

May 6, 1930.

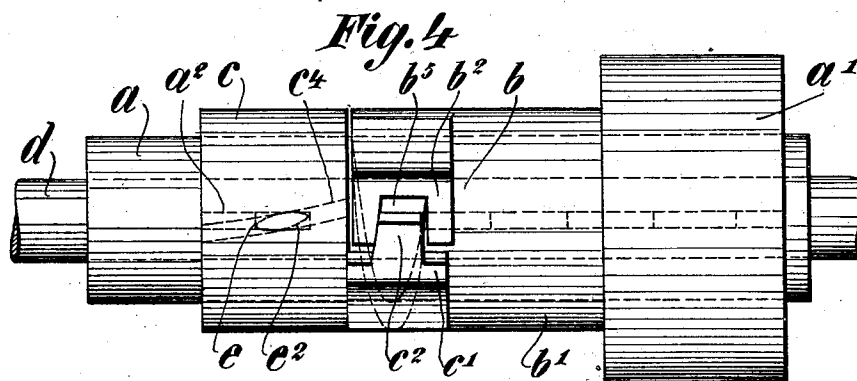
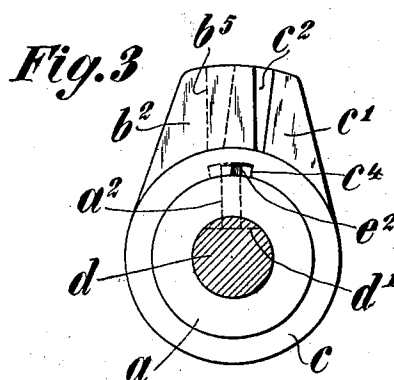
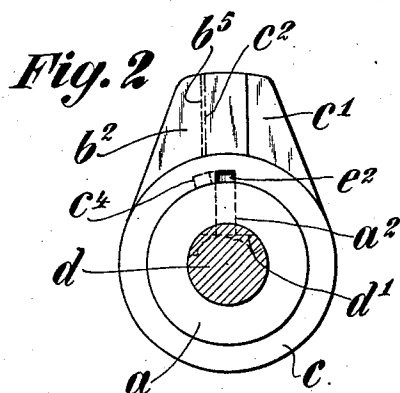
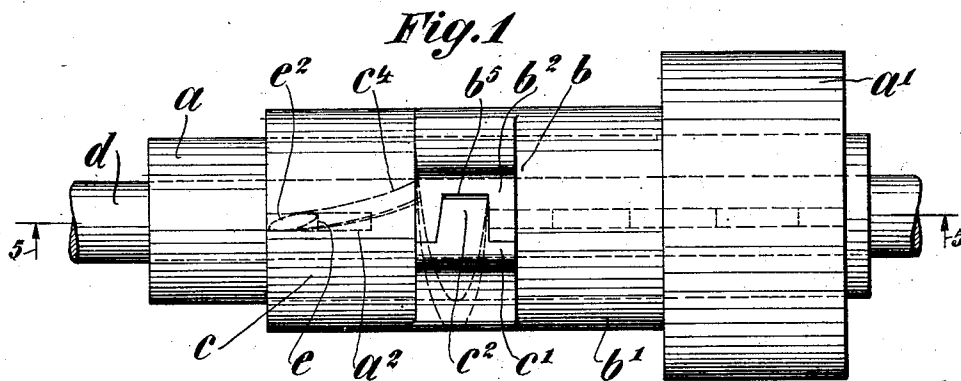
M. C. HORINE

1,757,046

VARIABLE NOSE CAM

Filed Feb. 27, 1929

2 Sheets-Sheet 1



Inventor:
Merrill C. Horine,
 By his Attorneys
 Redding, Greeley, O'Brien & Campbell

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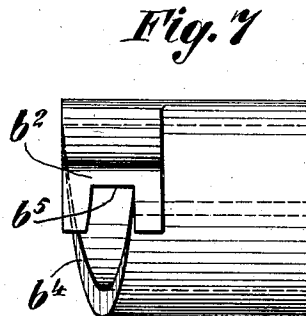
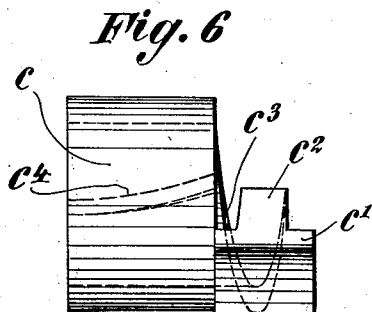
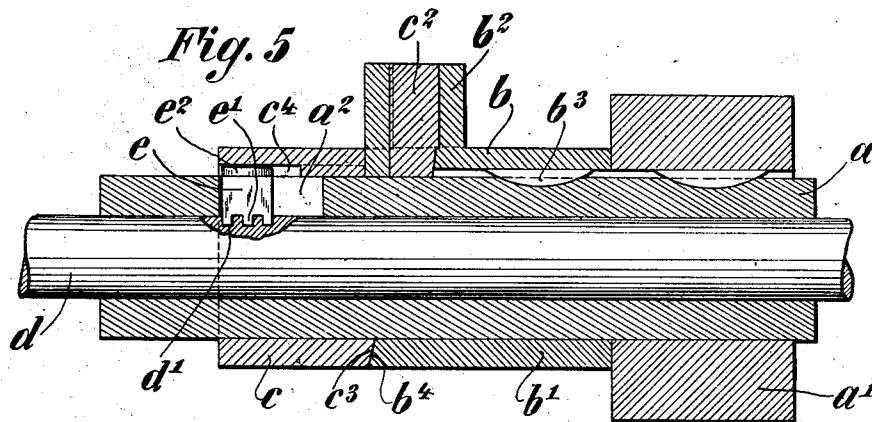
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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VARIABLE NOSE CAM

Application filed February 27, 1929. Serial No. 343,043.

The present invention relates to expanding or variable nose cams and embodies, more specifically, a cam, the nose of which may be expanded or varied during the continuous operation of the cam without interrupting the function which it accomplishes.

In many instances it is desirable to vary the characteristics of a cam during the operation thereof. This is particularly so in connection with engines operating at high speeds where the opening of the valves is required to be of greater duration than the opening required for low speeds. It will thus be seen that it would be very desirable to have a cam nose of greater width for use during high speeds than that for use under low speed conditions. In low speed engines, where the torque is great, the cam nose should be narrow to decrease the duration of the opening of the valves.

An object of the present invention is to provide a cam which is automatically variable during rotation thereof, thus not affecting the operation of the engine, and adapting the cam to the desired condition of operation.

A further object of the invention is to provide a cam of the above character, the parts of which are simple in construction and sufficiently strong to be highly serviceable, a device being associated therewith to vary the width of the nose as desired.

The above objects are attained by the provision of a cam formed of two parts, one of the parts telescoping in the other. One of the parts is keyed to the driving element and the other part secured thereto through a variable connection which is operated by a sliding rod within such driving part. By sliding the rod axially of the driving part, the movable cam element can be rotated and advanced into or away from the other element to vary the effective width of the nose of the cam.

Further objects and advantages will be apparent as the invention is described in greater detail in connection with the accompanying drawings, wherein:

Figure 1 is a plan view showing a cam constructed in accordance with the present invention, the nose thereof being adjusted to its smallest width.

Figure 2 is an end view, taken from the left in Figure 1, and showing the cam nose adjusted to its smallest width.

Figure 3 is a view similar to Figure 2 showing the cam nose expanded from the position shown in Figure 2.

Figure 4 is a plan view, similar to Figure 1, showing the cam nose expanded as in Figure 3.

Figure 5 is a view in section, taken on line 5—5 of Figure 1, and looking in the direction of the arrows.

Figure 6 is a plan view showing the left hand cam section as viewed in Figures 1, 4 and 5.

Figure 7 is a view, similar to Figure 6, showing the right hand cam section.

Referring to the above drawings, a designates a driving sleeve to which is keyed a collar a^1 . Abutting against the collar and keyed to the sleeve a , is a cam section b , this section being formed of a hub b^1 and a cam segment b^2 . The cam section b is keyed to the sleeve at b^3 and the outer face thereof is helically formed as at b^4 , as shown in Figure 7. The outer face merges into the outer edge of the cam segment b^2 , the latter being formed with a groove b^5 .

Aligned with the cam section b is a cooperating cam section c having a cam segment c^1 . This segment is formed with a tongue c^2 , the segment and tongue being adjacent the helically formed face of the cam section b . The face c^3 of the cam section c is helically formed to cooperate with the corresponding face b^4 of the cam section b . It will be seen that relative rotation of one section with respect to the other will advance the tongue c^2 into the groove b^5 or retract the same therefrom in accordance with the direction of such rotation. Such movement will be accompanied by a slight axial movement of one of the sections with respect to the other but the effective breadth of the cam will not be varied materially by such movement.

Figures 2 and 3 illustrate the manner in which the cam nose may be expanded or varied and the means for effecting such expansion during operation of the cam will now be described. Within the sleeve a , operat-

ing rod d is slidably mounted. A slot a^2 , lying in a radial plane of the shaft d is formed in the sleeve a and a curved groove c^4 is formed on the internal periphery of the cam section c . A movable cam key e is formed with teeth e^1 which engage corresponding teeth d^1 in the slide rod d . This cam key is slidable within the slot a^2 and is formed with a nose e^2 which is curved to engage the respective sides of the curved or helical groove c^4 within the cam section c .

From the foregoing description the operation of the device will be quite apparent since axial movement of shaft d with respect to the driving sleeve a causes the key e to be moved within the slot a^2 . Such movement is purely axial with respect to the sleeve a and cam section b but the nose of the key engages the corresponding side of groove c^4 and effects circumferential movement thereof with respect to the sleeve a and cam section b . This relative rotation between the cam sections serves either to expand or retract the cam in accordance with the direction of movement of the shaft d . In practice, the shaft d may be automatically moved in accordance with the speed of the engine, as by means of a flywheel or other form of speed responsive device.

Although the invention has been described in connection with the specific construction shown in the accompanying drawings, it is not to be limited, save as defined in the appended claims.

I claim as my invention:

1. A variable nose cam comprising a hollow driving member, relatively movable cam elements mounted on the driving member, one of said elements being keyed to the driving member and the other provided with a curved groove on its internal periphery, telescoping cam sections on the elements, an axially extending slot in the driving member, an operating rod in the driving member, and a key on the rod movable in the slot and engaging the groove to vary the telescoping of the cam sections.

2. A variable nose cam comprising a hollow driving member, an axially extending slot therein, relatively movable cam elements mounted on the driving member, one of said elements being keyed to the driving member, opposed cam sections on the elements, opposed helical faces on the elements, a curved groove in the other element, an operating rod in the driving member, and a key on the operating rod movable in the slot and engaging the groove.

3. A variable nose cam comprising a hollow driving member, an axially extending slot therein, relatively movable cam elements mounted on the driving member, one of said elements being keyed to the driving member, opposed cam sections on the elements, an operating rod in the driving member, a curved

groove in the other element, and a key on the operating rod movable in the slot and engaging the groove.

4. A variable nose cam comprising a hollow driving member, an axially extending slot therein, relatively movable cam elements mounted on the driving member, one of said elements being keyed to the driving member, opposed cam sections on the elements, an operating rod in the driving member, and a connection in the slot between the rod and the other of said elements to move one of the cam sections circumferentially with respect to the other.

5. A variable nose cam comprising a hollow driving member, an axially extending slot therein, a cam formed of a plurality of relatively movable elements mounted on the driving member, one of said elements being keyed to the driving member, an operating rod in the driving member, a movable key in the slot and engaging the rod, and a curved groove in the other element receiving the key.

6. A variable nose cam comprising a hollow driving member, an axially extending slot therein, a cam formed of a plurality of relatively movable elements mounted on the driving member, one of said elements being keyed to the driving member, an operating rod in the driving member, and means in the slot connecting the other element and the rod to move the last named element with respect to the driving member.

This specification signed this 23rd day of February, A. D. 1929.

MERRILL C. HORINE.