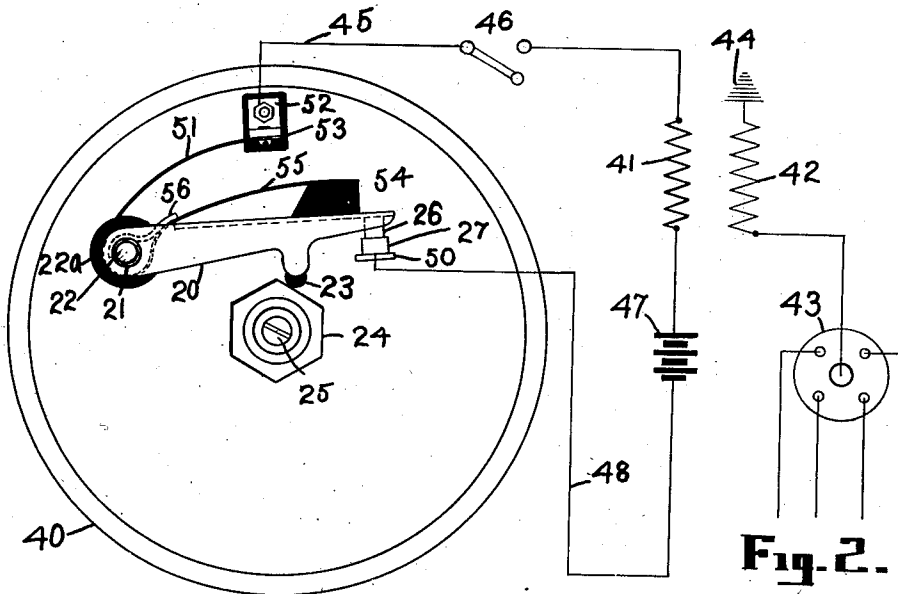
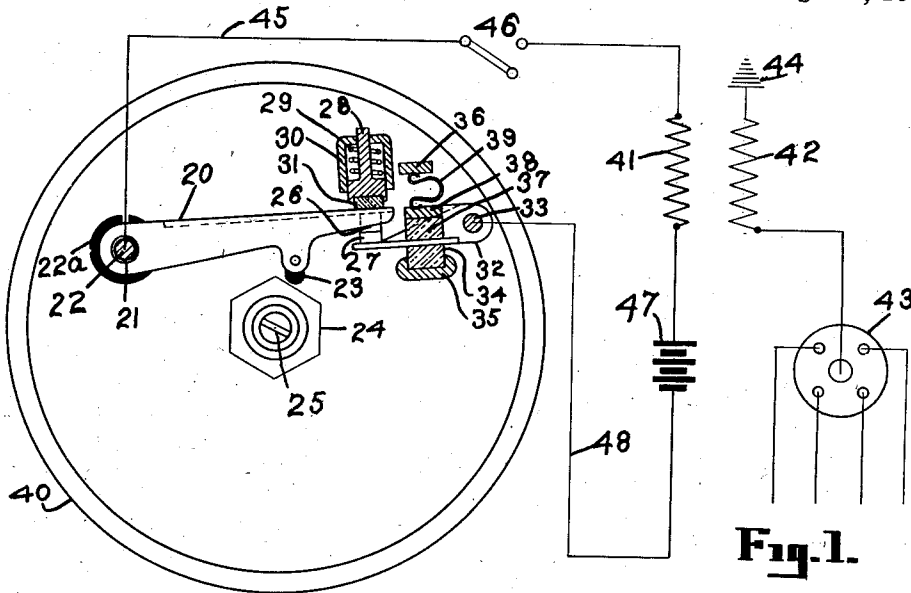


J. H. HUNT.
IGNITION SYSTEM.
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1,426,873.

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IGNITION SYSTEM.

1,426,873.

Specification of Letters Patent. Patented Aug. 22, 1922.

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To all whom it may concern:

Be it known that I, JOHN H. HUNT, a citizen of the United States of America, residing at Dayton, county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Ignition Systems, of which the following is a full, clear, and exact description.

This invention relates to an improvement in ignition systems for internal-combustion engines, and more particularly to the timing mechanism of such systems.

One of the objects of the present invention is to provide means for reducing the chattering or rebounding of the timer contacts which ordinarily takes place in an ignition timing device having a timer cam which controls the opening and closing of the primary circuit.

In carrying out this object it is a further object of the invention to provide means for reducing the rebounding of the contacts by absorbing the energy of impact of the contacts, with a result that the contacts will remain as long as possible in circuit closing relation until the cam operates again to separate the contacts.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein preferred embodiments of the present invention are clearly shown.

In the drawings:—

Fig. 1 is a plan view showing one form of timer mechanism embodying the present invention, certain parts being shown in section for the sake of clearness, and a wiring diagram showing the application of the timer mechanism to an ignition system; and

Fig. 2 is a plan view showing a modification of the timer mechanism shown in Fig. 1.

Referring to the drawings, 20 is an arm of light construction pivoted upon a stud 22 by means of a hub 21. Stud 22 is mounted upon the timer cup 40, but insulated therefrom by an insulating member 22^a. Arm 20 carries a cam follower 23 which is engaged at intervals by means of a cam 24 carried by an engine driven shaft 25. The free end of arm 20 carries a contact 26 which cooperates with contact 27. The contacts 26 and 27 are normally held in engagement by means of a plunger 28 pressed by a spring 29 and sliding in a support 30 formed integrally with

the base of timer cup 40, which base is formed of conducting material. A block 31 of elastic yielding material, preferably of rubber, is interposed between the plunger 28 and the arm 20. It will be noted that the pressure exerted by spring 29 is in alignment with contacts 26 and 27.

Contact 27 is mounted upon arm 32 pivoted at 33 upon support 40. Rubber cushion 34 is located between the arm 32 and a cushion carrying member 35 formed upon the support 40. Interposed between the arm 32 and lug 36 which is formed upon timer cup 40, are rubber cushion 37, plate 38, and spring 39.

When contacts 26 and 27 come together suddenly under the action of spring 29, the contacts will move in touching relation a short distance, causing compression of cushion stop 34. When the energy of impact has been absorbed by being converted into potential energy in cushion 34, said cushion 34 will expand, causing compression of members 37, 39, 31 and 29. A slight oscillation of arm 32 will take place until the equilibrium is established and the contacts return in touching relation to the normal position occupied just before the cam operates to cause separation of the contacts. The energy of impact of the contacts is thus absorbed by means of the springs and rubber cushions which permit the contacts to move together, but in circuit closing relation until the contacts are again separated by the action of the cam 24 on arm 20.

The action of the rubber elements in absorbing the energy of impact and in preventing rebound is believed to be due to the property exhibited by the rubber known as elastic hysteresis. This property is based on the fact that when a piece of soft rubber is distorted by a blow the reactionary force is much less than the force of the blow, much of the energy of the blow being absorbed by the rubber. In the present invention, when the contact 26 suddenly strikes the contact 27, the energy of impact is delivered to the rubber blocks 31 and 34. Block 31 absorbs much of the energy imparted to it, permitting very little to pass into the spring 29. Block 34 absorbs much of the energy imparted to it, and block 37 in turn reduces the energy imparted to spring 39. It will be seen that the restoring action of spring 29 is not appreciably hindered by the re-

action from impact; but while block 31 is being compressed in absorbing the energy of impact of contact 26 upon contact 27, spring 29 may continue to apply pressure to maintain these contacts in engagement.

While rubber is preferred as a cushioning material, it will be understood that other substances may be used which exhibit elastic hysteresis under the conditions referred to.

In the wiring diagram, 41 indicates the primary winding of the induction coil, and 42 the secondary winding. One end of the secondary winding 42 is connected with a distributor 43 and the other end of the secondary winding 42 is grounded at 44. One end of the primary winding is connected by means of wire 45 with the insulated stud 21. The wire 45 is provided with an ignition switch 46. The other end of the primary winding is connected to a battery or other source of current 47, which in turn is connected by means of wire 48 with the arm 32. Thus it will be seen that, when the ignition switch is closed and contacts 26 and 27 are in circuit closing position, the primary circuit will be completed.

Since the rebounding of the contacts has been eliminated by the provisions afforded by the timer mechanism described, the time in which the primary circuit will remain closed has been increased to a maximum and therefore the efficiency of the ignition system is increased.

Fig. 2 illustrates a modified form of the present invention. The contact 27 is mounted upon a support 50 which is formed upon the timer cup 40. A spring 51 is fixed at one end to a bracket 52 mounted upon insulating pad 53, and partly encircles hub 21 of arm 20, and extends alongside of said arm. A block of rubber 54 is vulcanized upon said arm, and the free end 55 of spring 51 bears thereupon. A clip 56 is secured to spring 51 and serves to retain the said spring in proper position, and to conduct current passing through wire 45, bracket 52 and spring 51, into hub 21 and arm 20. The current will flow across contacts 26 and 27, when touching, and thence by wire 48 to the battery 47.

It is believed that the energy of impact due to the sudden striking of contact 26 against contact 27 passes into the cushion 54 which absorbs this energy in a large measure, permitting but little to pass into the spring 51. The restoring action of spring 51 is not appreciably hindered by the reaction from impact; but, while cushion 54 is being compressed in absorbing the energy of impact, spring 51 continues to apply pressure to maintain the contacts in engagement.

While the forms of mechanisms herein shown and described constitute preferred embodiments of the present invention, it is

to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What I claim is as follows:

1. In a timer mechanism, the combination with cooperating contacts; of means for separating the contacts; means for bringing the contacts together after separation; means for absorbing the energy of impact of the contacts, consisting of a yieldable elastic support for one of the contacts which absorbs energy of impact and becomes distorted; and means for retarding the return movement of the support to its normal shape.

2. In a timer mechanism, the combination with cooperating contacts; of means for separating the contacts; means for bringing the contacts together after separation; means for absorbing the energy of impact of the contacts, consisting of a yieldable elastic support for one of the contacts which absorbs energy of impact and becomes distorted; and means for absorbing the energy of the distorted support as it returns to its normal shape.

3. In a timer mechanism, the combination with cooperating contacts; of a pivoted arm carrying one of the contacts; a second pivoted arm carrying the other contact; yielding means urging the first arm toward the second and normally maintaining the contacts in touching relation; means for intermittently causing separation of the contacts; a yieldable stop interposed in the path of movement of the second arm, and on one side thereof; and yielding means urging the second arm toward the yieldable stop.

4. In a timer mechanism, the combination with cooperating contacts; of a pivoted arm carrying one of the contacts; a second pivoted arm carrying the other contact; yielding means urging the first arm toward the second and normally maintaining the contacts in touching relation, said yielding means consisting of a spring pressed plunger and a block of elastic material interposed between the plunger and the first arm; means for intermittently causing separation of the contacts; a yieldable stop interposed in the path of movement of the second arm and on one side thereof; and yielding means urging the second arm toward the yieldable stop.

5. In a timer mechanism, the combination with cooperating contacts; of a pivoted arm carrying one of the contacts; a second pivoted arm carrying the other contact; yielding means urging the first arm toward the second and normally maintaining the contacts in touching relation; means for intermittently causing separation of the contacts; a block of elastic material interposed in the path of movement of the second arm and on one side thereof; and yielding means urging the second arm toward the said block, said

yielding means comprising a spring and a second block of elastic material interposed between the spring and the second arm.

6. In a timer mechanism, the combination
5 with cooperating contacts; of a pivoted arm carrying one of the contacts, a second pivoted arm carrying the other contact; yielding means urging the first arm toward the second and normally maintaining the con-
10 tacts in touching relation, said yielding means consisting of a spring-pressed plunger and a block of elastic material interposed between the plunger and the first arm; means for intermittently causing separation
15 of the contacts; a block of elastic material interposed in the path of movement of the second arm and on one side thereof and yielding means urging the second arm toward the said block, said yielding means
20 comprising a spring and a block of elastic material interposed between the spring and the second arm.

7. In a timer mechanism, the combination with cooperating contacts; of a movable
25 member carrying one of the contacts, means cooperating with the movable member to effect separation of the contacts; and means for bringing the contacts together after separation and absorbing the energy of impact
30 comprising a spring and a block of elastic material interposed between the spring and the movable member.

8. In a timer mechanism, the combination with cooperating contacts; of a pivoted arm
35 carrying one of the contacts; means cooperating with the pivoted arm to effect separation of the contacts; and means for bringing the contacts together after separation, comprising a spring and a block of elastic material interposed between the spring and the
40 pivoted arm.

9. In a timer mechanism, the combination with cooperating contacts; of a movable member carrying one of the contacts; means
45 cooperating with the movable member to periodically separate the contacts; and

means for bringing the contacts together after separation, said means comprising a spring and a cushioning member interposed
50 between the spring and the movable member, said cushioning member having the property of exhibiting elastic hysteresis, whereby to reduce the rebounding of the contacts.

10. In a timer mechanism, the combina- 55
tion with cooperating contacts; of a pivoted arm carrying one of the contacts; a cam cooperating with the pivoted arm to periodically separate the contacts; and means
60 for bringing the contacts together after separation, said means comprising a spring and a block of cushioning material interposed between the spring and the arm, said cushioning material exhibiting elastic hysteresis
65 whereby to reduce the rebounding of the contacts after being brought together.

11. In a timer mechanism, the combination with cooperating contacts; of a pivoted arm carrying one of the contacts; a cam co-
70 operating with the pivoted arm for intermittently separating the contacts; and means for bringing the contacts together after separation, said means including a spring and a block of rubber interposed between the
75 spring and the arm, said rubber being constructed to exhibit elastic hysteresis whereby to reduce the rebounding of the contacts after being brought together.

12. In a timer mechanism, the combination with cooperating contacts; of means for
80 intermittently separating said contacts; a spring tending to close said contacts; and means for absorbing the energy of impact of said contacts including a cushioning member acted upon by said spring, said cushion-
85 ing member exhibiting elastic hysteresis.

In testimony whereof I affix my signature.

JOHN H. HUNT.

Witnesses:

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