Nov. 3, 1931. E. LA CHAPELLE 1,830,704

CAM SHAFT OPERATING GEARING

Filed Oct. 15, 1928 3 Sheets-Sheet 1

Fig. 1.

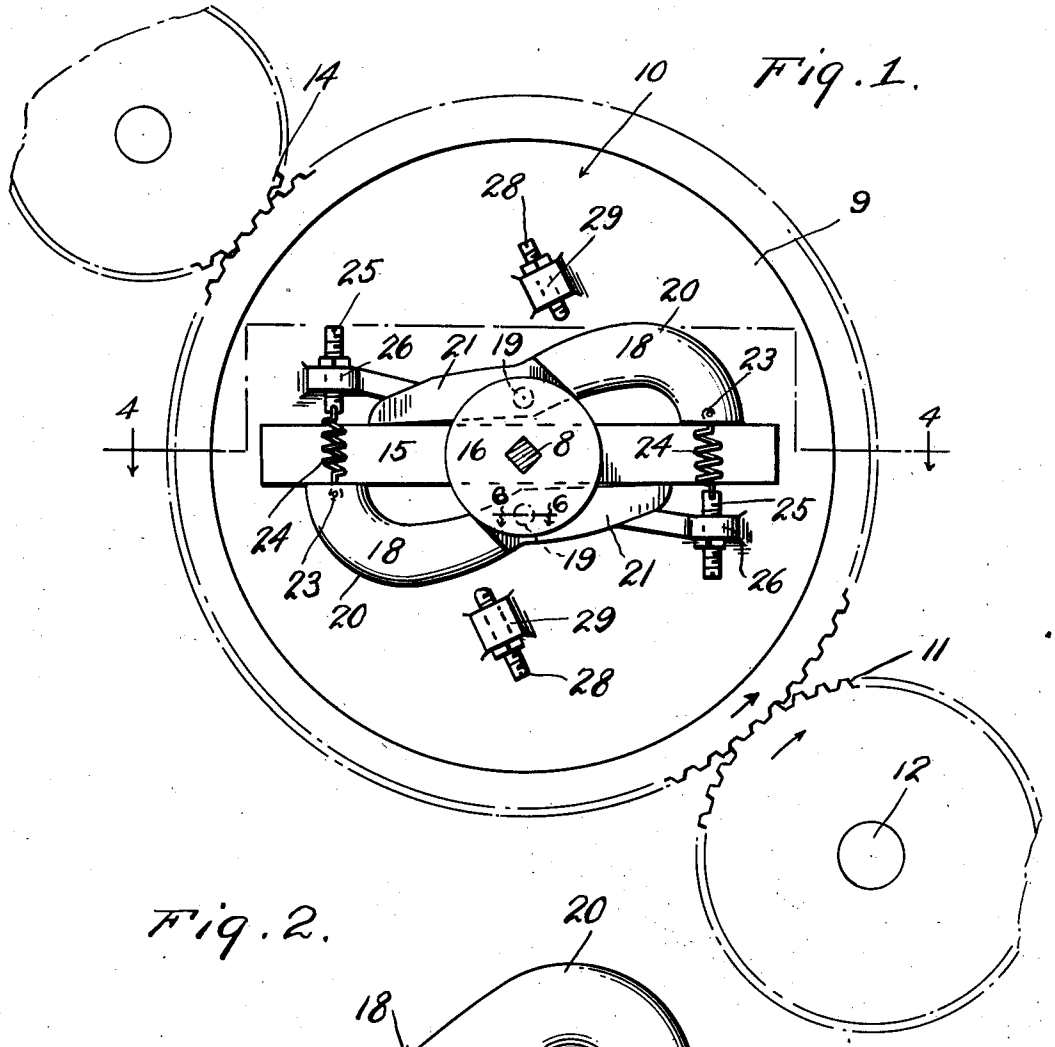


Fig. 2.

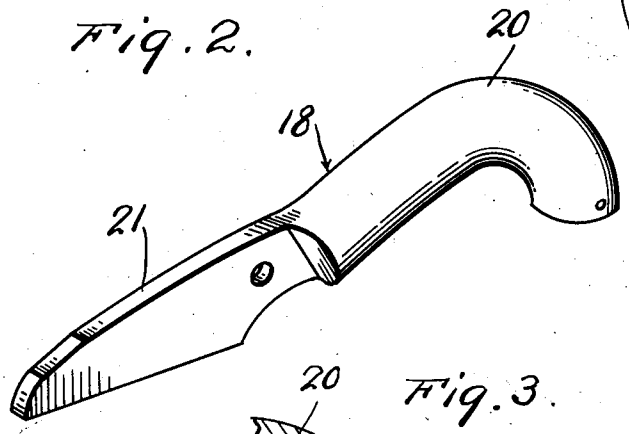
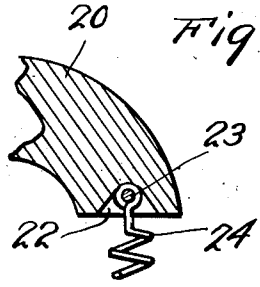


Fig. 3.



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CAM SHAFT OPERATING GEARING

Filed Oct. 15, 1928 3 Sheets-Sheet 2

Fig. 4.

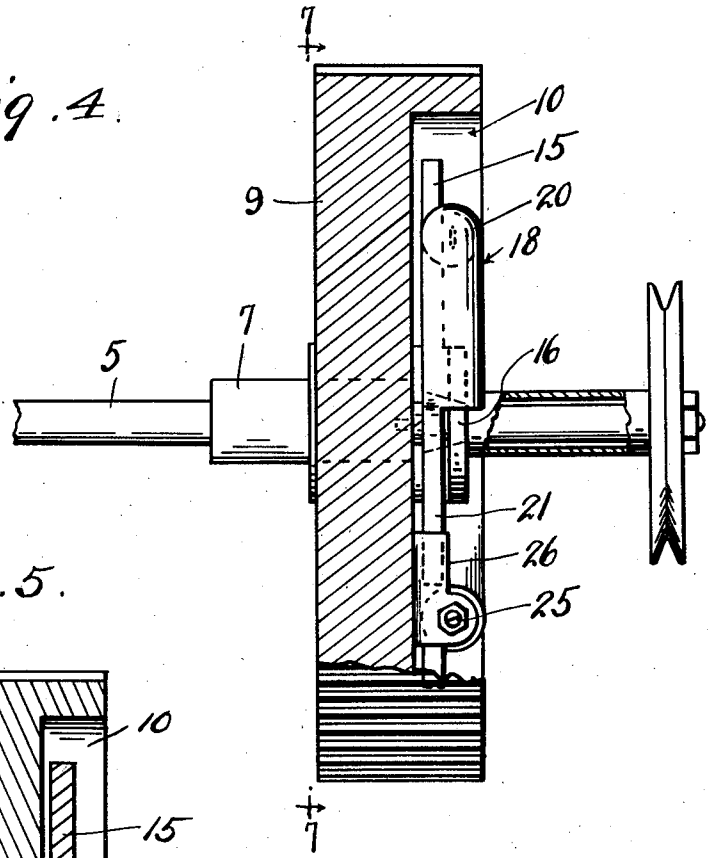


Fig. 5.

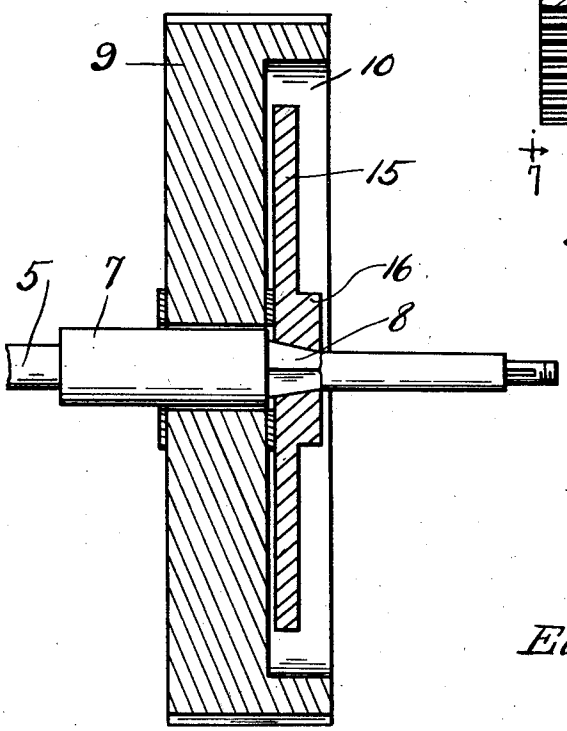
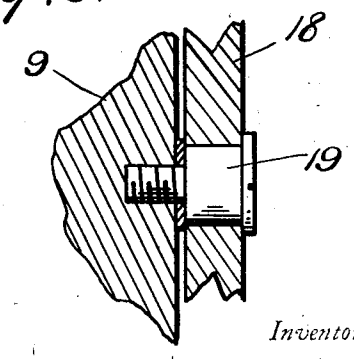


Fig. 6.



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CAM SHAFT OPERATING GEARING

Filed Oct. 15, 1928 3 Sheets-Sheet 3

Fig. 7.

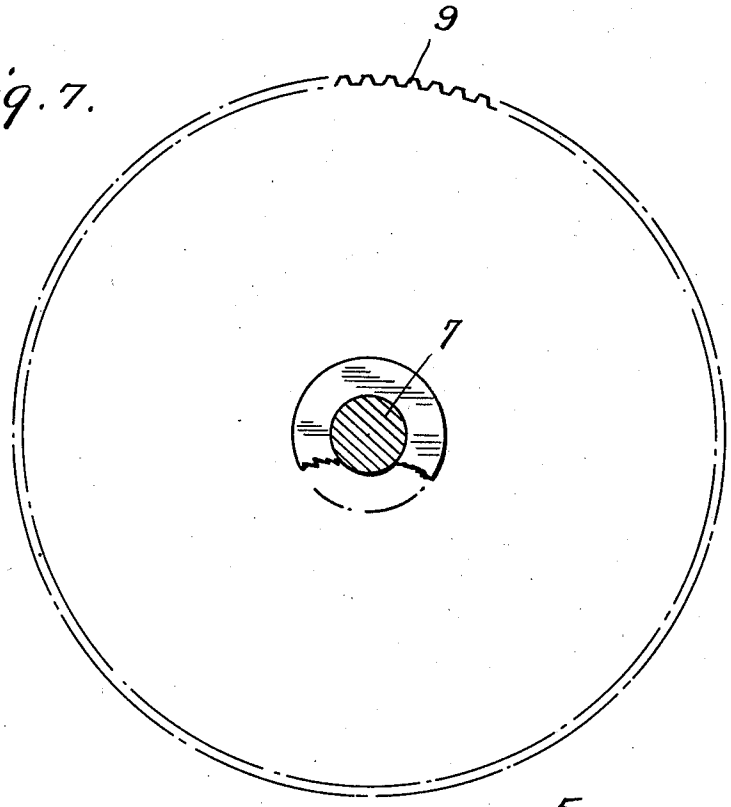


Fig. 8.

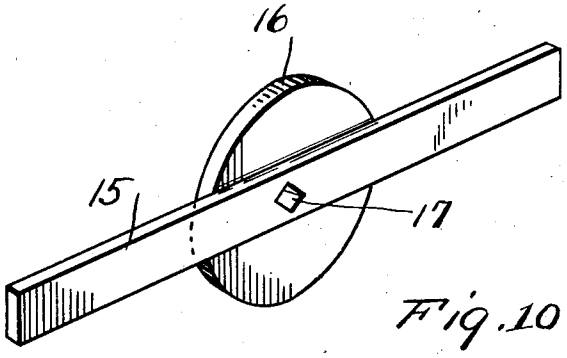


Fig. 9.

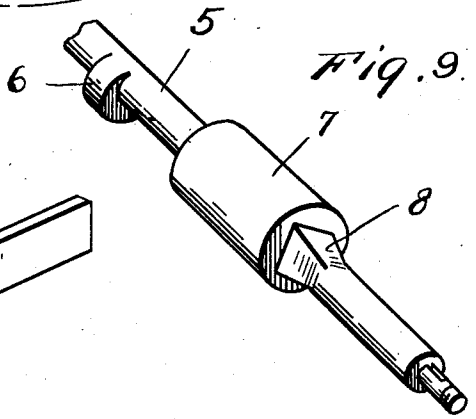
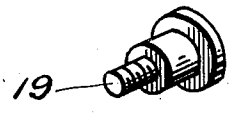


Fig. 10.



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UNITED STATES PATENT OFFICE

EDMOND LA CHAPELLE, OF DENVER, COLORADO

CAM SHAFT OPERATING GEARING

Application filed October 15, 1928. Serial No. 312,527.

The present invention relates to gearing generally and more particularly to the gearing used in operating the cam shaft of an automobile engine and has for its prime object to provide means whereby the rotation of the cam shaft may be advanced as the speed of the engine increases for the purpose of advancing the operation of the valve so as to obtain maximum power from the engine at all times and to eliminate unnecessary and undesirable vibration.

Another very important object of the invention resides in the provision of an improved gearing of this nature operating on the principle of a centrifugal governor.

A still further very important object of the invention resides in the provision of gearing of this nature wherein the parts are arranged in an exceedingly compact and convenient manner and wherein the structure is exceedingly simple, inexpensive to manufacture, strong and durable, thoroughly efficient and reliable in operation, and not likely to easily become out of order.

With the above and numerous other objects in view as will appear as the description proceeds, the invention resides in certain novel features of construction, and in the combination and arrangement of parts as will be hereinafter more fully described and claimed.

In the drawings:

Figure 1 is an elevation of the gearing embodying the features of my invention,

Figure 2 is a perspective view of one of the governor arms,

Figure 3 is a detail section through the weighted end of the governor arm showing the connection of the spring therein,

Figure 4 is a sectional view taken substantially on the line 4—4 of Figure 1,

Figure 5 is a somewhat similar section but showing the cam shaft arm in section,

Figure 6 is an enlarged detail section taken substantially on the line 6—6 of Figure 1,

Figure 7 is a sectional view taken substantially on the line 7—7 of Figure 4,

Figure 8 is a perspective view of the cam shaft arm,

Figure 9 is a perspective view of the cam shaft,

Figure 10 is a perspective view of the rocker pin screw.

Referring to the drawings in detail it will be seen that the numeral 5 denotes a cam shaft having cams 6 thereon for operating the valves of an internal combustion engine in the usual well known manner. In the present instance this cam shaft is constructed with a journal portion 7, and a squared portion 8 immediately adjacent thereto.

A cam shaft operating gear 9 is rotatable on the journal portion 7 and is formed in one face with a recess 10. This cam shaft gear 9 is operated by a gear 11 on the crank shaft 12 so that the cam shaft 5 rotates at one half the crank shaft speed.

The gear 9 operates a gear 14 which may be utilized for driving the pump of the engine. The numeral 15 denotes the cam shaft arm which is provided with a central hub portion 16 having a squared opening 17 therein to fit over the squared portion 8 of the cam shaft so that the arm 15 extends equidistant from both sides of the cam shaft within the recess 10.

A pair of governor arms 18 are rockably mounted intermediate their ends on rocker pin screws 19 engaged in the gear 9 within the recess 10. Each governor arm 18 has a weighted portion 20 at one end which is curved and a reduced portion 21 at the other end. The extremity of the reduced portion 21 is adapted to engage one side of the arm 15.

The extremity of the ball portion 20 is recessed as at 22 and a pin 23 is mounted therein and has attached thereto a spring 24. The springs 24 are attached to adjustment screws 25 threadedly engaged in the ears or lugs 26 on the gear 9. Adjustable stops 28 are threadedly mounted in lugs 29 on the gear 9 to limit the outward swinging of the weighted portions 20 of the arms 18 which will be caused by centrifugal force when the gear 9 is in rotation sufficiently fast to overcome the tension of the spring 24.

As these weighted portions 20 swing outwardly the reduced portions 21 slide along the edges of the arm 15 to cause the advance-

ment of the rotation of the cam shaft and thereby cause the operation of the valve sooner in the cycles of the engine.

From the above detailed description it will be quite apparent that as soon as the gear 11 rotates it will impart rotation to the gear 9 and the reduced portions 21 will turn the arm 15 and the cam shaft at the same speed with the gear 9, but as the gear 9 increases in speed the centrifugal force will swing the arms 18 outwardly so that the reduced ends thereof will advance slightly the arm 15 and the cam shaft.

Of course as the speed of the engine decreases the speed of the gear 9 will also decrease so that the centrifugal force will be less effective so as to allow the springs 24 to rock the arms 18 back to their normal position and thereby retarding the valve operation.

Obviously by adjusting the tension of the spring 24 through the screws 25 the advancement of the cam shaft may be controlled until a proper adjustment has been made.

It will also be seen that the outward swinging of the weighted portions 20 is limited in an adjustable manner by the stops 28 which may be adjusted as may be found desirable.

From the above detailed description it will be seen that I have devised an exceedingly efficient structure, wherein the parts are arranged in a convenient and compact manner. The parts are capable of easy adjustment as far as is necessary to efficient operation and furthermore the assembly enables the parts to be put together and taken apart with facility.

It is thought that the construction, operation, utility and advantages of this invention will now be quite apparent to those skilled in this art without a more detailed description thereof.

The present embodiment of the invention has been disclosed in considerable detail merely for the purposes of exemplification since in actual practice it attains the features of advantage enumerated as desirable in the statement of the invention and the above description.

It will be apparent that changes in the details of construction, and in the combination and arrangement of parts may be resorted to without departing from the spirit or scope of the invention as hereinafter claimed or sacrificing any of its advantages.

Having thus described my invention, what I claim as new is:

1. A gear mechanism for advancing the operation of internal combustion engine valves including, in combination, a valve operating cam shaft, a gear rotatable on the shaft, an arm rigidly coupled to the shaft and extending therefrom in opposite directions, a pair of governor arms rockably connected intermediate their ends to the gear, one on each side of the arm, the alternate ends of the governor arms engaging the shaft arm and other alternate ends of the governor arms resiliently connected to the gear, and means supported on the gear for adjusting the tension of the resilient connection, adjustable limit stops supported on the gear for limiting the rocking movement of the governor arms, and each governor arm including a weighted end and a reduced end alternately disposed with respect to each other and the reduced alternate ends bearing against the arms and the alternate weighted ends resiliently connected to the gear.

2. A gear mechanism for advancing the operation of internal combustion engine valves, including, in combination, a valve operating cam shaft adapted to be journaled in an internal combustion engine, a gear rotatable on the cam shaft and adapted for operative connection to the driving gear on the crank shaft, said gear having a recess in one face, an arm rigidly coupled to the cam shaft and extending therefrom in opposite directions, said arm confined within said recess and extending diametrically of the gear, a pair of governor arms rockably connected to the gear adjacent their centers, one on each side of the arm, alternate ends of the governor arms having weighted portions and the other alternate ends of the arms having reduced portions in slidable abutment with the arms adjacent the opposite ends thereof, a pair of springs adjustably supported on the gear and connected with the alternate weighted portions of the arms, and a pair of adjustable limit stops supported on the gears to engage the governor arms to limit the outward movement of said governor arms.

In testimony whereof I affix my signature.

EDMOND LA CHAPELLE.