

G. T. BROWN.

TIMER.

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997,746.

Patented July 11, 1911

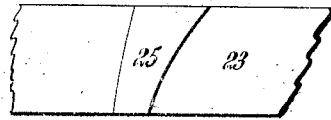
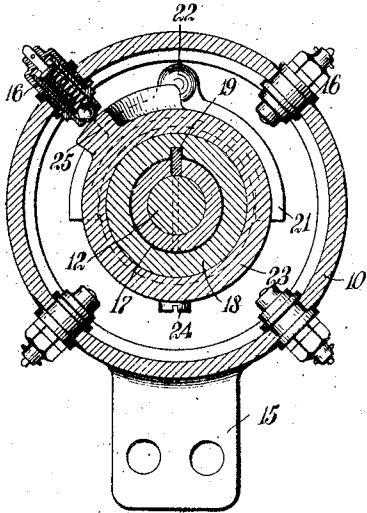
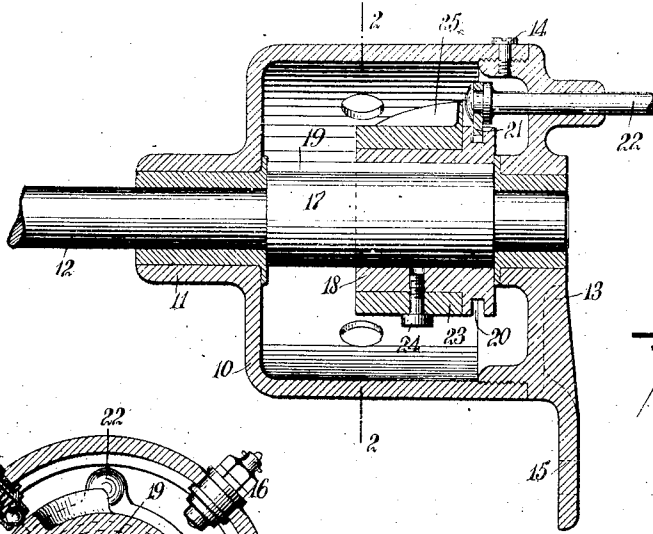
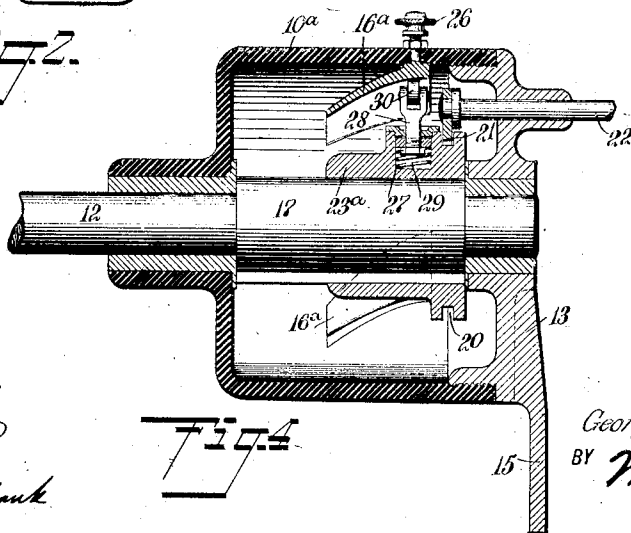


Fig. 2



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TIMER.

997,746.

Specification of Letters Patent.

Patented July 11, 1911.

Application filed December 18, 1909. Serial No. 533,854.

To all whom it may concern:

Be it known that I, GEORGE T. BROWN, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Timer, of which the following is a full, clear, and exact description.

This invention relates to certain improvements in timers for use in controlling the closing of a plurality of electric circuits in succession, and relates more particularly to the type of timer commonly employed with the electric ignition system of multiple cylinder internal combustion engines.

The main object of my invention is to so form the timer that the length of time during which the contact is made, will be substantially uniform irrespective of the speed of the engine.

In my improved timer I close the circuit by bringing into engagement with each other, two contact members, one of which presents a helical face, and I control the advancement or retardation of the spark by varying the point of engagement along the helical contact face in substantially the same manner as in my previous Patent, No. 938,208, granted October 26, 1909. In order to automatically control the length of time of the contact, I form the face of greater width adjacent one end than adjacent the other, so that as the point of contact is moved toward one end of the face and the spark advanced to increase the speed of the engine, the contact will be made across the wider portion of the face, and this wider portion traveling at higher speed will give substantially the same length of contact as the narrower portion traveling at lower speed.

A further object of my invention is to improve the means for advancing or retarding the time of contact.

Further objects and advantages of my improved construction will be set forth hereinafter and the invention defined in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures, and in which—

Figure 1 is a longitudinal section through a timer constructed in accordance with my

invention and in which the rotatable contact member presents a helical face; Fig. 2 is a transverse section on the line 2—2 of Fig. 1; Fig. 3 is a development of a portion of the surface of the rotatable contact member shown in Figs. 1 and 2; and Fig. 4 is a longitudinal section similar to Fig. 1, but showing a form in which the plurality of stationary contact members present helical faces.

The two specific forms illustrated in the drawings are adapted for use as timers for multiple cylinder internal combustion engines, but it is evident that the same novel features of construction might be embodied in devices for other uses, as, for instance, in distributors and in circuit closers generally.

In the specific form shown in Figs. 1 to 3, I employ a cylinder casing 10, having one end wall integral therewith and providing a bearing 11 for a rotatable shaft 12. At the opposite end of the casing, there is provided a removable wall 13, secured in place by screw threads or in any other suitable manner and adapted to be locked against accidental loosening by a locking screw 14. Either the casing or the end wall, but preferably the latter, is provided with a bracket 15, by means of which the casing may be rigidly and firmly secured to the engine base or to any other suitable support. The casing, about its periphery, is provided with a plurality of openings, within which are supported a plurality of contact members 16. These contact members are spaced at equal distances apart and correspond in number to the number of engine cylinders. Each contact member is insulated from the wall of the casing in case the latter is not made of insulating material, and each contact member preferably carries at its inner end, a spring-pressed ball which has a contact face. The ball is capable of rotation as it is struck by the movable contact member hereinafter described, and is capable of a slight outward movement, so that it will always make the proper contact and close the circuit. I do not claim any special novelty in the contact member *per se*, and do not desire to be limited to the contact member shown, but in practice I have found this specific contact member very efficient in operation.

The shaft 12 is journaled in the opposite end walls of the casing, and within the cas-

ing it carries a sleeve 17, which engages with the opposite end bearings and positively prevents any longitudinal movement of the shaft in respect to the casing. This sleeve carries a collar 18, which is free to slide lengthwise of the sleeve, but is prevented from rotating in respect thereto by a key 19. The collar is provided with an annular groove 20 adjacent one end, and within this groove is disposed a yoke 21 carried by a rod 22, extending through a bearing in the end wall 13 and parallel to the shaft 12. The rod 22 is capable of longitudinal movement into and out of the casing, and the yoke 21 is carried thereby, so as to move the collar 18 lengthwise of the casing. The collar 18 carries a second collar 23, which is held rigid in respect thereto by a set screw 24, or other suitable means. This second collar 23, upon its outer surface, has an outwardly-extending flange 25, presenting a helically-disposed contact face concentric with the shaft. This contact collar 23 and its flange are electrically connected with the shaft and with the engine base, while the contacts 16 are connected by separate wires to the induction coils. As the shaft 12 is rotated at a speed bearing some definite relationship to the speed of the engine, the helical contact 25 is brought into engagement with the several contacts 16 in succession, so as to close the several circuits in succession. The shaft bears a particular angular relationship to the engine shaft, so that the helical contact 25 is always in exactly the same position when the piston of any one engine passes head center, but the time at which the helical contact engages with any particular contact 16, will depend upon the longitudinal disposition of said helical contact. If the advanced end of the contact 25 be the portion which closes the circuit, then the circuit will be closed early in the revolution, but if the rear or retarded end of the contact 25 be the portion which closes the circuit, then the circuit will be closed later in the revolution.

All other things being equal, the speed of the engine is largely dependent upon the time of the explosion in respect to the time of the engine piston passing the end of the compression stroke, and the more the spark is retarded the slower will be the speed of the engine.

One of the most important features of my present invention relates to the means whereby the duration of the spark or the duration of time during which the circuit is closed, will be substantially constant irrespective of the speed at which the helical contact members pass the stationary contact. In order to render this duration of time substantially constant, I make the advanced end of the helical contact of greater width than the rearward end, as is illustrated particu-

larly in the development in Fig. 3. If the rearward end of the helical contact acts to close the circuit, the engine will be going at a slow rate of speed, and there will be a certain definite duration of contact. If the advanced end of the helical contact serve to close the circuit, the engine will ordinarily be traveling at a much higher speed, and the duration of contact due to the greater width at the advanced end will be substantially the same as before. Thus, the longitudinal movement of the rod 22 operates to advance or retard the spark, and this advancement or retardation serves to increase or decrease the speed of the engine. The variation in the speed of the engine varies the speed of rotation of the helical contact member, so that under substantially all conditions, the duration of contact will be the same.

It is not at all essential that the helical contact member be the one that rotates, or that the helical contact member be the one which is moved longitudinally to advance or retard the time of circuit closing. In the form shown in Fig. 4, certain reversals of parts are shown. In this form, the casing 10^a is similar to the casing above referred to, except that it is formed entirely of insulating material. To the inner surface of this casing, there are secured a plurality of contact members 16^a, which present helically-disposed surfaces, and which are connected to separate binding posts 26 extending out through the casing wall. Within the casing, the sleeve 17 carries a collar 23^a, capable of longitudinal movement but held from rotation in respect to the sleeve. This collar is adapted to be moved longitudinally by a rod 22, the same as the form first described. The collar 23^a has a radially-disposed socket 27 at one point about its periphery, and within this socket is a plunger member 28, normally pressed outwardly by a spring 29. The plunger member carries a roller 30, adapted to engage with the several helical contact members 16^a during the rotation of the shaft. The helical contact members 16^a are each wider at one end than at the other, and the collar 23^a may be moved lengthwise of the casing, so that the roller will engage with the wider advanced ends or the narrower rearward ends of these helical contact members. The result produced is substantially the same as that obtained by the use of the form shown in Figs. 1, 2 and 3.

If it is not desired to operate the timer, for instance when a second or auxiliary ignition system is employed, I may move the helical contact member of the form shown in Fig. 1, to one extreme position, so that no portion of it will engage with the contacts 16. This will permit the shaft to rotate freely without wear on any of the contacts, and without any material retarding effect.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

- 5 1. A timer for internal combustion engines, comprising a casing adapted to be rigidly secured in position and having a peripheral wall and end walls, a rotatable shaft extending through one of said end walls into said casing and supported by the
10 latter, a collar mounted on said shaft within said casing and non-rotatable in respect to said shaft and movable longitudinally of the casing, means for shifting said collar, a contact carried by said casing, and a contact
15 carried by said collar, one of said contacts presenting a helical face, one end of which is of greater width than the other end.
- 20 2. A timer for internal combustion engines, comprising a casing adapted to be rigidly secured in position and having a peripheral wall and end walls, a rotatable

shaft extending through one of said end walls into the casing and supported by said end walls, a collar mounted on said shaft within the casing and non-rotatable in respect to said shaft and movable longitudinally of the casing, a rod extending through one of said end walls adjacent said shaft and substantially parallel to the latter and having its inner end provided with a yoke in engagement with said collar, a plurality of contacts carried by said casing, and a contact carried by said collar, one of said contacts presenting a helical face, one end of which is of greater width than the other. 25 30 35

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE TEALL BROWN.

Witnesses:

CLAIR W. FAIRBANK,
PHILIP D. ROLLHAUS.