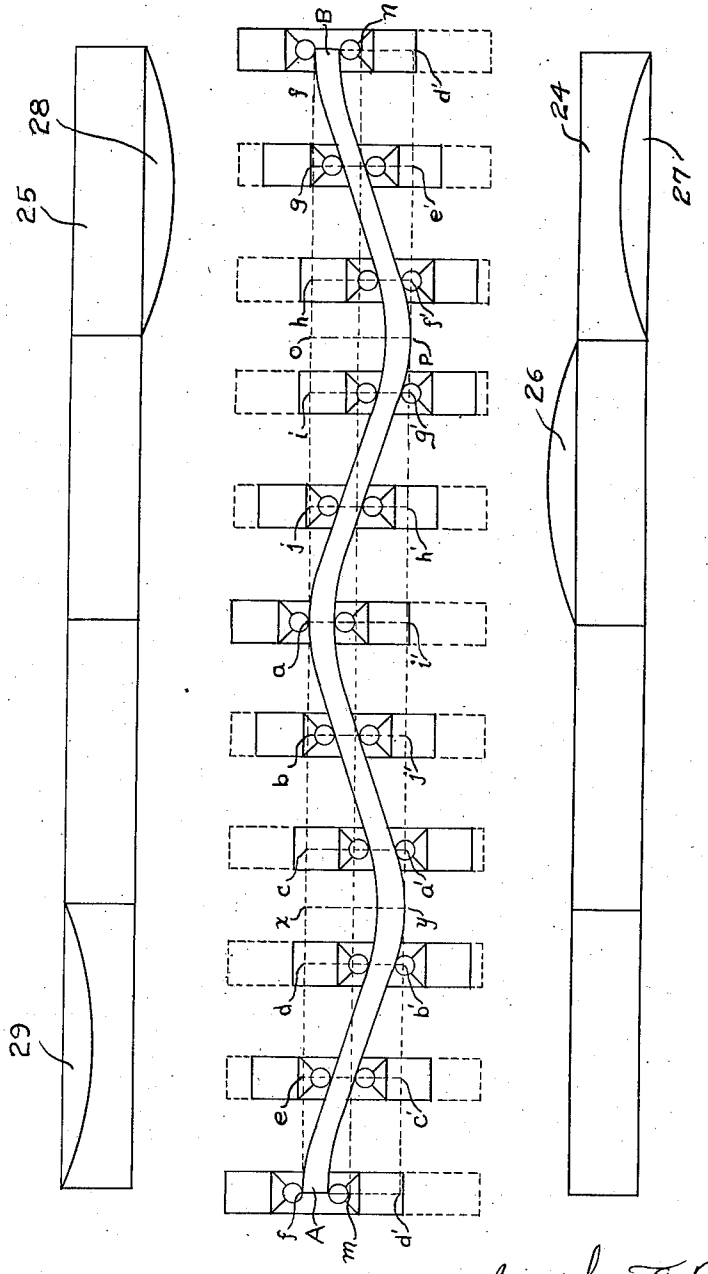

FIG. 8.

Joseph F. Bleser
INVENTOR.

BY: A. B. McCall
ATTORNEYS.

Patented Oct. 20, 1931 1,828,353

UNITED STATES PATENT OFFICE

JOSEPH F. BLESER, OF SPRINGFIELD, ILLINOIS

INTERNAL COMBUSTION MOTOR

Application filed October 20, 1928. Serial No. 313,901.

My invention relates to motors of a class adapted to be used for turning drive shafts and the like; an object being in the motor particularly to drive airplane propeller shafts with a minimum of motor head wind resistance.

A further object of my invention is to provide a motor having a maximum of power in a minimum of space occupied thereby.

A further object of my invention is to provide a motor that can be installed in a relatively small space and be operatively connected with generators, machines, vehicles and other driven mechanism such as may be adapted to motor driven control in addition to its use as an airplane or automobile or boat driving motor where a maximum of power with a minimum of motor weight may be a great advantage.

I attain the objects of my invention in the device described in the annexed specification, recited in the claims, and illustrated in the accompanying drawings in which like reference numerals indicate like parts in the several figures.,

Referring to the figures:

Fig. 1 is a side elevation of my motor with details of the structural arrangement shown in a longitudinal half section as a cut-away exposes the same to view.

Fig. 2 is an enlarged detail of one end of my motor showing in a cut-away a more complete disclosure of the structure thereof.

Fig. 3 is an end view of my motor disclosing in a cut-away a cross section of the cylinders and water jacket and the relative position of the intake and exhaust pipes communicating with the cylinders; while in the portion not in cut-away there is disclosed to view the valve tappets and rocker arms and valve control cams through which the explosions in the cylinders are timed and controlled.

Fig. 4 is a detailed perspective of one of the double headed pistons in my motor.

Fig. 5 is a detail of the cam wheel adapted to be controllably connected with the pistons in my motor in a manner shown in this section to be adapted to rotate the shafts on which the cam is mounted by the reciprocal movements of the pistons in a direction parallel with the shaft in their respective cylinders of the motor.

Fig. 6 is a perspective of the cam plate adapted to control the movements of the valve tappets of my motor.

Fig. 7 is a perspective of the cam wheel of my invention adapted to be controllably connected with the pistons of my motor.

Fig. 8 is a chart illustrating the cam movement of the cam wheel controlled by the double headed pistons in my motor.

Referring in detail to the structure of my motor and the preferred method of operating the same I provide securely mounted on a shaft —1— a cam wheel —2— adapted to be rotated with the shaft through the reciprocal action thereon of a number of double headed pistons uniformly spaced apart, parallel with and equi-distant from, the central shaft supporting the cam wheel.

The rim —4— of cam wheel —2— rotates between rollers —5— and —6— of double headed pistons —7— each having oppositely disposed piston heads —8— and —9— adapted to move by reciprocal movement in a direction parallel with shaft —1—.

These double headed pistons are operatively mounted within cylinders in my motor which are parallel with the shaft, arranged in pairs each member of which is oppositely disposed in longitudinal alignment with the other. These pairs of aligned cylinders are cylindrically disposed about the shaft so as to make the pistons operating therein move in parallel alignment with the shaft when they are in normal operation.

In my motor I provide a plurality of these pistons each controllably and operatively connected with the cam wheel —2— through the contact of rollers —5— and —6— of the pistons with cam rim —4—.

My motor is preferably water cooled and for this arrangement I provide for each cylinder to be surrounded with water in water jacket —12—.

My motor is so designed as to have the general shape of a cylinder inclosing the combustion cylinders and double headed pistons therein about the cylinder wall in a manner

causing the double headed pistons to move in reciprocal action in parallel alignment with the shaft to be driven thereby through the action of these pistons on the cam rim —4— of cam wheel —2— mounted on the shaft.

The motor block —13— is preferably made in sections to be easily assembled and adapted to be substantially secured to the structure within which or on which it is adapted to operate.

Shaft —1— is rotatably mounted within the longitudinal center of my motor block with cam wheel —2— rigidly secured thereto and with shaft —1— rotating in bearings —14— and —15— with the aid of thrust bearings —16— and —17— adapted to hold the shaft —1— in its proper relative longitudinal position with respect to the motor.

The design of my motor makes it essential that its opposite ends forming cylinder heads be detachable to provide access to the combustion chambers operatively supporting the double headed pistons.

These cylinder heads are secured in their operative position by bolts such as —18— and —19— at one end; —20— and —21— at the other.

Hoods —22— and —23— are provided at the respective ends of the motor for protection of the valve tappets, rocker arms, etc.

Cam plates —24— and —25— are substantially secured to shaft —1— each in their respective operative position.

Cam plates —24— and —25— have double cam faces each integral therewith and concentrically disposed thereon. These cam faces are designated by numerals —26— and —27— at one end of the motor and —28— and —29— at the other end of the motor.

Cam faces —26— and —27—, —28—, and —29— rotate respectively with their integral cam plates —24— and —25— and are shaped somewhat as shown in Fig. 6 on those plates. These cam faces are adapted to control the thrust movement of tappets —30—, —31—, —32—, and —33— controllably connected with rocker arms —34— —35—, —36— and —37— which in turn respectively control valves —38— —39—, —40— and —41—.

It will be noted that cam faces —26— and —28— control the movement of intake valves —38— and —40— respectively. In like manner cam faces —27— and —29— control the movement of exhaust valves —39— and —41— respectively.

Referring to Fig. 3 it will be observed that I connect with the respective cylinders an intake manifold pipe —42— and an exhaust manifold pipe —43— and in order to make my motor more compact where it may be used for airplane driving purposes I hold these manifolds preferably in close contact with the cylindrical sides of the motor block in some such recesses as are shown in Fig. 3 at numeral —44—.

The carburator for my motor is indicated in Fig. 1 and numeral —45— while manifold ring —46— connects with all the distributing intake manifolds —42— running therefrom to the cylinders in their turn at the respective ends of my motor.

In like manner exhaust manifolds —43— connecting with each cylinder preferably communicates with a discharge manifold —47— for the exhaust gases from the cylinders in their turn at the respective ends of the motor.

I have shown in Fig. 1 a propeller —48— adapted to be operatively mounted on the drive shaft of my motor indicating the possibility of using the motor with which to drive the airplane or for driving a boat and I might have illustrated other ways of connecting up my motor as a source of driving power. For instance my motor would be adaptable to use in driving electric generators, machine tools, conveyors, elevators, centrifugal pumps, automobiles, trains, dirigibles, cranes and other such machines and vehicles as may require the use of internal combustion motors.

Referring to Fig. 7 it will be observed that cam wheel —2— is shaped so as to form rim —4— thereof in an annular zig-zag curve which provides within the complete circumference of the cam wheel two oppositely disposed maximum high points one hundred and eighty degrees from each other and also two oppositely disposed low points one hundred eighty degrees from each other while each low point is ninety degrees from each high point. This construction of cam wheel —2— is also shown in Fig. 5.

In a study of Fig. 8 there will be observed the extent of movement of the double-headed pistons —7— where each cylinder fires once to every revolution of the cam and also on this chart there is shown the pitch of the zig-zag curves in the annular cam rim.

Each cylinder on each end of the motor is provided with two spark plugs —49—, —50—, —51—, and —52— to provide a double safety ignition circuit. In the sectional views Fig. 1 and Fig. 2 these spark plugs cannot well be shown. The ignition system of my motor is not shown since any one of a number of timing and distributing systems now on the market could be adapted to be used in my motor.

By a further study of the chart in Fig. 8 there will be seen the relative position of the respective pistons in their normal movements at a given time in their reciprocal action. This chart shows a development of the curve shape of rim —4— of cam wheel —2— as well as a development of the respective intake and exhaust cam faces —26— and —27— of cam plate —24— and faces —28— and —29— of cam plate —25— which control

the intake and exhaust valves for the cylinders of my motor.

Referring to Fig. 6 for the construction of cam plates —24— and —25— it will be seen that the valve controlling lugs on the faces of these cams are each confined to a relatively small rise extending approximately one fourth the way around the cam face circle.

In a further study of the chart in Fig. 8 the development of the cam wheel rim represented by the curve A—B the curve is represented as moving in the direction indicated by the arrows while the cam plates —24— and —25— turn with shaft —1— as it rotates cam wheel —2—.

Cam plate —24— has intake cam face —26— and exhaust cam face —27—. Cam plate —25— has intake cam face —28— and exhaust cam face —29— as shown in the chart in Fig. 8.

It will be observed in this chart that this plate is divided into four parts each of equal length for showing the timing arrangement of the faces on the cam plate —24— and —25—. Each of these faces effect the movement of its corresponding intake or outlet explosion chamber valve over approximately a quarter of its turn in rotating with the respective cam wheels on shaft —1—.

The firing of the cylinders in order according to their relative adjacent successive positions disposed about the shaft causes the respective pistons to move in a manner that controls the rotating movement of cam wheel —2— shown on the chart as the development of the cam wheel rim there designated by the zig-zag line A—B.

For instance line *m—n* represents the middle point in the movement of each piston between its opposite limits.

When cylinder —*a*— is fired it causes the entire curve A—B to move forward in the direction of the arrows one twentieth of a turn until position *x—y* moves forward to coincide with positions *a'* at which time opposite cylinder *a'* fires moving the curve down another twentieth of a turn until the point of the curve registering with cylinder —*a*— on the first firing again takes place on the same end of the motor with cylinder —*a*— thus forcing curve A—B forward until the position of the curve starting at point *y* of the chart now registers with cylinder *j'* where the rotating cam rim again gets another thrust forward from the explosion in cylinder *j'* and so on around the motor as alternate cylinders fire on opposite ends of the motor at intervals of one twentieth of a turn of the rotating cam wheel on the shaft.

Intake cam face —26— and exhaust cam face —27— of cam plate —24— adapted to control the intake and exhaust valves in their respective positions control the cylinders on one end of my motor while intake cam face —29— and exhaust cam face —28— on cam plate —25— are adapted to control the movement of intake and exhaust valves respectively for the cylinders on the other end of my motor.

It will therefore be seen that by placing cam faces —26— and —27— in suitable position for control of the corresponding intake and exhaust valves at one end of the motor and placing cam faces —28— and —29— in position to control the valves at the other end of the motor; that the result of the successive explosions in alternate cylinders on opposite ends of the motor so timed, affect a movement in the rotating cam wheel as the moving piston bears against the incline surface of the cam wheel rim with the force of the explosion applied thereto through the rollers —5— and —6— alternately to the rim —4—.

It will therefore be seen that the shaft —1— is caused to rotate by carefully timed explosions in the cylinders at opposite ends of my motor affecting the movement of the pistons —7— back and forth which act upon the zig zag curved surface of rim —4— of cam wheel —2— causing the cam wheel to rotate and carry with it the shaft —1—.

To those engineers who are acquainted with internal combustion motors it will be evident that certain minor changes may be made in the details of structure thereof and still stay within the spirit and scope of my invention.

For instance any one of numerous ignition and carburating systems may be used successfully in controlling my motor but the novel features of my motor are recited in the claims which follow.

Having thus described the nature of my motor and the operating principles thereof what I claim is:

1. In an internal combustion engine, the combination of a plurality of abutting annular cylinder blocks secured together at their abutting edges and having chambers formed therein and communicating at the abutting edges of said blocks for receiving a cooling fluid, a shaft rotatably mounted in said blocks, oppositely disposed integral pistons slidably mounted in the blocks, and a double faced cam secured to said shaft and operatively related to said pistons in a manner to be rotated thereby for imparting a rotary motion to said shaft.

2. In an internal combustion engine, the combination of a plurality of abutting annular cylinder blocks secured together at their abutting edges and having communicating chambers for receiving a cooling fluid, a shaft rotatably mounted in said blocks, oppositely disposed integral pistons slidably mounted in the respective blocks, and a double faced cam secured to said shaft and having a mean radial plane substantially coincident with the plane of the abutting edges

of said blocks, the said cam being operatively related to said pistons in a manner to be rotated thereby for imparting a rotary motion to said shaft.

3. In an internal combustion engine, the combination of a plurality of oppositely disposed end abutting annular cylinder blocks secured together at their abutting ends and having a plurality of aligned annularly spaced cylinders formed in the respective blocks, said blocks having chambers formed therein surrounding said cylinders and communicating with each other at the abutting ends of said blocks, a shaft having its axial line of rotation positioned substantially coincident with the axial line of said blocks and rotatably mounted therein, a plurality of oppositely disposed integral pistons mounted in said aligned cylinders, a double faced cam secured to said shaft and having a mean radial plane substantially coincident with the plane of the abutting ends of said blocks, pairs of anti-friction rollers mounted on said pistons and engageable with the faces of said cam in a manner to impart a rotary motion to said cam and shaft when said pistons are driven, head members secured to the outer ends of said blocks, intake and exhaust valves mounted in said members, and means mounted on said shaft for actuating said valves.

4. In an internal combustion engine, the combination of a plurality of oppositely disposed end abutting cylinder blocks having a plurality of aligned cylinders formed therein and having grooves formed in the respective blocks communicating at the abutting ends thereof, a shaft rotatably mounted in the blocks, a plurality of oppositely disposed pistons mounted in said cylinders, a cam secured to said shaft and operatively related to said pistons for imparting rotation to said shaft, and intake and exhaust manifolds mounted in said grooves and communicating with said cylinders.

5. In an internal combustion engine, the combination of a plurality of oppositely disposed end abutting cylinder blocks having a plurality of aligned cylinders formed therein and having a plurality of annularly spaced longitudinally extending grooves formed in the respective blocks communicating at the abutting ends thereof, a shaft rotatably mounted in the blocks, a plurality of oppositely disposed pistons mounted in said cylinders, a cam secured to said shaft and operatively related to said pistons for imparting rotation to said shaft, and intake and exhaust manifolds mounted in said grooves and communicating with said cylinders.

6. In an internal combustion engine, the combination of a plurality of oppositely disposed end abutting annular cylinder blocks having a plurality of aligned annularly spaced cylinders formed in the respective blocks and having a plurality of annularly spaced longitudinally extending grooves formed in the periphery thereof, a shaft rotatably mounted in said blocks, a plurality of oppositely disposed integral pistons mounted in said aligned cylinders, a cam secured to said shaft and operatively related to said pistons for imparting a rotary motion to said shaft, head members secured to the outer ends of said blocks, intake and exhaust valves mounted in said members, intake and exhaust manifolds mounted in said grooves and communicating with said cylinders through said intake and exhaust valves, respectively, and a plurality of cams carried by said shaft for actuating said valves.

In witness whereof I hereunto set my hand this 15th day of October, 1928.

JOSEPH F. BLESER.