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IGNITION TIMING DEVICE FOR LOW SPEEDS

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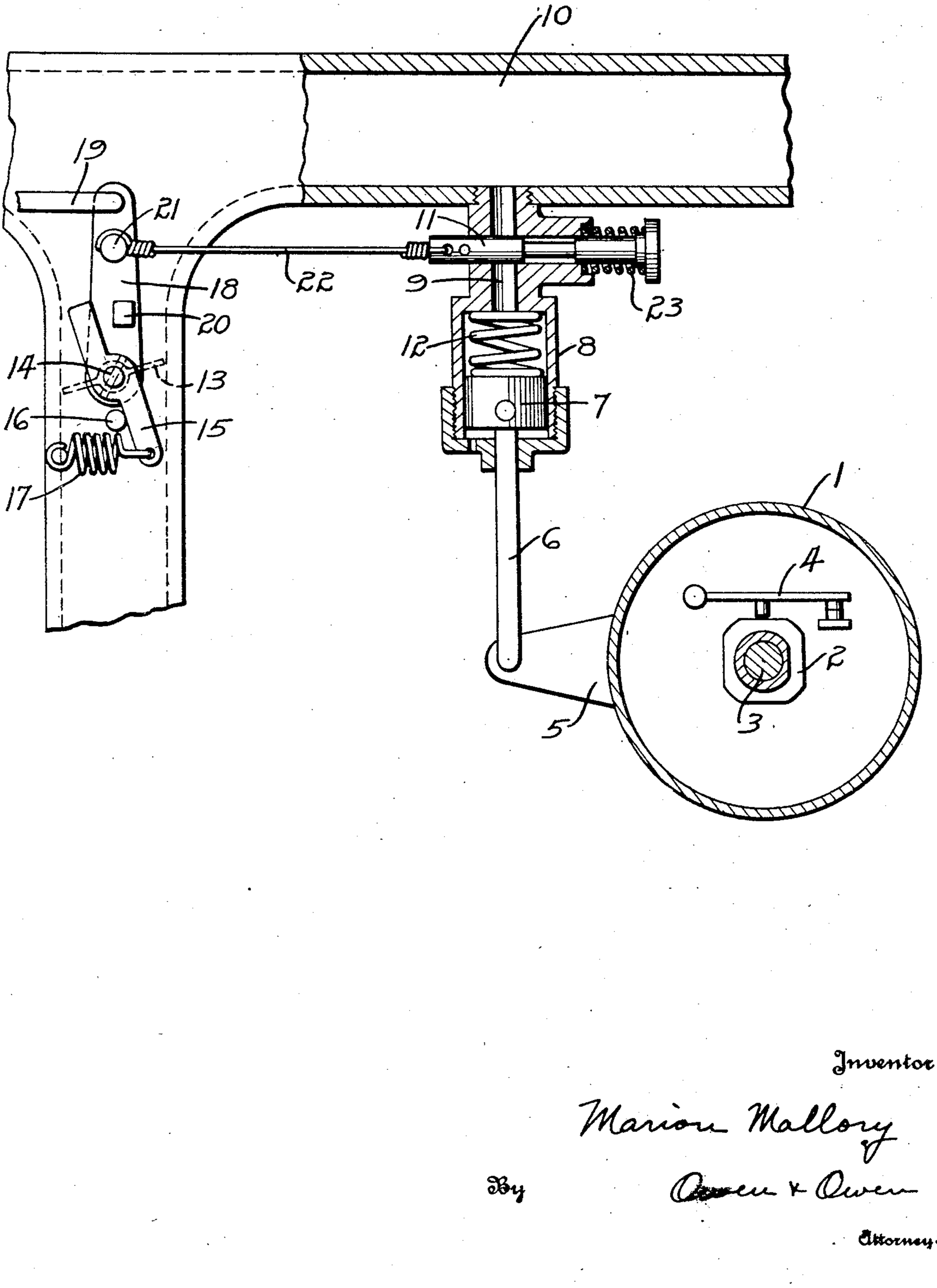

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IGNITION TIMING DEVICE FOR LOW SPEEDS

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This invention relates to a control device for ignition timers, with particular reference to conditions when the engine is idling or operating at low speeds.

In order to insure a smooth and steady operation when the engine is idling, it is necessary for the timer to be set so that the spark will occur when the crank is 5° to 10° past dead center. With such setting, when the throttle is opened, if the initial spark advance depends primarily upon a centrifugal governor, no advance will take place until there has been a considerable increase in speed and as a consequence the pick-up will be slow. On the other hand, if the spark is initially set where it should be for the best performance after the throttle is opened, the idling operation of the engine will be unsteady or perhaps stopped altogether.

With the above facts in mind, it is the object of the present invention to provide an improved device for controlling the timing at low speeds and particularly to provide for an immediate advance of the timing when the throttle begins to open. With such a device, the timer may be set for an extreme retardation of the spark when the throttle control means is in position for idling and yet, the moment the throttle begins to open, the spark will be advanced immediately so as to insure a quick pick-up. The subsequent control of the timing as the speed of the engine increases may be effected entirely by the action of the vacuum in the intake manifold or by any of the other usual devices which have been heretofore used.

The present embodiment of my invention will be more particularly described in connection with the accompanying drawing, which is a sectional view of the timer and intake manifold with the invention associated therewith.

As illustrated in the drawing, the timer comprises a housing 1 within which is a cam 2 mounted on the timer shaft 3 and adapted to actuate the circuit breaker 4. Associated with the timer is an arm 5 which is movable to and fro to advance or retard the times of ignition as will be readily understood by those familiar with the art. A rod 6 is connected at one end to the arm 5 and has a piston 7 connected to its other end. The piston 7 is reciprocable in a cylinder 8 which has a port 9 leading to the fuel intake passage 10 of the engine. The port 9, however, is normally closed by a valve 11 when the engine is idling. A spring 12 in the cylinder 8 is adapted to act on the piston 7 to maintain an extreme retardation of the timing mechanism when the engine is idling.

The throttle valve 13 is secured to a pivot pin 14 to which there is also secured a lever 15 which is held against a stop 16 by a spring 17 to maintain the throttle valve in closed or idling position except when it is positively opened by other means. For opening the throttle valve a control arm 18 is journaled on the pin 14 and has a connection 19 with the accelerator. In order to open the throttle valve, the control arm 18 is moved about its pivot with the lug 20 engaging the end of the lever 15. The arm 18 also has a lug 21 which is connected by a rod or wire 22 with the valve 11. When the arm 18 is released, a spring 23 acts on the valve 11 to close the same and at the same time to swing the arm 18 away from the lever 15 as the latter engages the stop 16 with the throttle valve 13 closed. When the throttle control arm is released for idling, therefore, there is a lost motion of the arm 18 which must be taken up as the accelerator is again moved to open the throttle valve.

From the foregoing description, it will be understood that when the throttle control is in idling position as illustrated in the drawing, the valve 11 will be closed and the timing mechanism, then controlled entirely by the action of the spring 12, will be in its extreme retarded position. With the throttle closed, even though the engine is idling, there will be a high vaccum in the intake passage 10 but, with the valve 11 closed, this vacuum will have no effect upon the piston 7 and with the maximum retardation of the timing, the idling operation will be smooth. As the accelerator is actuated to open the throttle, the lost motion between the arm 18 and the lever 15 will first be taken up and just as soon as the throttle valve begins to

open, the valve 11 will open the port 9, providing a free communication between the intake passageway 10 and the interior of the cylinder 8. The suction produced in the passage 10 by the operation of the engine will then be communicated to the piston 7 and will actuate the latter in opposition to the spring 12 to advance the timing and since, with the throttle in any given position, the increasing speed of the engine will cause an increasing vacuum in the intake passage, the timing will be progressively advanced. If the throttle valve, however, is suddenly opened wide, there will be comparatively little vacuum in the passageway 10 and there will be a correspondingly limited advance of the timing until the speed of the engine increases and the compression in the cylinders decreases. This prevents a spark knock such as frequently occurs with timers as heretofore constructed, when the engine is traveling at low or moderate speed and the throttle is suddenly opened.

While I have described in detail the present form of the invention, it is to be understood that the same includes all such modifications that may fall within the scope of the appended claims.

What is claimed is:

1. The combination with an ignition timer mechanism, of a member connected with said timer mechanism and movable back and forth to vary the timing, a throttle valve, an arm having a connection for controlling the throttle valve, with a lost motion between the idling position of said arm and the position where it begins to open the throttle, and means actuated by said arm as the throttle begins to open, to act on said member to advance the timing before there is any material increase in the engine speed.

2. The combination with an ignition timer mechanism, of a member connected with said mechanism and movable back and forth to vary the timing, a throttle valve, an arm having a connection with the throttle valve for opening it, with a lost motion between the idling position of said arm and the position where it begins to open the throttle valve, and means actuated by said arm as the throttle valve begins to open, to cause the vacuum in the intake passage of the engine to act on said member to advance the timing before there is any material increase in the engine speed.

3. The combination with an ignition timer mechanism, of a piston connected with said mechanism and reciprocable to vary the timing, means operable by itself on said piston to cause maximum retardation when the engine is idling, a throttle valve, an arm having a connection with the throttle valve, with a lost motion between the idling position of said arm and the position where it begins to open the throttle valve, and means actuated by said arm, as the throttle valve begins to open, to act on said member to advance the timing before there is any material increase in the engine speed.

4. The combination with an ignition timer mechanism, of a piston connected with said mechanism and pneumatically operable to advance the timing, a cylinder for guiding said piston and having a port leading from the cylinder to the intake passage of the engine, a valve normally closing said port when the engine is idling, a throttle valve, an arm having a connection with the throttle valve for controlling the same, with lost motion between the idling position of said arm and the position where it begins to open the throttle valve, and means actuated by said arm to open the first mentioned valve as the throttle valve begins to open.

5. The combination with the ignition timing mechanism and the intake manifold of an internal combustion engine, of a member connected with said timing mechanism and movable back and forth to vary the timing, a passageway leading from said member to the intake manifold, a valve for said passageway, a spring acting directly upon said valve and operable by itself to close said valve, a throttle valve, control means for said throttle valve, and a connection between said control means and the first mentioned valve for opening the same as soon as the control means is actuated to open the throttle.

In testimony whereof I have hereunto signed my name to this specification.

MARION MALLORY.