Dec. 14, 1926. 1,610,409

M. O. ANTHONY

BRAKE

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Fig. 1.

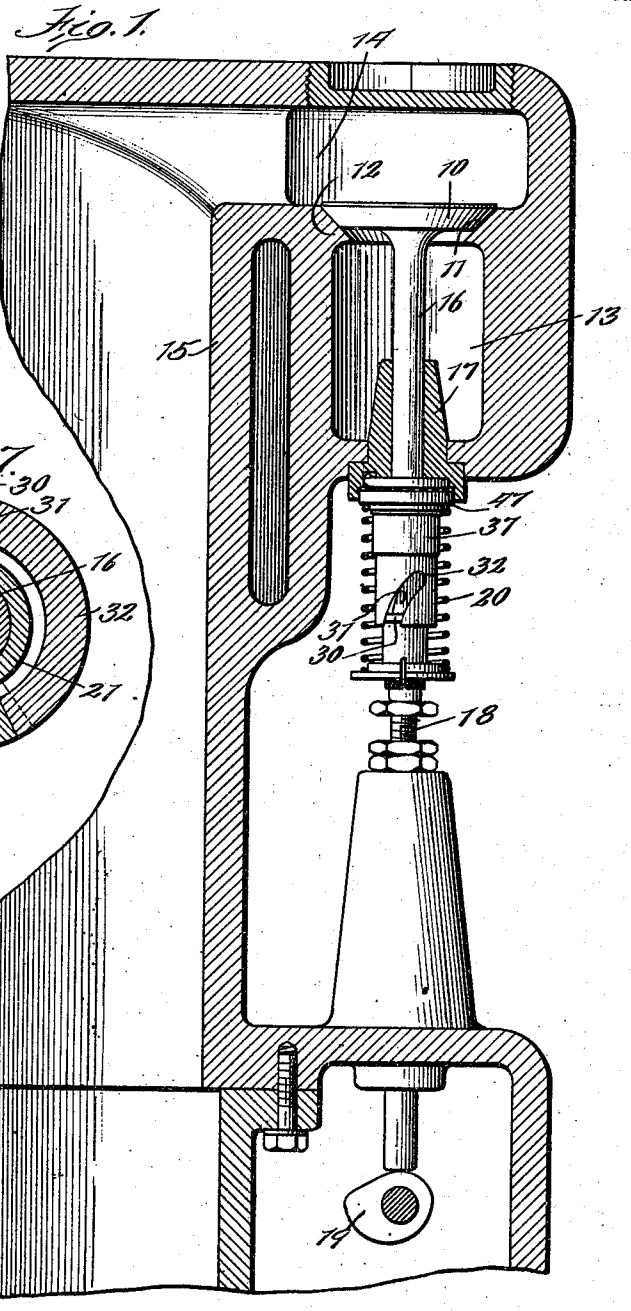
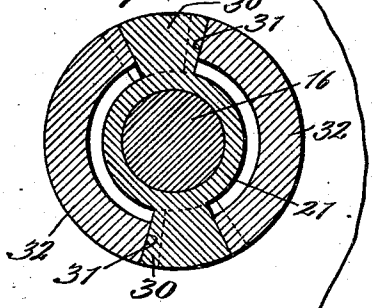


Fig. 7.



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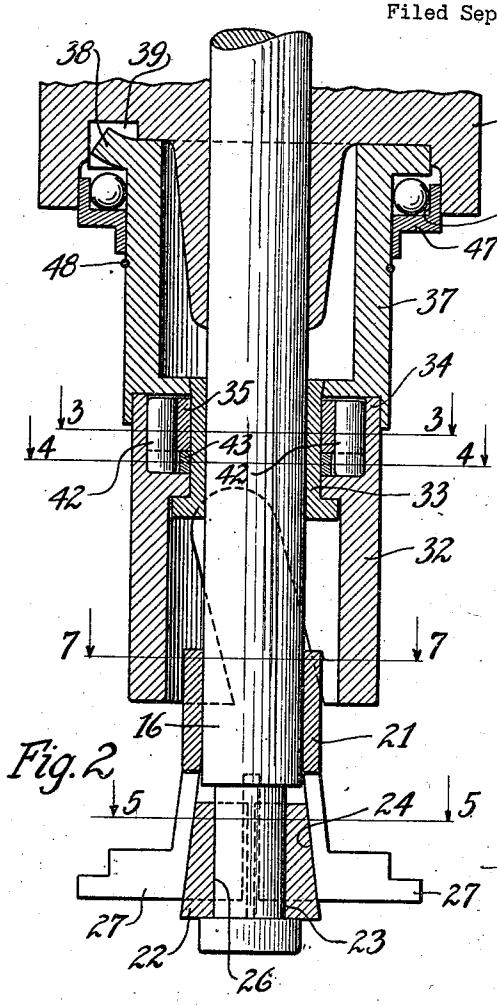


Fig. 2

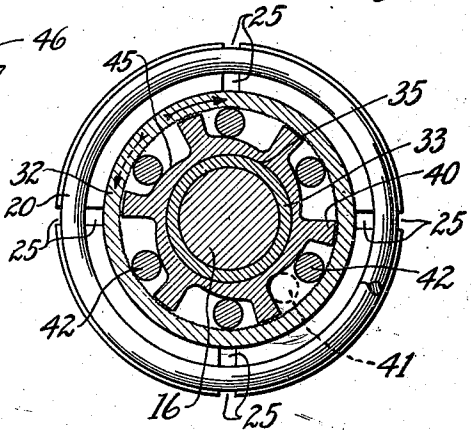


Fig. 3

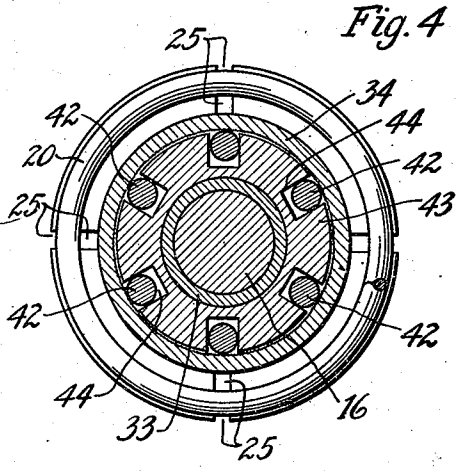


Fig. 4

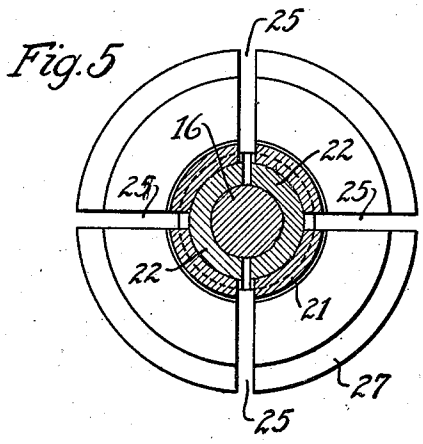


Fig. 5

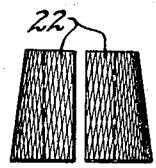


Fig. 6

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Patented Dec. 14, 1926. 1,610,409

UNITED STATES PATENT OFFICE.

MARCUS O. ANTHONY, OF CLEVELAND, OHIO, ASSIGNOR TO CONTINENTAL ENGINEERING CORPORATION, OF OMAHA, NEBRASKA, A CORPORATION OF NEBRASKA.

BRAKE.

Application filed September 25, 1922. Serial No. 590,219.

This invention relates to valves, and particularly to rotary valves for internal combustion engines. One of the objects of the invention is to provide suitable means for gradually rotating the valve as it is operated, particularly on the closing stroke thereof. Another object is to provide dependable and inexpensive rotating means.

Of the accompanying drawings, Fig. 1 is an elevation of a valve and operating means therefor mounted in an engine casing, the casing being shown in section; Fig. 2 is a longitudinal sectional elevation of the valve rotating means which embody the features of my invention; Figs. 3, 4 and 5 are transverse sections along the respective lines 3—3, 4—4, 5—5 of Fig. 2; Fig. 6 is an elevation of a split collar which is used in connection with the device, and Fig. 7 is a sectional view along the line 7—7 of Fig. 2.

For various reasons it has been common to provide means to give to the valves of internal combustion engines, a limited or step by step rotary movement of the valve as it is operated, and it has been common to provide such means for rotating the valve as the valve is opening. I have found, however, that it is desirable to impart this rotary movement to the valve as it is closing. This not only provides for the gradual rotation of the valve which is desirable to prevent warping or abnormal wearing of the valve or its seat, but it also imparts a slight rotary movement to the valve just as it comes in contact with the seat, so as to more effectively clean the seat or the valve, and to reduce the effects of the pounding of the impact, the impact occurring in conjunction with a slight rotary relative movement of the valve and the seat.

The means which I provide for carrying out this operation may be applied to any ordinary internal combustion engine valve, particularly the ordinary puppet valve 10, which, when closed, is seated on a seat 11 in a partition 12 between the gas inlet or the exhaust outlet 13 and the passageway 14 to the cylinder 15. The valve stem 16 passes through an ordinary stem guide 17, and the lower end of the stem abuts against an ordinary tappet 18 which is operated in any suitable manner, such as by means of the cam 19. As the cam 19 revolves, the tappet 18 is forced upwardly and this in turn opens the valve, and a spring 20 is adapted to close the valve as the cam continues to revolve.

In order to produce a limited rotary movement of the valve as it is closing, I provide a member 21, which is fixed in any suitable manner to the lower end of the valve stem 16. In this instance, I prefer to fix the member 21 to the valve stem by means of a split collar 22, which is positioned in an annular recess 23 in the lower end of the stem 16; and the collar 22, which is conical, with its periphery converging upwardly, passes into the conical bore 24 of the member 21. Slots 25 are formed in the member 21 so as to allow the separated segments of the member, when they are pressed downwardly by the spring 20, to spread and thus clamp firmly at all times the split collar 22, and press the members of the collar snugly against the valve stem. The slots also allow the spring, acting on the flange 27 of the member 21, to force inwardly the segments of the member, and thus to cause the collar to grip the stem. The inner surface 26 of the split collar 22 is slightly roughened so as to more firmly grip the valve stem, and the outer surface of the collar is also roughened or knurled so as to prevent relative movement of the collar and the member 21.

The member 21 is provided with lugs 30, which normally play respectively in the slots 31 in a barrel 32 which rotatably encircles the valve stem. The barrel 32 also encircles a cylindrical member 33 which is fixed to a casing 37. The casing 37 is non-rotatably fixed to the stem guide 17 by means of a lug 38 passing into a recess 39. Fixed to the upper end of the barrel 32 is a cup 34 which encloses a cam member 35. This member 35 is fixed to the member 33 and has arms 40 enclosing in the cam recesses 41 the clutch pins 42. A retaining member 43, rotatably mounted in the bottom of the cup 34, has recesses 44 for retaining in upright positions the pins 42.

By this arrangement when the valve stem 16 is forced upwardly the barrel 32 will be given a rotary movement by the action of lugs 30 in the slots 31. But on the downward or closing movement of the valve stem the pins 42 will prevent rotation of the barrel, and by means of the action of the slots 31 on the lugs 30 a limited rotary movement will be given to the member 21 and

hence to the valve stem and valve. The result is produced in the following manner:

When the stem is forced upwardly the lugs 30 acting on the sides of the slots 31 will rotate the barrel 32 in the direction of the full line arrow, Fig. 3, and the clutch pins will not interfere with this rotation. But as the valve stem moves downwardly under the force of the spring 20, the lugs 30 acting on the opposite sides of the slots 31, will tend to rotate the barrel 32 in the direction of the dotted line arrow, Fig. 3. This, however, causes the pins 42 to move along the cam surfaces 45 and they thus prevent relative movement of such surfaces and the barrel 32. As a consequence, the lugs 30 will be forced sidewise by the walls of the slots 31 and this will give to the valve stem a limited rotary movement on its downward stroke. The pins are held close to the inner surface of the cup 34 so as to reduce the loose play of the clutch, and the inner surface of the cup is roughened to increase the effectiveness of the clutch.

This rotary movement will include not only the member 21 but also the spring 20 which presses against the flange 27 of the member 21. To reduce the friction opposing such rotation, I provide a ball race 46 in the annular member 47 which forms a bearing for the upper end of the spring, thus providing means for reducing the friction between the bearing 47 and the fixed members of the device. The member 47 may be supported in any suitable manner, such as by means of a spring 48 lying in a groove in the member 37.

By placing the ball race at the upper end of the device instead of on the member 21, the mass to be moved as the valve stem is reciprocated, is materially reduced, as no movement of the ball race is required. This is desirable as when the race is moved the inertia of the race and balls not only materially increase the injurious pounding effects as the tappet forces the stem upwardly, but when the downward movement commences the momentum of the moving race and balls must be overcome by the spring, and this tends to delay unduly the closing of the valve.

I claim as my invention:

A brake comprising a member having a rotatably mounted cylindrical cup opening upwardly, a fixed cam member projecting into said cup, said cam member having recesses in its periphery, the inner walls of said recesses having inclined circumferential cam surfaces, a pin vertically mounted in each of said recesses and extending transversely substantially from its respective surface to the wall of said cup, and a pin retaining member rotatably positioned in said cup beneath said cam member and resting on the bottom of said cup, said retaining member having recesses in its periphery for receiving and retaining the lower ends of said pins, said recesses registering vertically with the respective recesses of said cam member.

In testimony whereof, I hereunto set my hand.

MARCUS O. ANTHONY.