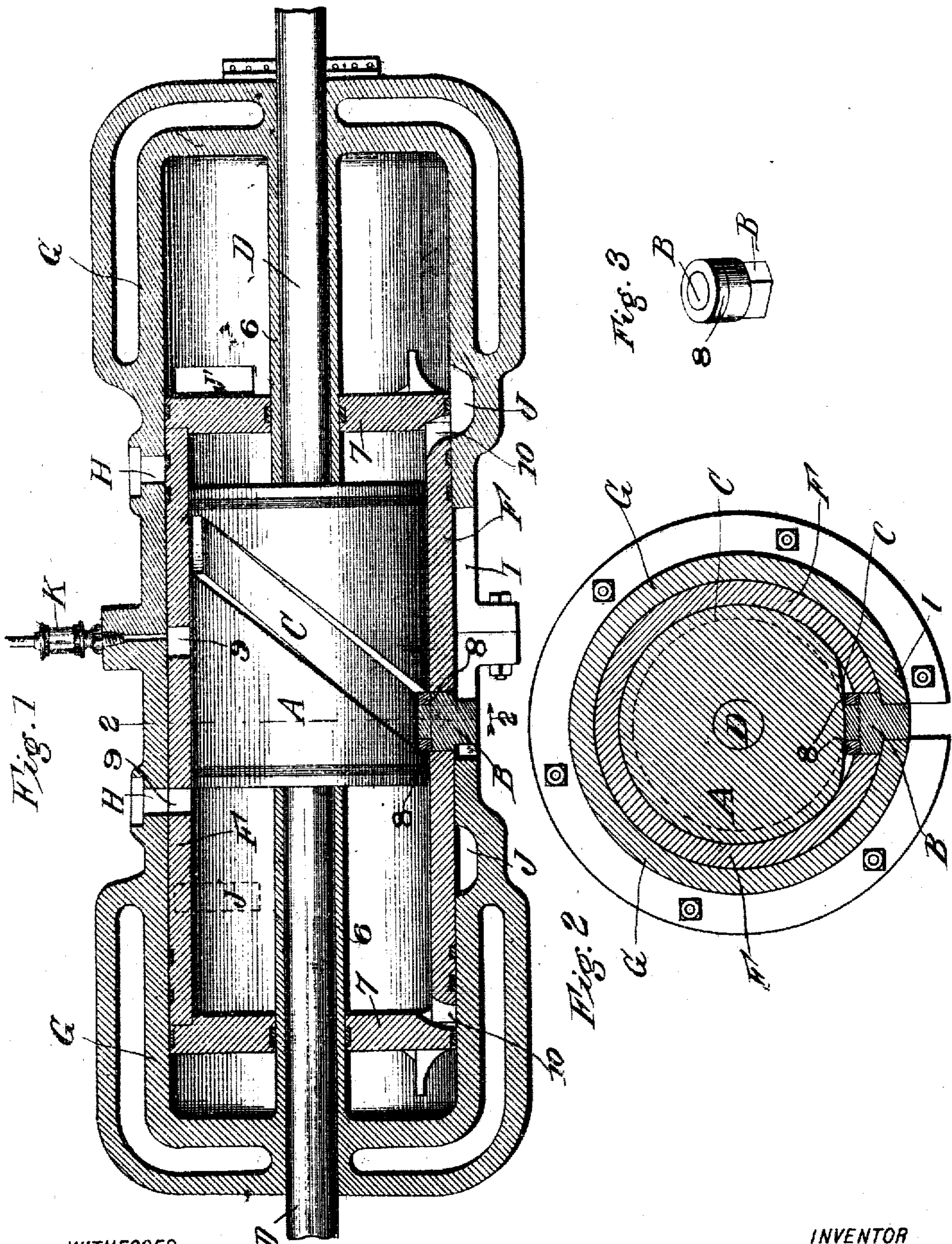


No. 855.256.

PATENTED MAY 28, 1907.

F. MOREY.  
INTERNAL COMBUSTION ENGINE.  
APPLICATION FILED DEC. 17, 1906.



WITNESSES  
*C. H. Huffy*  
*J. Middleton*

INVENTOR  
FRANK MOREY  
BY *Munn & Co.*  
ATTORNEYS



# UNITED STATES PATENT OFFICE.

FRANK MOREY, OF SCRAFFORD, WEST VIRGINIA.

## INTERNAL-COMBUSTION ENGINE.

No. 855,256.

Specification of Letters Patent.

Patented May 28, 1907.

Application filed December 17, 1906. Serial No. 348,246.

*To all whom it may concern:*

Be it known that I, FRANK MOREY, a citizen of the United States, residing at Scrafford, in the county of Monongalia and State of West Virginia, have invented a new and useful Improvement in Internal-Combustion Engines, of which the following is a specification.

This invention is an internal combustion engine of the type in which the reciprocation of a piston or pistons is converted into the rotation of a shaft by means of a drum having a continuous encircling cam groove, and a roller journaled upon a pin attached to the piston and engaging the groove.

The embodiment of the invention herein shown includes a pair of co-axial two cycle cylinders acting oppositely and alternately upon a piston or connected piston heads so that two impulses are imparted at each revolution.

An embodiment of the invention is illustrated in the accompanying drawings, in which

Figure 1 is a longitudinal central section of the machine. Fig. 2 is a cross section on the line 2-2 of Fig. 1. Fig. 3 is a perspective view of the pin and roller.

Referring specifically to the drawings, G indicates a pair of cylinders, jacketed as usual, and connected on the same axis in opposition to each other. The shaft D extends lengthwise through the axis of these cylinders or rather through sleeves 6 formed therein, and mounted upon or integral with the shaft, at the middle, is a drum A, having therein a symmetrical cam groove C of regular or uniform throw on each side of the middle line. The sleeves 6 bear at their inner ends against the heads of the drum.

The reciprocating piston is built up of or with a pair of heads 7, one in each cylinder, connected by a cylindrical shell or body F. The cylinders are of uniform bore throughout and the piston as a whole slides freely therein, each piston head sliding also on the exterior of the sleeve 6, which extends there-through, the drum A being rotatable within the shell or body of the piston, between the heads. The body of the piston also carries a pin B, fixed thereto and extending radially. Within the body, the pin carries a roller 8 which fits in the cam groove C, and outside the body the pin slides lengthwise in a slot I

formed in the wall of the cylinders at the middle thereof. The slot is slightly greater in length than the stroke of the piston, and in connection with the pin serves to guide the piston and to prevent rotation thereof.

The valve mechanism or devices for controlling inlet and exhaust of the charge include inlet ports H in the wall of the cylinders, and exhaust ports J' in said wall, which open alternately on opposite sides of the piston heads, the former, or inlet ports being arranged to register with co-operating ports 9 in and through the body or shell F of the piston. By-pass ports J, from the rear to the front side of the piston heads, are formed in the wall of the cylinders, and register with ports 10 in the piston body at the limit of stroke.

A lubricator K, at the middle line of the structure feeds through the wall thereof to lubricate the piston body, and also alternately through each of the ports 9 to lubricate the rotary drum and cam groove, and also the piston heads, cylinders and sleeves, by carrying lubricant deposited in said ports into the inner or rear compression spaces with the inflowing charges.

Operation: Referring to one of the cylinders, when the piston travels into the cylinder, or toward the end head thereof, to a sufficient extent, the ports H and 9 register and the charge is drawn into the space within the body of the piston between the piston head and the corresponding end of the drum A. On the outstroke (toward the middle) the charge is compressed in said space. The rotation of the drum, then occurring, produces a whirl which materially assists in mixing the charge. At the limit of this stroke the port 10 and passage J are opened, and the charge flows therethrough from the rear side to the front side of the piston head, into the explosion chamber in the end of the cylinder, where it is further compressed by the ensuing instroke of the piston. On explosion by any suitable means, the piston is driven rearwardly, or toward the middle, and the port J' is uncovered, allowing the escape of the spent charge, and also the inlet of the succeeding charge through the passage J, in a manner common in two-cycle engines. Meanwhile, the reverse actions are occurring in the opposite cylinder.

It will be seen that there are alternate



compressions and explosions occurring in the respective cylinders, on opposite sides of the cylinder heads, so that two impulses, one in one direction and one in the other, are received by the piston at each reciprocation.

The travel of the pin B, carried by the piston, and working in the cam groove, causes rotation of the drum A and consequently of the shaft D.

The inlet, outlet, and by-pass ports are most direct and simple, no moving valves being necessary. This insures easy running and certainty of operation, which is further assisted by the compact construction and the unitary arrangement of the piston. By the provision of the continuous cam groove encircling the drum the shaft is driven continuously in one direction.

I claim

1. In an internal combustion engine, the combination with a cylinder and hollow piston, of a shaft extending coaxially through the cylinder and having a drum at the rear end of the cylinder and within the hollow piston, said drum and piston head forming a compression chamber therebetween and means between the piston and the shaft to convert the reciprocation of the former into rotation of the latter.

2. In an internal combustion engine, the combination with a cylinder and a hollow piston therein, the cylinder having inlet, exhaust and by-pass ports controlled by the piston, of a shaft extending coaxially through the cylinder and piston and having a drum thereon fitting within the hollow of the piston, said drum and piston forming a compression chamber therebetween, said chamber communicating through the by-pass with the explosion chamber in the cylinder, and means to transmit and convert the reciprocation of the piston into rotation of the drum and shaft.

3. In an internal combustion engine, the combination with a cylinder having inlet and exhaust ports in the side thereof and a by-pass passage in the wall thereof, of a hollow piston in the cylinder arranged to cover and uncover the exhaust port and having an inlet port through the side thereof arranged to register with the inlet port to let in a charge to the space within the piston, and also having a port arranged to register with the by-pass to connect the said space with the explosion chamber in the cylinder, a shaft within the cylinder and piston, having a drum fitting within the piston, said drum and piston head forming a compression chamber therebetween, and means to transmit and convert the reciprocation of the piston into rotation of the shaft.

4. In an internal combustion engine, the combination of a pair of coaxial cylinders and piston heads therein arranged and acting op-

positely, a shaft extending coaxially through the cylinders and piston heads and having a drum thereon, said drum and piston heads forming compression spaces therebetween, and means to convert and transmit the reciprocation of the piston heads into rotation of the shaft.

5. In an internal combustion engine, the combination of a pair of two-cycle rear-compression cylinders and piston heads therein, arranged coaxially and acting oppositely, a shaft extending coaxially through the cylinders and piston heads and having thereon a drum located between the piston heads, said drum and piston heads forming compression chambers therebetween, said drum having a cam groove, and a pin connected to the piston heads and extending into the groove to transmit the motion of the piston heads to the drum and shaft.

6. In an internal combustion engine, the combination of a pair of opposed coaxial cylinders, a hollow piston therebetween having heads in the opposite cylinders, a shaft extending axially through the cylinders and piston and having a drum thereon within the piston and between said heads, said drum having a cam groove extending around the same and forming with the piston heads compression spaces, a pin projecting from the piston into the groove, and means to prevent relative rotation of the piston and cylinders.

7. In an internal combustion engine, the combination of a pair of opposed coaxial cylinders having axial sleeves therein, a hollow piston slidable between the cylinders and having heads through which the sleeves extend, a shaft extending through the sleeves and having thereon a drum within the piston and between the ends of the sleeves, and means to transmit and convert the reciprocation of the piston into rotation of the drum and shaft.

8. In an internal combustion engine, the combination of a cylindrical casing having two explosion chambers in opposite ends thereof and a longitudinal slot in the middle portion, a hollow piston between the explosion chambers, a coaxial shaft extending through the casing and piston and having a drum thereon within the piston provided with a cam groove, and a pin carried by the piston and projecting at its outer end into the slot and at its inner end into the groove.

9. In an internal combustion engine, the combination of a pair of opposed cylinders arranged coaxially and having inlet and exhaust ports in the side walls, and by-passes, a hollow piston between the cylinders and having a head in each, a shaft extending axially through the cylinders and piston and having a drum fitting within the body of the piston, said drum forming with the respective piston heads compression spaces, said piston heads being arranged to alternately

cover and uncover the respective exhaust ports, and said piston also having ports extending therethrough and arranged to alternately register with the inlet ports and by-passes to let a charge into the piston and compress and force the same into the explosion chambers of the cylinders, and means

to transmit and convert the reciprocation of the piston into rotation of the drum and shaft.

FRANK MOREY.

Witnesses:

GEO. W. WILSON,  
JNO. S. BRAND.