Sept. 6, 1927. 1,641,930

G. D. LAWSON

CAM OPERATED TIMER

Filed Jan. 10, 1925

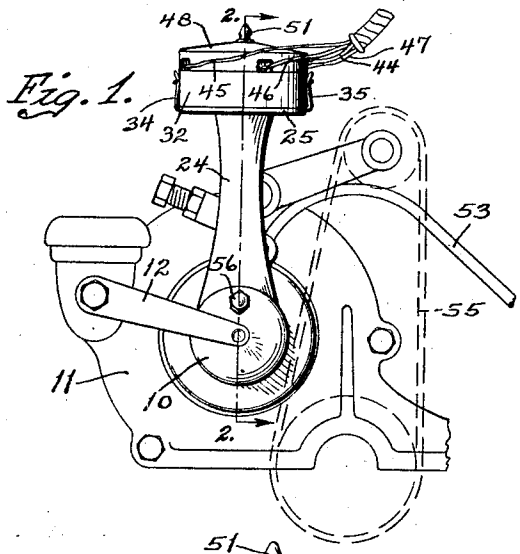


Fig. 1.

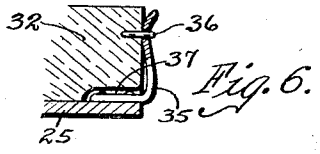


Fig. 6.

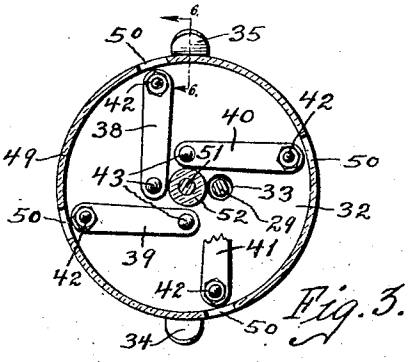


Fig. 3.

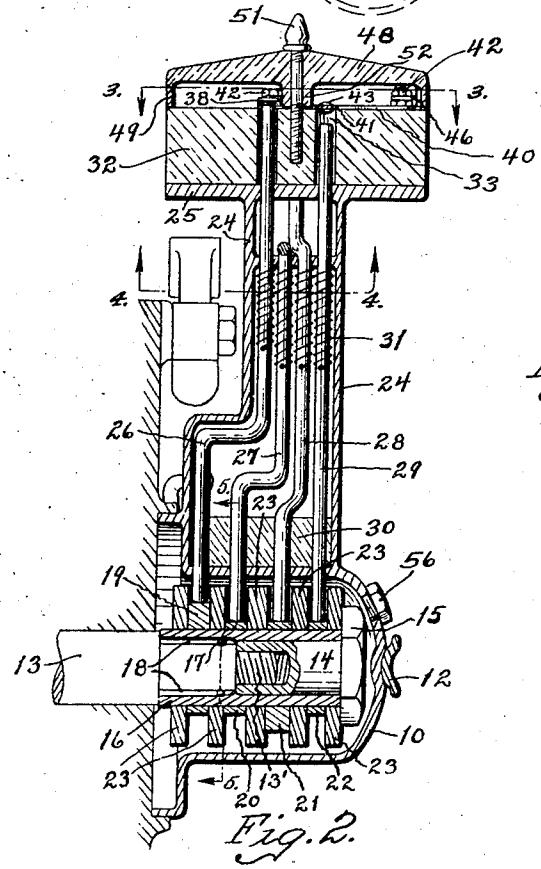


Fig. 2.

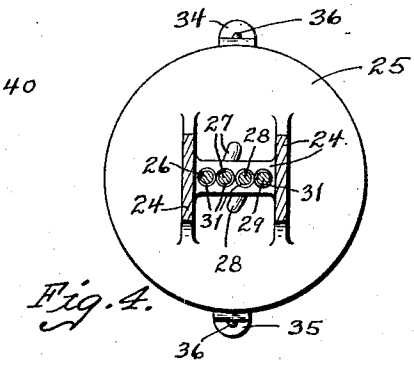


Fig. 4.

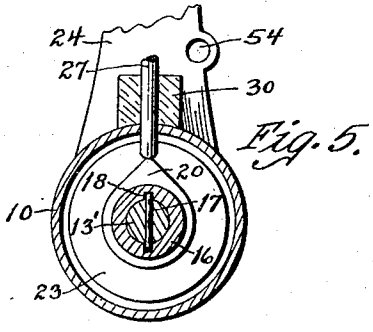


Fig. 5.

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UNITED STATES PATENT OFFICE.

GEORGE D. LAWSON, OF POCAHONTAS, IOWA.

CAM-OPERATED TIMER.

Application filed January 10, 1925. Serial No. 1,704.

The object of this invention is to provide an improved cam-operated timer for use on motor vehicles.

A further object of this invention is to provide an improved timer especially designed for use on Ford motor vehicles, which is positive and sure in operation and capable of very extensive service.

A further object of this invention is to provide an improved timer in which particular precautions have been used to avoid short circuiting or other disarrangement which might interfere with correct operation.

With these and other objects in view, my invention consists in the construction, arrangement and combination of elements hereinafter set forth, pointed out in the claims and illustrated by the accompanying drawing, in which—

Figure 1 is a front elevation showing my improved timer installed as required for practical use. Figure 2 is a vertical section, on an enlarged scale, on the line 2—2 of Figure 1. Figures 3 and 4 are cross-sections on the lines 3—3 and 4—4 respectively of Figure 2. Figure 5 is a detail section substantially on the line 5—5 of Figure 3. Figure 6 is a detail section substantially on the line 6—6 of Figure 3.

In the construction of the device as shown the numeral 10 designates a housing, of generally cylindrical form, mounted for rotary oscillation against the forward face of the cylinder front cover plate 11 of the motor, in the seat provided for the timer, and held in place by the ordinary spring clamp 12 engaging at one end axially of the said housing or case 10. The housing 10 encloses the end of the cam shaft 13 of the motor, which projects through the cover plate 11, as well as other parts of my device which are mounted on or carried by said cam shaft. The operative parts of my device occupy more space axially of the shaft 13 than the timer mechanism ordinarily provided for this motor, so I have extended the shaft, to accommodate said parts, by adding an internally threaded tubular extension 14 adapted to be screwed on the reduced threaded portion 13′ of said shaft, said tubular extension having at its outer end an integral angular wrench-receiving portion or head 15 by which it may be applied and removed, and also designed to hold other elements in position. A cylindrical sleeve 16 is provided and is adapted to be applied by endwise movement to the projecting portion of the shaft 13, before the tubular extension 14 is put in place, after which the extension is applied and its head 15 serves to hold said sleeve in place. Any desired means may be employed to cause the sleeve 16 to rotate with the shaft 13, such as a pin 17 extending diametrically through said shaft and projecting at its ends into internal longitudinal grooves 18 formed in said sleeve. Mounted rigidly on the sleeve 16 and for rotation therewith and with the cam shaft 13 are spaced cams 19, 20, 21, 22, four in number to correspond with the number of cylinders of the motor, which cams are alike and have their operating points set ninety degrees apart, successively, circumferentially of said sleeve. A plurality of disks 23 are provided, which are of greater diameter than any portion of the cams, and are placed one on each side of each cam, whereby said cams are spaced apart, and the outermost disk is engaged by the head 15 of the tubular extension. A frame 24 is formed on and extends upwardly from the housing 10 and terminates at its upper end in a base plate 25 of circular form adapted to support other elements. Push rods 26, 27, 28, 29 are arranged for vertical reciprocation in the frame 24 and have bearings at their upper ends in the base plate 25 and at their lower ends in a bearing block 30, preferably of fibre or other suitable insulating material, carried by said frame. The lower ends of the push rods 26, 27, 28, 29 extend slidably through the top portion of the housing 10 and into the spaces between successive disks 23, and are adapted to be engaged and operated by the cams 19, 20, 21 and 22 respectively. The lower end portions of the push rods 26, 27, 28, 29 are in a common plane perpendicular to the face of the cover plate 11, and are of course spaced apart in said plane to correspond to the spacing of the cams; but above the bearing block 30 some of them may be offset, in said plane, to bring them into close proximity; and still higher up the intermediate rods, 27 and 28, are offset laterally in opposite directions equal distances outside of said plane, whereby the upper ends of the four rods are arranged in the form of a square as indicated in Figure 3. Coil springs 31 are mounted on the push rods

26, 27, 28, 29 and secured at one end thereto, the opposite end of each spring engaging a portion of the frame 24 and tending to press said rods into engagement with their cams.

Mounted on and removably attached to the base plate 25 is an insulating base member 32, relatively thick and of circular form and having a diameter corresponding to that of said base plate. The insulating base member 32 is formed with four holes extending therethrough in a form of a square and each indicated by the numeral 33, the position of the holes and rods, which extend therein, being indicated in Figure 3. The holes 33 are of materially greater diameter than the rods 26, 27, 28, 29, so that there is a clearance. Fixed to the upper surface of the base plate 25, preferably in diametrically opposed relations, are clamping springs 34, 35 of angular form, having portions extending upwardly outside the circumference of said base plate and adapted to engage the periphery of the insulating base member 32 and hold it in place. A pin 36 is provided to extend through each of the springs 34, 35 into member 32. The lower peripheral portion of the member 32 is formed with recesses, one of which is shown in Figure 6 and designated by the numeral 37, to receive the base portions of the springs 34, 35. Contact springs 38, 39, 40 and 41, of flat form, are mounted in spaced relation on the insulating base member 32 and secured at one end thereto by screws 42 or studs, the free ends of said contact springs overlying the respective holes 33 in said member and adapted to be contacted by the upper ends of the rods 26, 27, 28 and 29, respectively, when said rods are elevated by the cams. Each contact spring, 38, 39, 40, 41 preferably has near its free end a thickened contact point or knob 43 adapted to receive the actual contact of the push rod. The studs or posts 42 are adapted to receive connection of conductors 44, 45, 46 and 47 which form a part of the ignition system in a common manner and are connected to the spark coils (not shown) of the motor. A cap 48 is provided for the insulating base member 32, which cap also is of insulating material and is formed with a peripheral flange 49 adapted to rest on a marginal portion of said base member, whereby a housing is provided for the contact devices, and the lead wires or conductors 44, 45, 46, 47 enter said housing through notches 50 formed in said marginal flange. The cap 48 is held in place by a screw 51 extending therethrough and seated in the member 32 in a central location, and said cap also is formed with a central boss 52 on its lower surface, contacting with the top of the member 32 and serving to completely house the screw 51 and also to space apart and insulate from each other the contact springs and the push rods 26, 27, 28, 29 when they project from said base member.

In practical use the mechanism is assembled and mounted as shown and described, and in operation of the motor the cam shaft 13 is rotated, causing the cams 19, 20, 21 and 22 to turn and to successively operate and elevate the push rods 26, 27, 28 and 29 respectively, thereby causing contacts with the respective members 38, 39, 40 and 41. This causes impulses to be transmitted through the conductors 44, 45, 46 and 47 to the coils and thence to the spark gaps of the motor to control the time of firing in the common manner, the current being grounded through my device because of the metallic contact of the separate push rods with the cams which are in turn metallically connected with the cam shaft. The spark is advanced or retarded manually by the usual spark rod 53 which has one end connected with the spark lever (not shown) on the steering column, the opposite end of said rod being bent at right angles and extending through a hole 54 in one side of the frame 24 and secured in any suitable manner. As the rod 53 is reciprocated through oscillation of the control lever, the frame 24 is swung on the axis of the cam shaft 13, carrying with it the other parts of the mechanism with the exception of those which are mounted on the cam shaft. This movement changes the position of the push rods relative to the cam points, as the push rods are moved through arcs circumferentially of the cams, and thereby the spark is advanced or retarded.

The operation of the spark controls through cams and push rods is sure, certain and positive, and there is no danger of shorts occurring, or of the contact points becoming covered with grease so that they will not operate. Furthermore, there is very little wear upon the moving parts, which is one of the great drawbacks of the common rotary type of contact device, and it is thought this timer will last as long as the motor with which it is used.

The housing 10 is considerably reduced in diameter just beyond its base, which fits in the seat on the cover plate 11, and this provides ample room for the fan belt, shown by dotted lines at 55 in Figure 1, and this overcomes another difficulty encountered with the ordinary types of timer used on this style of vehicle, in which the fan belt frequently contacts with the timer case and causes trouble.

The housing 10 may be filled with lubricant through an opening normally closed by a screw plug 56.

I claim as my invention—

1. A timer for use in connection with the cam shaft of an internal combustion motor

which shaft is threaded at its outer end, comprising a tubular extension internally threaded at one end and adapted to be screwed on said cam shaft, a sleeve embracing said tubular extension and a portion of said cam shaft and arranged for rotation with the latter, together with longitudinally and circumferentially spaced cams carried by said sleeve, said tubular extension being formed with a wrench-receiving head engaging the outer end of said sleeve, a plurality of push rods arranged for reciprocation and each engageable by one of said cams, a plurality of contact devices each engageable by one of said push rods, and means for connecting said contact devices with the ignition devices of the motor.

2. A timer, comprising a housing mounted for rotary oscillation, a plurality of cams mounted for rotation within said housing, a frame formed on said housing, a plurality of push rods mounted for reciprocation in said frame and arranged at one end in the same plane and extending within the housing, each push rod extending within the range of one of said cams, an insulating member carried by said frame, through which said push rods are adapted to project at times, some of said push rods being offset laterally in their upper portions so that their ends are arranged in the form of a polygon, spring contact members carried by said insulating member and adapted to be engaged by the respective push rods at times, an insulating member extending between and separating the contact portions of said contact members, and means for oscillating said housing and frame to change the position of the push rods circumferentially of the cams.

3. In a motor having a cam shaft, a series of separately formed and independent cams adapted to be mounted longitudinally of said shaft and independently detachable therefrom, a housing to enclose said cams, a plurality of push rods extending slidably within said housing and into the range of said cams, a plurality of separate disks mounted one on each side of each cam and being of greater diameter than said cams and serving as guides and spacers for the lower ends of said push rods, a plurality of contact members adapted to be engaged at times by the respective push rods, means for connecting said contact members with the ignition devices of the motor, and means for oscillating the housing to change the position of the push rods circumferentially of the cams.

Signed at Pocahontas, in the county of Pocahontas and State of Iowa, this 19th day of November, 1924.

GEORGE D. LAWSON.