E. S. LINCOLN.

MULTIPLE CONTACT TIMER.

APPLICATION FILED MAY 5, 1908.

926,066. Patented June 22, 1909.

Fig. 1.

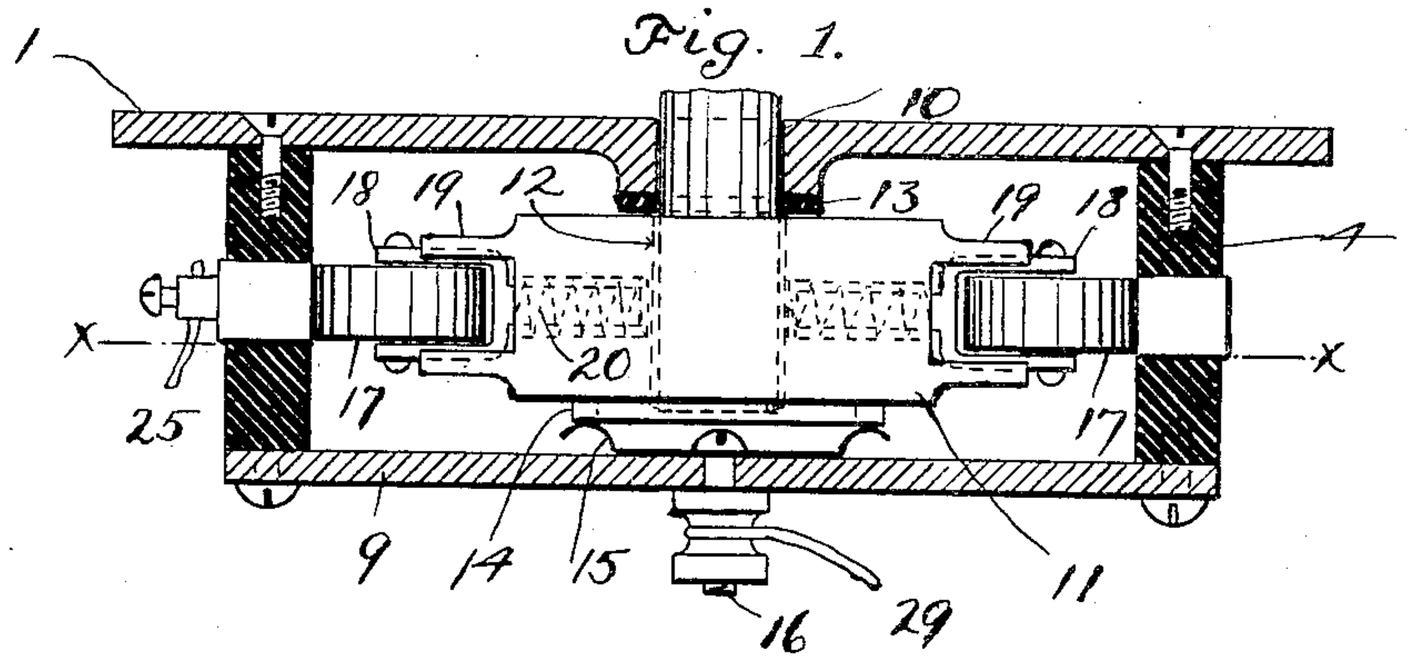
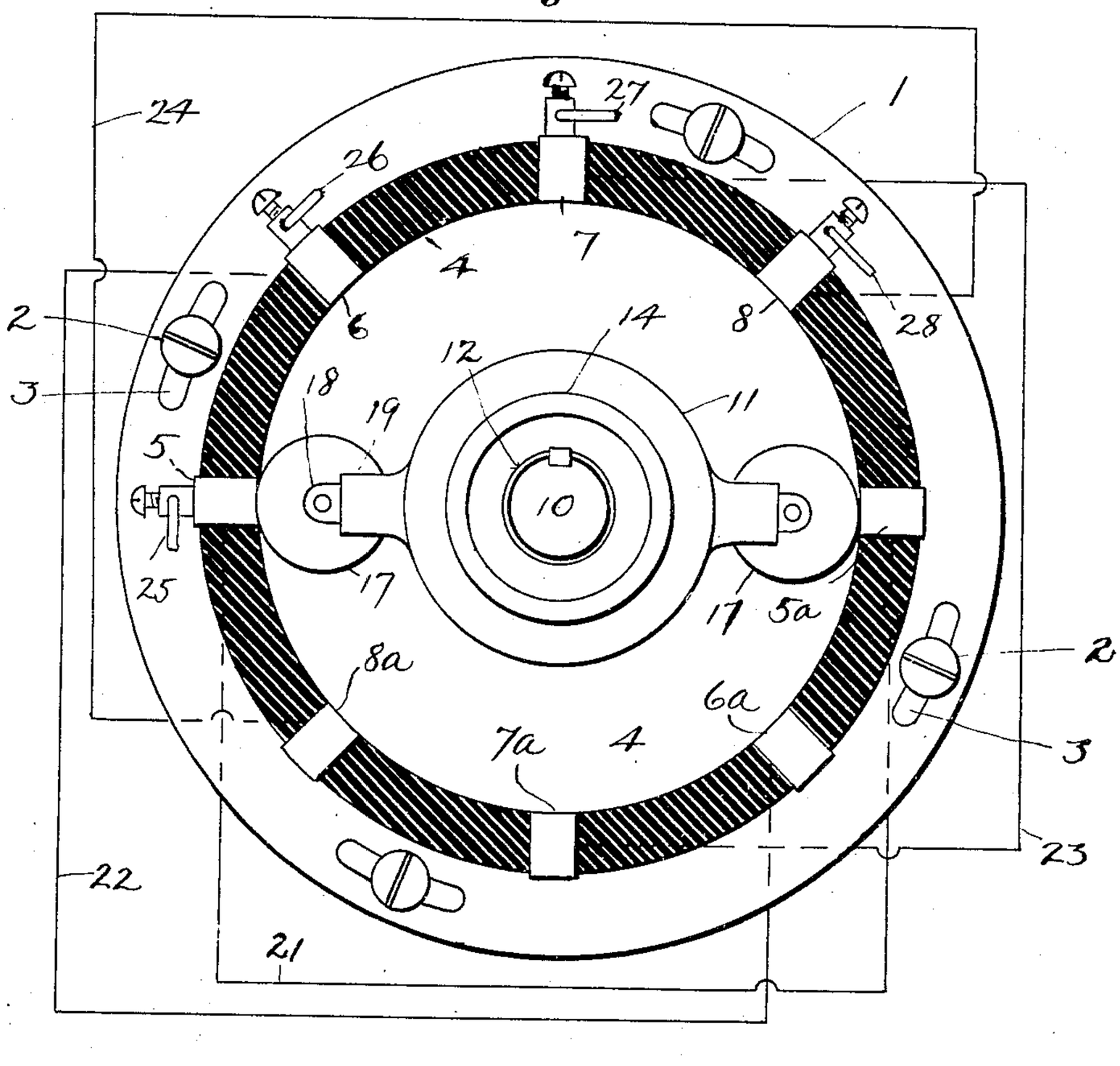


Fig. 2.



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UNITED STATES PATENT OFFICE.

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MULTIPLE-CONTACT TIMER.

No. 926,066. Specification of Letters Patent. Patented June 22, 1909.

Application filed May 5, 1908. Serial No. 431,024.

To all whom it may concern:

Be it known that I, EDWIN S. LINCOLN, citizen of the United States, residing at Brookline, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Multiple-Contact Timers, of which the following is a specification.

My invention relates to timers adapted to distribute electrical energy to the ignition systems of the cylinders of explosive engines, so as to energize said systems and to explode the gaseous charge in the engine or motor cylinders at the desired time.

As is well known, timers employed for the purpose above mentioned, consist essentially of a rotating member carrying a moving contact adapted to successively engage a series of stationary contacts, the engagement of the moving contact with any stationary contact serving to complete an electrical circuit by which the ignition system of the cylinder controlled by that contact is energized.

Ordinarily it is the practice to provide a series of stationary contacts corresponding in number to that of the cylinders of the engine controlled thereby, and mounted at angularly equal intervals on the circumference of a stationary member axially concentric with the rotating member. Thus a four cylinder timer has four stationary contacts spaced ninety degrees apart, or a six cylinder timer has six contacts spaced sixty degrees apart, and so on. The rotating member, furthermore, has been driven so as to make one revolution for each double revolution of the motor controlled by it, if a four cycle motor, or for each single revolution of a two cycle motor.

The construction above outlined has led to the result, which is especially manifest in the case of high speed two cycle engines, that the rotary member of the timer revolves with great rapidity, and in consequence not only is there excessive wear on the timer parts, but the period of engagement between the contact carried by the rotating member and the stationary contacts is of exceedingly brief duration. The said engagement is furthermore, often imperfect, owing to the rapidity of the engagement of the contacting contacts, and to the small area of the surfaces in contact, this being especially apparent in timers in which a ball or roller form of contact is employed.

My invention aims to produce a timer in which the speed of rotation is relatively slow, thus reducing the wear on the rotating parts of the timer, and with the further result of securing a largely increased period of engagement between the moving and the stationary contacts. At the same time I aim to make provision whereby the surface of engagement between the moving and the stationary contacts is increased to theoretically double that possible in a similar type of timer not embodying my invention. The result is a timer of greatly increased durability and efficiency as compared with those hitherto in use.

In the drawings is shown one embodiment of my invention, Figure 1 being a side view of the same, partly in section, and Fig. 2 a plan view of the same, showing the timer wall partly in section on the plane x—x, of Fig. 1.

Referring to the drawings, 1 shows the timer base, means being provided, as screws 2 engaging curved slots 3, by which the base may be adjustably secured to the motor in the desired position of angular adjustment. To the base is secured the wall of the case, indicated by the numeral 4, the same preferably being in the form of an annular piece of insulating material, as hard rubber or the like, and having the stationary contacts 5, 5^a, 6, 6^a, 7, 7^a, and 8, 8^a, mounted therein. Such contacts may be provided with means whereby they may be individually or collectively adjustable, radially, or otherwise, but such means forms no part of my invention and therefore is not shown in the drawings. A cover 9 is adapted to fit over the case, being secured to the top of the wall 4 by screws or other suitable devices.

The timer shaft, which may be geared, or otherwise positively driven from the motor, by means not shown in the figures, is indicated at 10, and is adapted to revolve axially concentric with the center of the inner circumferential surface of the wall 4. Mounted on shaft 10 is the rotating member 11, which may be either in direct contact with shaft 10, or electrically insulated therefrom, as well as from the timer base, as by the use of the insulating bushing 12, and the washer 13. On

the rotating member 11 is a ring 14 which engages a brush 15 leading to a binding post 16, mounted on the cover 9, shown only in Fig. 1.

The rotating member is provided with a plurality of contact devices, which are preferably wheels or rollers 17, and are two in number, as in the drawings. Said rollers 17 are rotatably mounted in carriers 18, which are radially movable in the guides 19 provided on the rotating member 11. Said carriers are pressed outwardly by means of springs 20, or other suitable means, so that as the rotating member 11 revolves the contact rollers 17 roll over the internal circumferential surface of the wall 4.

Mounted in the wall 4, so as to lie in the path of the rollers 17, are a series of contact blocks 5, 5ª, 6, 6ª, 7, 7ª, and 8, 8ª, which in number are a multiple of the number of cylinders in the motor controlled thereby, being preferably twice the number of the cylinders, where the rotating member carries two contact wheels, three times the number there are three contact wheels, and so on.

The construction of a four cylinder timer having, as shown in the drawings, two contact rollers, and eight contacts, will alone be described in illustration of my invention, the construction of timers to suit other situations being identical in principle, and requiring only modification in their mechanical details. In the timer shown in the drawings the stationary contact blocks are spaced angularly equidistant, on the wall 4 of the timer case, and they are arranged to form four pairs of diametrically opposite contacts whose members are electrically connected by wires or other appropriate connections. Thus conductor 21 electrically unites contacts 5 and 5ª, 22 connects 6 and 6ª; 23, 7 and 7ª; and 24, 8 and 8ª.

One contact of each pair of contact blocks, as for example 5, 6, 7, and 8, are provided with binding screws or the like, by which may be secured wires 25, 26, 27, and 28, which lead to one of the terminals of the ignition systems of the various cylinders of the motor controlled by the timer. The other terminals of the ignition systems of the said cylinders, may branch from a single wire 29 leading to binding post 16 on the cover 9 of the timer, and so be in electrical connection with the rollers 17 through brush 15 and ring 14, or said terminals may be in electric connection with said rollers 17 by grounding through the motor frame, in usual and well known manner, the rotating member 11 in such case being mounted directly upon the shaft 10 without the use of the insulating bushing 12. Said rollers 17 are in electrical connection with each other through the rotating member by which they are carried. When, therefore, the contact rollers 17 are in any position of engagement with the stationary contacts, as for example, with the pair of interconnected contacts 5 and 5ª, the circuit leading to the ignition system will be closed both through the engagement of one contact roller with contact block 5, and also through the other roller and contact 5ª. Thus an area of contacting surfaces is secured which is theoretically double in amount that secured in a timer of usual construction, resulting in a largely increased efficiency for the ignition system. Furthermore the symmetrical formation of the rotating member, incident to the use of a plurality of contact rollers or the like, secures a more perfect balance of the rotating member, and leads to a smoother and more even running of the same. Again it will be observed that, if the rotating members revolve clockwise, the contact rollers 17 will simultaneously engage contacts 6 and 6ª after one eighth of a revolution of the rotating member; with contacts 7 and 7ª, after one quarter of a revolution; with contacts 8 and 8ª, after three eighths of a revolution; and again coming into contact with contacts 5 and 5ª after one half a revolution of the rotating member has been completed. Thus the electrical energization of the ignition systems of all the engine or motor cylinders will be completed during one half of a revolution of the timer, and in consequence it is necessary that the timer have a rate of revolution but half that of a timer having but a single set of engaging contacts.

The result of the slower rate of rotation of my timer is a lessened amount of wear, while by reason of the relatively slower speed with which the moving and stationary contacts engage, a more perfect contact is secured. These advantages, combined with the fact that the contacting surfaces through which the ignition circuit is completed, are substantially double in area those of a timer having but one set of contacting surfaces produce a timer of largely increased mechanical durability and electrical efficiency over those hitherto employed.

Having described my invention what I claim and desire to secure by Letters Patent is:

1. In a timer adapted to control the ignition system of multi-cylindered explosive engines, or the like, two members having a capacity for rotation with respect to each other, one of said members having a plurality of contacts in electrical engagement with one terminal of the ignition system of each cylinder of said engine, and the second member embodying a plurality of contacts arranged in electrically insulated sets, the number of such sets corresponding to the number of the engine cylinders controlled by the timer, and each set comprising a plurality of contacts individually electrically connected to

each other and collectively connected electrically to the unengaged terminal of the ignition system of one of the cylinders of said engine, the contacts of the first member being adapted to simultaneously engage in succession with the contacts comprised in each of the said sets as one member revolves with reference to the other member, substantially as described.

2. In a timer adapted to control the ignition system of a multi-cylindered explosive engine, or the like, in combination, a rotating member having a plurality of contacts, collectively in electrical engagement with one terminal of the ignition system of each engine cylinder, and a stationary member embodying a plurality of electrically insulated stationary contacts arranged in electrically insulated sets, the number of such sets corresponding to the number of the engine cylinders controlled by the timer; each set comprising a plurality of stationary contacts, individually in electrical communication with each other, and collectively in electrical communication with the unengaged terminal of the ignition system of one of the cylinders of said engine, the contacts of the rotating member being adapted to simultaneously engage in succession with a plurality of the stationary contacts in each set as the rotating member revolves.

In testimony whereof I affix my signature in presence of two witnesses.

EDWIN S. LINCOLN.

Witnesses:
NATHAN B. DAY,
WILLIAM A. COPELAND.