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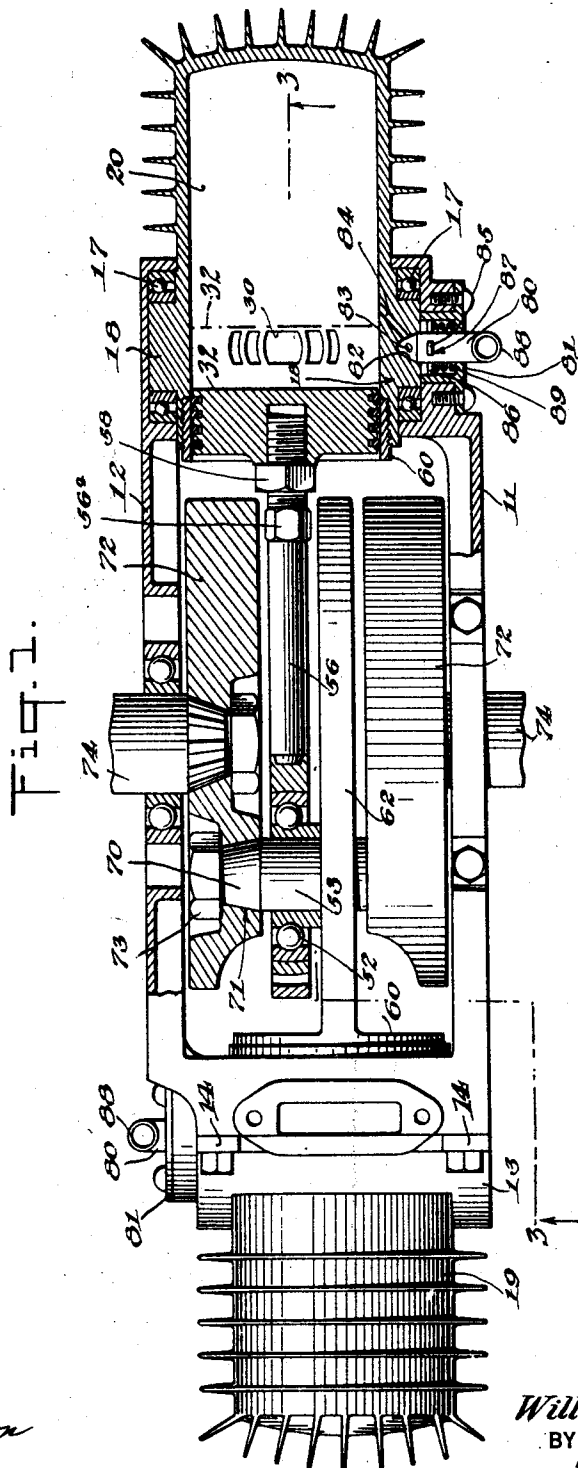
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INTERNAL COMBUSTION ENGINE

Filed April 4, 1928

2 Sheets-Sheet 1



WITNESSES

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INVENTOR

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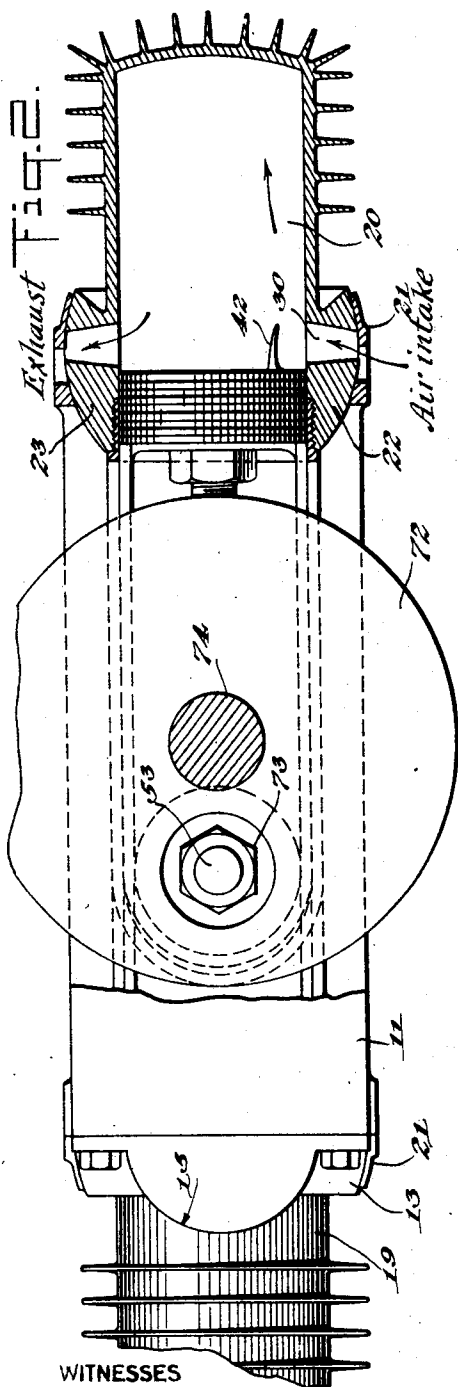
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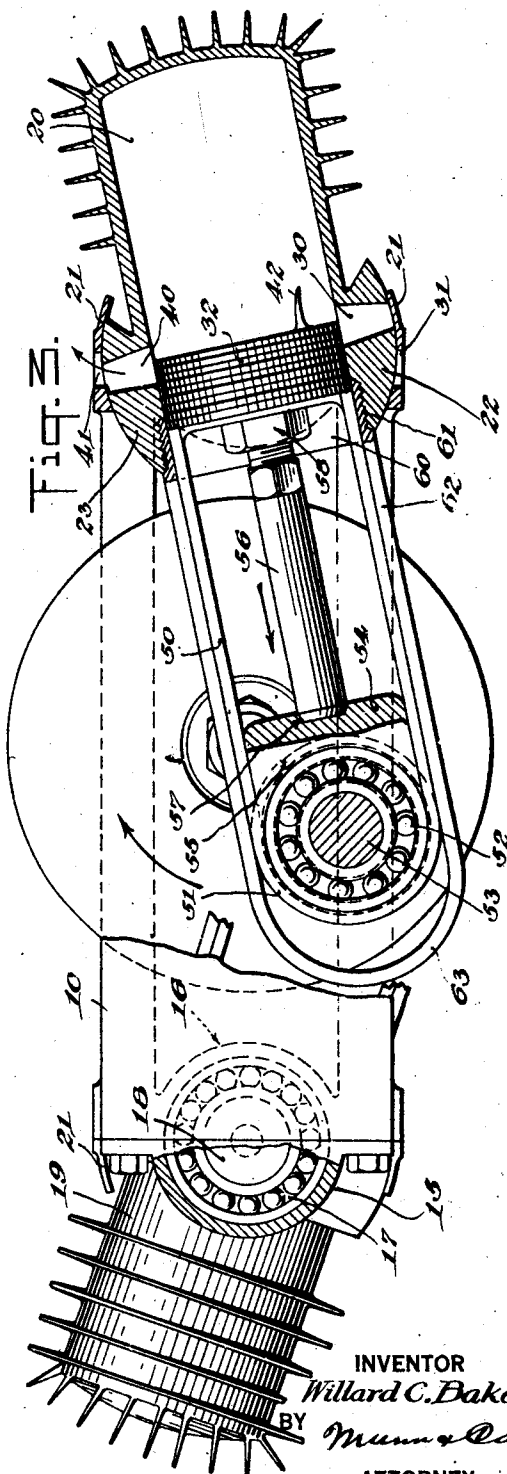
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UNITED STATES PATENT OFFICE.

WILLARD C. BAKER, OF LESLIE, MICHIGAN.

INTERNAL-COMBUSTION ENGINE.

Application filed April 4, 1928. Serial No. 267,317.

This invention relates to internal combustion engines.

An object of the invention is the provision of an internal combustion engine having a plurality of cylinders which are oscillated by a revolving crank shaft, with the axis of each cylinder at all times intersecting the axis of its crank pin during the revolution of the crank shaft.

Another object of the invention is the provision of an internal combustion engine in which a reciprocating piston cooperating with an oscillating cylinder and a pivotal support for the piston for controlling the intake and exhaust thereby eliminating the usual valves for such purposes.

A further object of the invention is the provision of an internal combustion engine having a plurality of cylinders which are oscillated by a revolving crank shaft, the cylinders having a pivotal support intermediate the ends thereof, a lever arm being connected to the cylinder and embracing the crank shaft with a yoke connected to a piston and slidable in the arm, the yoke carrying the bearings which receives a crank of the shaft, the construction being such that the arm acts as a lever of a length which will place the point of application to the inertia load when the force applied to this load will be exerted to prevent undesirable stresses or wear on the assembled unit.

A still further object of the invention is the provision of an internal combustion engine having a U-shaped lever arm connected to a cylinder in which is reciprocated a U-shaped member connected to a piston, a ball bearing being carried by the U-shaped member with a block retaining the bearing in position, a rod connected to the piston in turn acting as a clamp for forcing the block in snug contact with the bearing.

This invention will be best understood from a consideration of the following detailed description; nevertheless it is to be understood that the invention is not confined to the disclosure, being susceptible of such changes and modifications which shall define no material departure from the salient features of the invention as expressed in the appended claims.

In the drawings:

Figure 1 is a horizontal, longitudinal section of an engine constructed according to the principle of my invention,

Figure 2 is a side view of the engine

partly in section, the cylinder being alined,

Figure 3 is a side view of the engine partly in section showing the cylinders at an angle to each.

Referring more particularly to the drawings 10 designates a supporting frame consisting of side plates 11 and 12 connected together at their ends by bars 14 to which are bolted heads 13.

The heads and plates are provided respectively with sections 15 and 16 of a bearing in which is mounted a ball bearing 17. Trunnions 18 are received by the bearing 17 and support an oscillating cylinder 19 or 20.

The opposite ends of the frame are provided with sockets 21 in which are fitted, semi-circular enlargements 22 and 23 which are formed complementarily to the sockets. The enlargements have a close fit with the walls of the sockets to prevent the leakage of fluid past the same as will be presently explained.

The enlargement 22 is formed integrally with the cylinder and has a plurality of intake ports 30 adapted to aline with similarly shaped ports 31 formed in one portion of the socket 21. The ports 31 are in direct communication with a source of compressed air for supplying the cylinder with fluid to support combustion. The ports 30 are controlled by a piston 32 and by the oscillation of the cylinder which causes the enlargement to cover the ports 31 at times.

Diametrically opposite the ports 30 are ports 40 formed in the enlargement 23, which is likewise cast integrally with the cylinder. Ports 41 in the opposite portion of the socket 21 are adapted to be alined with the ports 40 periodically, and such alinement is controlled by the oscillation of the cylinder and the reciprocation of the piston cooperates with the oscillating cylinder for determining the time of the exhaustion of the burnt gases from the cylinder. The gases are conducted away from the cylinder by the usual exhaust pipe (not shown).

A deflecting plate 42 is mounted on each piston at the intake side of the cylinder, whereby a more thorough scavenging of the cylinders will be had when the air is admitted through the intake ports 30 and 31.

It will be appreciated that both cylinders 19 and 20, together with the construction of the enlargements and intake and exhaust ports, are identical in construction.

Each piston has a U-shaped arm or yoke 50 rigidly or integrally connected thereto. This yoke has a curved bight 51, which carries a roller bearing 52 embracing a crank pin 53. A block 54 is mounted in the U-shaped member 50, and has an arcuately shaped shoe 55 forced into engagement with the bearing 52 for retaining the bearing in position. A rod 56 has one end seated in a socket 57 in the block 54, and the other end screwed into the piston 32. A lock nut 58 threaded onto the rod 56 maintains the adjustment of said rod when it has been turned to force the block 54 into rigid engagement with the bearing 52.

A ring 60 has external threads 61, which are screwed into the inner portion of the enlargements 22 and 23. A U-shaped lever or arm 62 is formed integrally with the ring, extends outwardly from the inner end of each piston, and has a bight portion 63 adapted to receive at times the bight portion of the yoke 50. The yoke slides in the arms of the lever 62 which acts as a guide for the yoke. Tracks may be provided in the arms of the lever to receive corresponding ribs on the yoke.

As shown more particularly in Figure 1, the crank pin 53 is tapered at 70, and received by a complementarily formed socket 71 in a flywheel 72. A nut 73 secures the tapered end of the pin to said wheel. A shaft 74, located axially of the flywheel has a tapered portion secured to the wheel.

A tube 80, which acts as a valve, is supported by means of a cap or flanged plate 81, and has its inner end conically shaped, as shown at 82, which is provided with a port 83 adapted to aline at times with a passage 84 formed in a trunnion 18. A lug 85, secured to a plate 86, is adapted to project through a passage 87 in the tube 80 for preventing rotation of said tube. An inlet pipe 88 is connected with a tube 80, and is adapted to supply the said tube with liquid fuel under pressure. A spring 89 carried by the flanged plate 81 maintains a conically shaped end 82 and the tube 80 against its socket. As the cylinder oscillates, it will automatically place the passage 84 in communication with the port 83 at times when the engine has been designed for supplying the combustion chamber of the engine with a predetermined quantity of fuel.

A hexagonal portion 56^a of the rod 56 is provided at a point on the rod for engagement with a suitable tool for rotating the said rod and adjusting the same lengthwise of the yoke 50 when it is desired to place greater pressure on the block 54 to maintain the bearing 55 in position.

I claim:

1. An internal combustion engine comprising a frame, a cylinder oscillatably sup-

ported in the frame, a piston in the cylinder, a yoke secured to the piston, a bearing carried by the yoke, a crank shaft mounted on the frame and provided with a crank pin received by the bearing, a lever arm embracing the yoke and connected to the cylinder, said lever arm acting as a guide for the yoke while causing oscillation of the cylinder.

2. An internal combustion engine comprising a frame, a cylinder oscillatably supported in the frame and at one end of the cylinder, a piston in the cylinder, a yoke secured to the piston, a bearing carried by the yoke, a crank shaft mounted on the frame and provided with a crank pin received by the bearing, a lever arm embracing the yoke and connected to the cylinder, said lever arm acting as a guide for the yoke while causing oscillation of the cylinder.

3. An internal combustion engine comprising a frame, a cylinder oscillatably supported in the frame, a piston in the cylinder, a yoke secured to the piston, a bearing carried by the yoke, a crank shaft mounted on the frame and provided with a crank pin received by the bearing, a ring threaded into the inner end of the cylinder, a lever arm connected to the ring and embracing the yoke, said lever arm acting as a guide for the yoke while causing oscillation of the cylinder.

4. An internal combustion engine comprising a frame, a cylinder oscillatably supported in the frame, a piston in the cylinder, a yoke secured to the piston, a bearing carried by the yoke, a crank shaft mounted on the frame and provided with a crank pin received by the bearing, a ring threaded into the inner end of the cylinder, a U-shaped arm embracing the yoke and slidably receiving said yoke, the arm being connected to the ring and causing oscillation of the cylinder.

5. In an internal combustion engine, a frame provided with sockets, cylinders having enlargements forming bearings mounted in the sockets thereby providing for oscillation of the cylinders, means for causing oscillation of the cylinders, said enlargements and sockets having intake and exhaust ports adapted to be alined, said enlargements being movable with the cylinders for moving the ports into and out of alinement with the ports in the sockets, means movable in each cylinder and cooperating with the enlargements for controlling the opening and closing of the ports, said cylinder having an inlet passage for supplying a liquid fuel to the cylinder, and means controlled by the oscillation of the cylinder for causing closing or opening of the passage.

6. In an internal combustion engine, a frame provided with sockets, cylinders hav-

ing enlargements forming bearings mounted in the sockets thereby providing for oscillation of the cylinders, means for causing oscillation of the cylinders, said enlargements and sockets having intake and exhaust ports adapted to be alined, said enlargements being movable with the cylinders for moving the ports into and out of alignment with the ports in the sockets, means movable in each cylinder and cooperating with the enlargements for controlling the opening and closing of the ports, said cylinder having a passage for supplying a liquid fuel to the cylinder, a valve having a port adapted to be alined with the passage when the cylinder is oscillated.

7. In an internal combustion engine, a frame provided with sockets, cylinders having enlargements forming bearings mounted in the sockets thereby providing for oscillation of the cylinders, means for causing oscillation of the cylinders, said enlargements and sockets having intake and exhaust ports adapted to be alined, said enlargements being movable with the cylinders for moving the ports into and out of alignment with the ports in the sockets, means movable in each cylinder and cooperating with the enlargements for controlling the opening and closing of the ports, said cylinder having a passage for supplying a liquid fuel to the cylinder, a valve having a port adapted to be alined with the passage when the cylinder is oscillated, said piston being adapted to cover and uncover the passage and cooperating with the oscillation of the cylinder for controlling the flow of fuel to the cylinder.

8. In an internal combustion engine, a frame provided with sockets, cylinders having enlargements forming bearings mounted in the sockets thereby providing for oscillation of the cylinders, means for causing oscillation of the cylinders, said cylinder being provided with trunnions, bearings on the frame and supporting the trunnions, a conduit passing through a trunnion and opening into the cylinder, a valve carried by the trunnion and controlling said passage.

9. In an internal combustion engine, a frame provided with sockets, cylinders having enlargements forming bearings mounted in the sockets thereby providing for oscillation of the cylinders, means for causing oscillation of the cylinders, said cylinder being provided with trunnions, bearings on the frame for supporting the trunnions and the cylinder, one of the trunnions having an axial passage, the cylinder having a passage connecting the interior of the cylinder with the axial passage, and a valve in the axial passage for controlling the opening and closing of the passage to the cylinder when the cylinder is oscillated.

10. In an internal combustion engine, a frame provided with sockets, cylinders having enlargements forming bearings mounted in the sockets thereby providing for oscillation of the cylinders, means for causing oscillation of the cylinders, said cylinder being provided with trunnions, bearings on the frame for supporting the trunnions and the cylinder, one of the trunnions having an axial passage, the cylinder having a passage connecting the interior of the cylinder with the axial passage, and a valve in the axial passage for controlling the opening and closing of the passage to the cylinder when the cylinder is oscillated, said valve having a flange, a spring engaging the flange for retaining the valve in position.

11. In an internal combustion engine, a frame provided with sockets, cylinders having enlargements forming bearings mounted in the sockets thereby providing for oscillation of the cylinders, means for causing oscillation of the cylinders, said cylinder being provided with trunnions, bearings on the frame for supporting the trunnions and the cylinder, one of the trunnions having an axial passage, the cylinder having a passage connecting the interior of the cylinder with the axial passage, a cylindrical valve in the axial passage having a closed end, the closed end having a port adapted to be alined at times with the passage in the cylinder, and means for maintaining the valve in position in the axial passage.

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