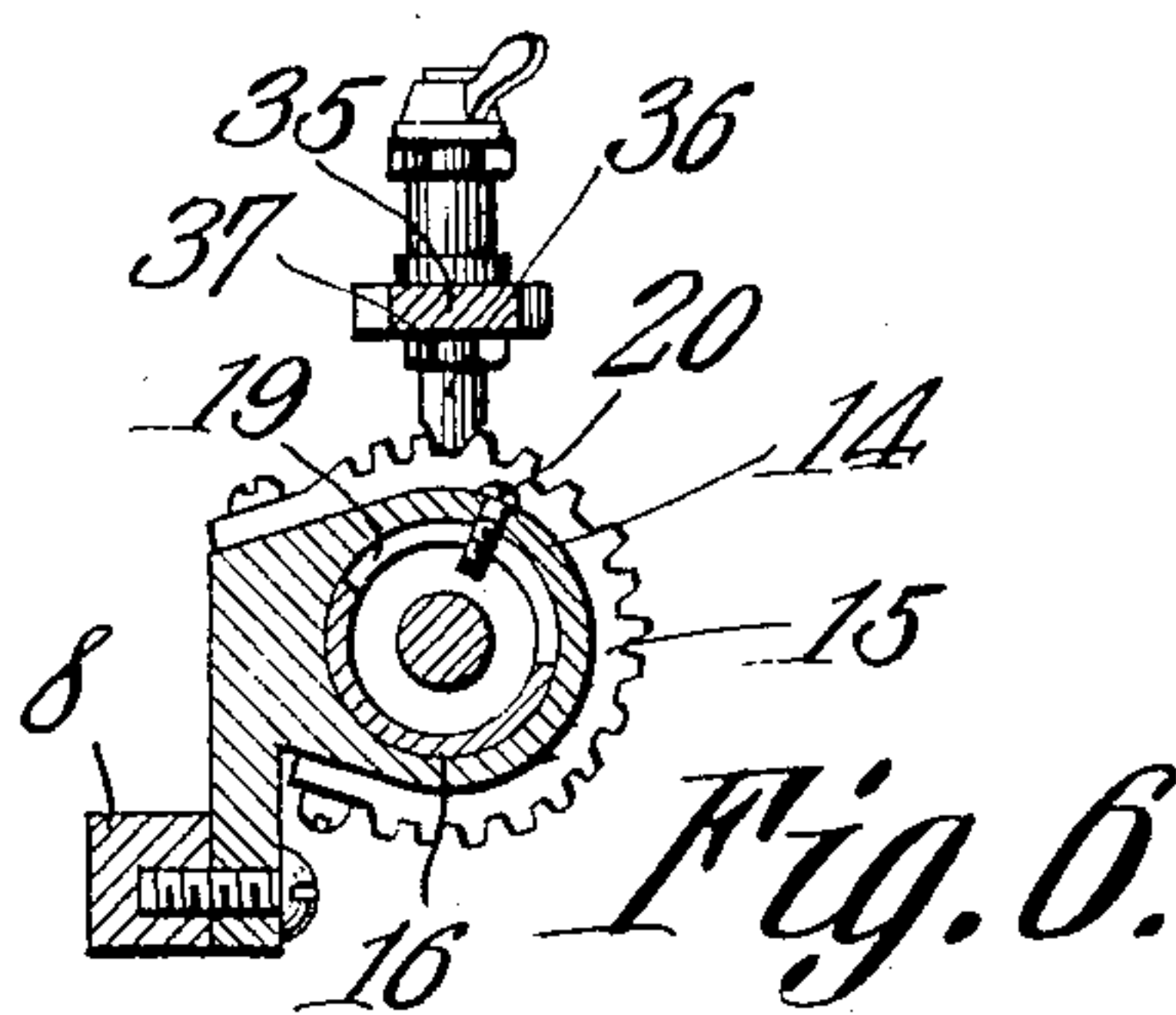
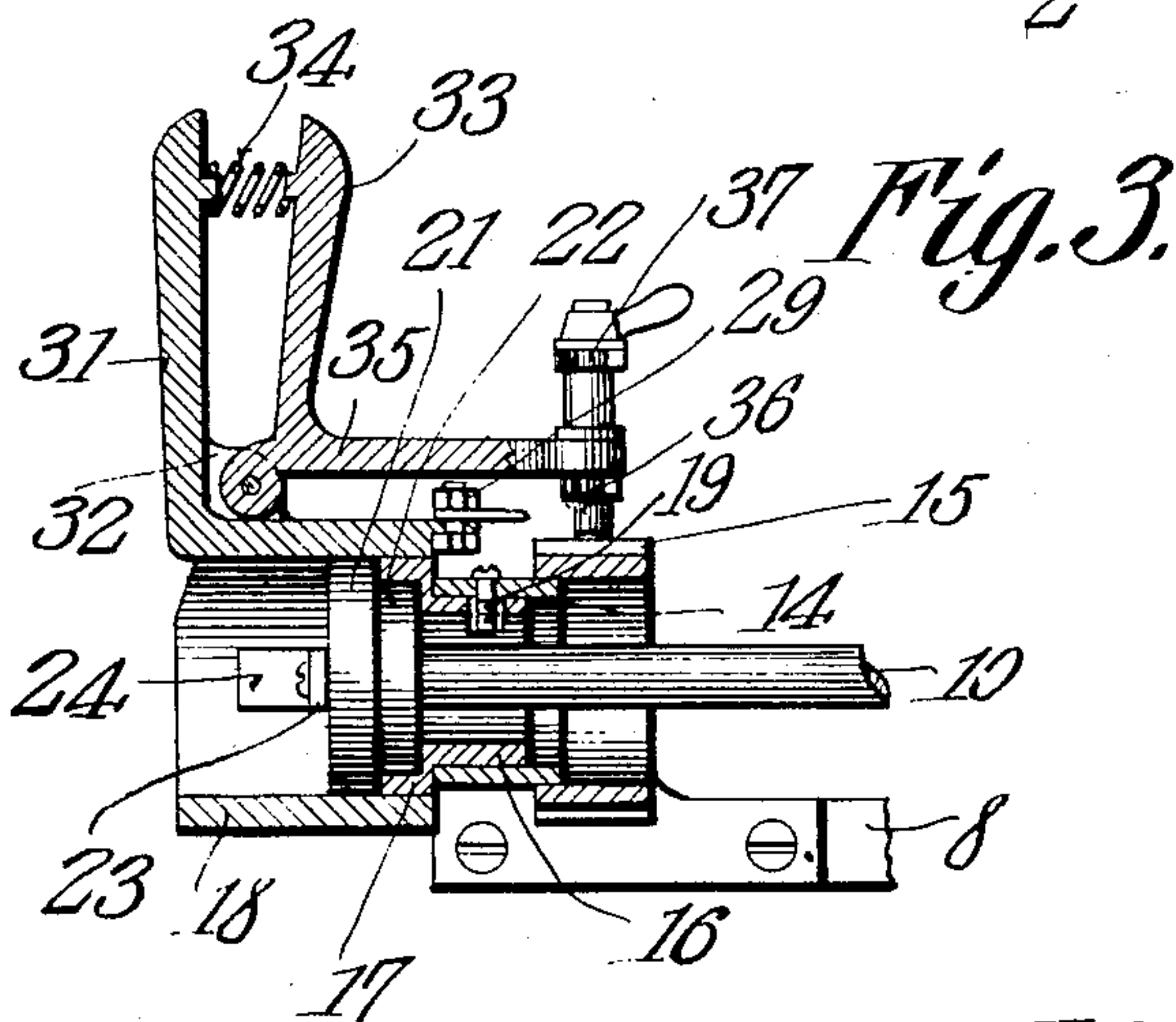
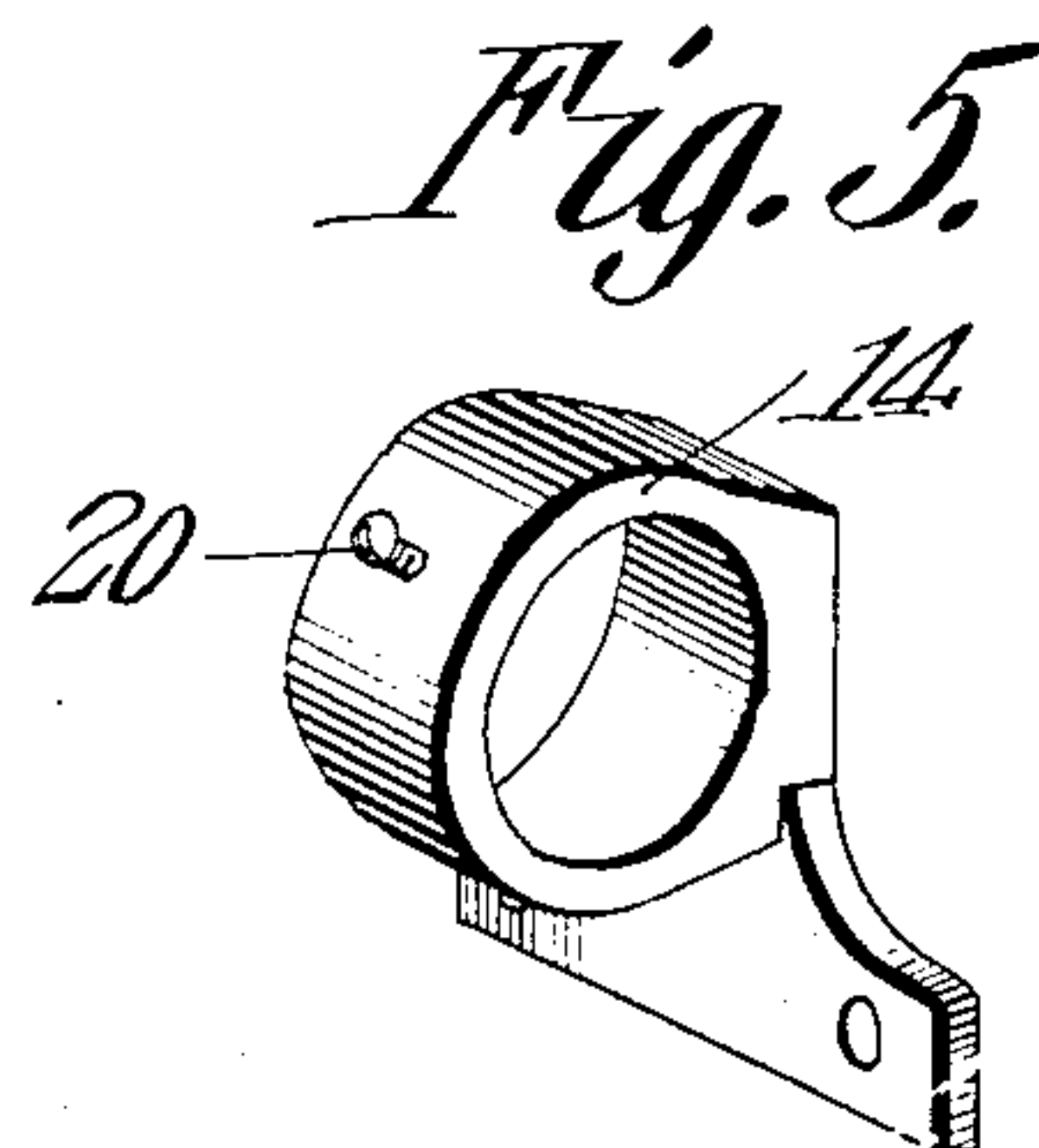
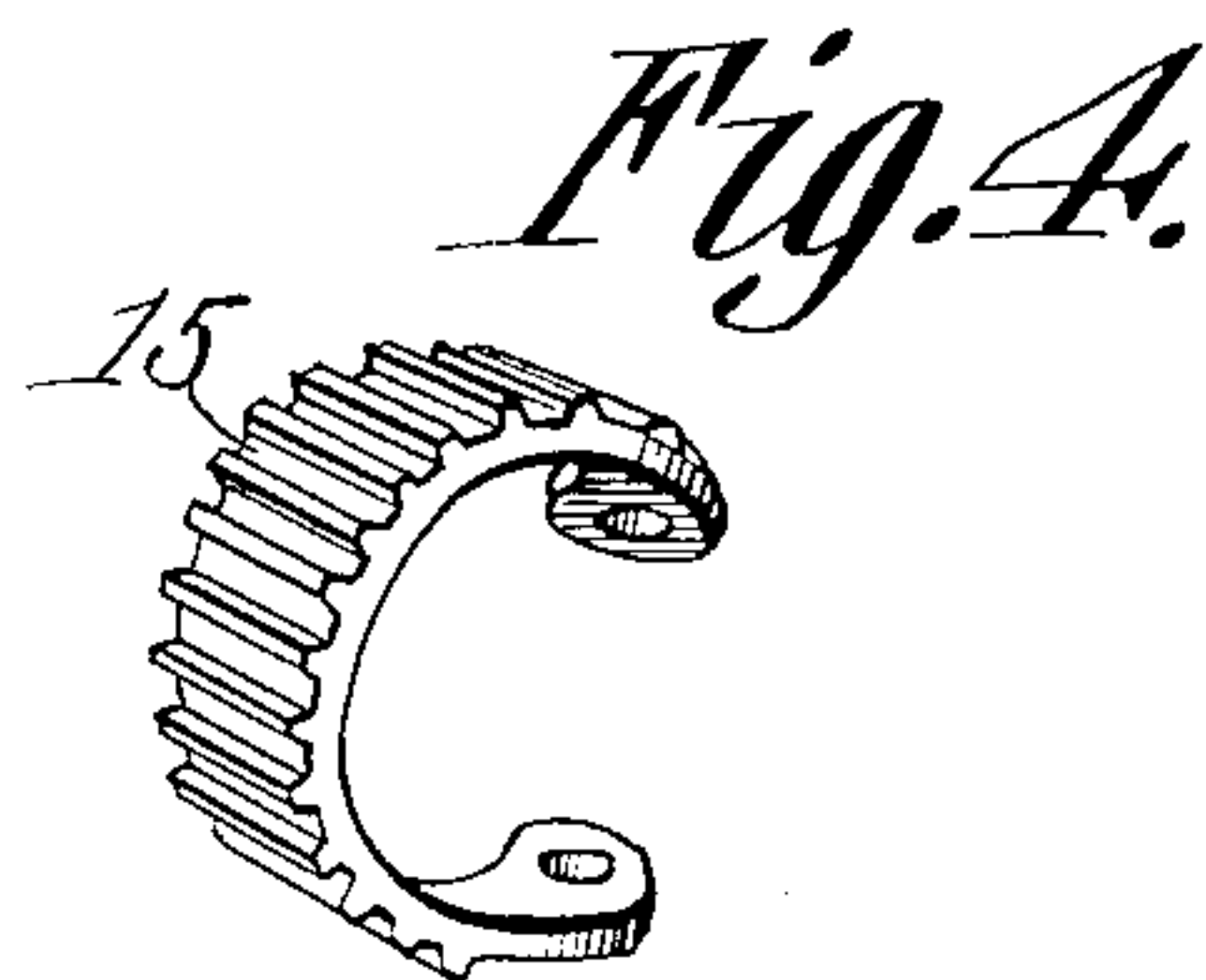
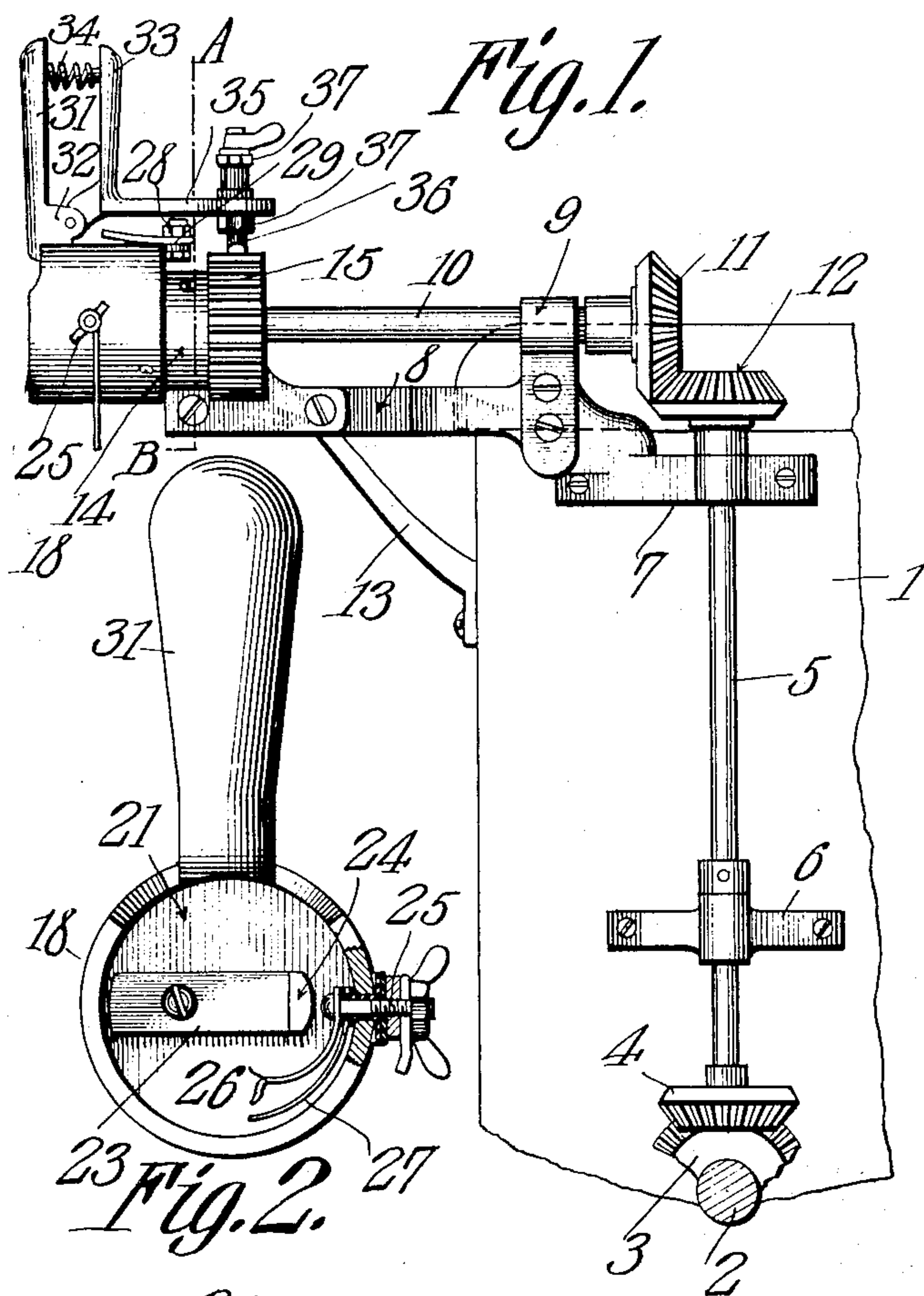


E. L. RANCOURT.  
CIRCUIT BREAKING DEVICE.  
APPLICATION FILED NOV. 11, 1908.

925,838.

Patented June 22, 1909.



Witnesses

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# UNITED STATES PATENT OFFICE.

EDWARD L. RANCOURT, OF WATERVILLE, MAINE.

## CIRCUIT-BREAKING DEVICE.

No. 925,838.

Specification of Letters Patent.

Patented June 23, 1909.

Application filed November 11, 1908. Serial No. 462,138.

*To all whom it may concern:*

Be it known that I, EDWARD L. RANCOURT, a citizen of the United States, residing at Waterville, in the county of Kennebec and State of Maine, have invented a new and useful Circuit-Breaking Device, of which the following is a specification.

This invention has reference to improvements in circuit controlling devices designed more particularly for use in connection with igniters for internal combustion engines, especially the igniters or spark plugs of the jump spark type.

The present invention relates to a means for periodically closing the charging circuit of an induction coil used to produce the high tension current needed for the operation of the spark plugs of the jump spark type, and in accordance with the present invention there is provided means whereby the time of ignition may be advanced or retarded with relation to the time of maximum compression in the explosion chamber.

The invention will be best understood from a consideration of the following detail description taken in connection with the accompanying drawings forming a part of this specification in which drawings,

Figure 1 is an elevation of a portion of the cylinder of an explosion engine with the invention applied thereto. Fig. 2 is an end view of a portion of the structure shown in Fig. 1 on a larger scale. Fig. 3 is a central vertical sectional view with parts in elevation of the structure shown in Fig. 2, and also showing some parts omitted from Fig. 2. Figs. 4 and 5 are perspective views of details of the structure. Fig. 6 is a section on the line A—B of Fig. 1 with some of the remoter parts omitted.

It is customary in explosion engines wherein the igniter or spark plug is of the jump spark type, to include such spark plug in a high tension electric circuit fed from the secondary winding of an induction coil the primary winding of which is charged by a suitable battery or other source of current and it is necessary that the charging periods of the primary of the induction coil be properly timed to cause the formation of a spark or preferably of a series of sparks between the terminals of the spark plug within the ignition chamber just prior to the point of greatest compression of the charge within the explosion chamber if the maximum effect of the

explosive mixture be desired. It is however customary in the operation of explosion engines to cause the ignition of the explosive charge either before or after the point of greatest compression at a time when the ignition of the explosive charge will not produce the maximum effect and consequently the power and speed of the engine will be correspondingly regulated. In fact it is quite common to regulate explosion engines entirely by advancing or retarding the time of producing the sparks at the spark plug relative to the point of maximum compression within the explosion chamber.

In the drawings there is indicated a cylinder 1 of an explosion engine of any suitable type, the showing being taken simply as illustrative and not designed to show any particular make of engine since the invention is applicable to a large variety of different makes of engines, it only being necessary to modify the supporting and connecting part to adapt the invention to many different types of engines. The engine shaft is indicated at 2 and this showing is to be taken simply as typical or diagrammatic. To the shaft 2 there is secured a bevel pinion 3 and this pinion is in mesh with another pinion 4 fast on one end of a shaft 5 supported in journal bearings 6—7 made fast in any suitable manner to the engine cylinder 1 or other fixed portion of the structure.

The bearing or bearing bracket 7 has an off-set 8 in the form of a lateral bracket and this bracket 8 has fast thereto near its point of junction with the bracket 7 a journal support 9 in which is journaled a shaft 10 having at the end adjacent to the shaft 5 a bevel pinion 11 meshing with another bevel pinion 12 on the corresponding end of the said shaft 5.

Since it is desirable that the outer or free end of the bracket 8 be made as rigid as may be a support 13 is provided connected at one end to the outer end of the bracket 8 and at the other end to the cylinder 1.

Secured to the outer or free end of the bracket 8 is a sleeve 14 and this sleeve is surrounded near one end by an incomplete circular rack 15 in the form of a serrated band partly encircling the end of the sleeve 14 and secured thereto by suitable screws or other means.

Entering the end of the sleeve 14 remote from the serrated band 15 is the small end 16



of a reducing thimble 17 the other end of which is of considerably greater diameter than the end 16 and there receives and has secured to it another sleeve 18 to which reference will presently be made. The small end 16 of the thimble 17 has a circumferential slot 19 formed through its walls and a screw 20 extending through the sleeve 14 and through the slot 19 serves to maintain the sleeve or thimble 16 in place in the sleeve 14 while permitting a rotative movement of the said thimble 16 about the longitudinal axis of the sleeve 14 for an extent commensurate with the length of the slot 19. The sleeve 18 is fast on the large end of the thimble 17 so that rotative movement of said thimble is participated in by the sleeve 18 and the movement of the latter rotatively is limited by the length of the slot 19.

The shaft 10 extends through the thimble 17 and terminates in a head 21 housed within the sleeve 8 and the shaft side of the head 21 is formed with an annular shoulder 22 having a bearing in the larger end of the thimble 17.

The face of the head 21 remote from the shaft 10 carries a bar or plate 23 at one end of which there is formed a tongue or wiper 24 projecting away from the face of the head 21 at right angles thereto and this wiper is arranged eccentric to the axis of rotation of the said head 21.

Extending through the wall of the sleeve 18 but insulated therefrom is a binding post 25 carrying at its inner end within the sleeve 18 a spring finger 26 having its free end within the path of the wiper 24 when the latter is rotated about the axis of rotation of the shaft 10 and head 21. The binding post 25 may also carry an insulated strip 27 interposed between the finger 26 and the inner wall of the sleeve 18 so that there may be no danger of a short circuit between the said finger 25 and the sleeve 18 since the metal parts of the engine are used as the return or ground for the high tension secondary of the induction coil and one side of the battery or other low tension circuit is through the sleeve 18 by means of a binding post 28 fast thereon by means of a suitable lug 29.

When the shaft 10 is rotating then the wiper 24 is brought once every rotation into contact with the spring finger 26, the free end of which is appropriately bent for the purpose and wiping across said spring finger causes the closure of the primary circuit of the induction coil through the usual rheotome or vibrator and a series of sparks are caused to pass the terminals of the spark plug thus causing the ignition of the explosive mixture within the explosion chamber. The wiping action of the wiper 24 over the finger 26 will keep the contacts always in bright and good condition while the circuit is maintained for a sufficiently long though

actually short time to produce the necessary sparks for the ignition of the explosive mixture.

Formed on or made fast to the outer end of the sleeve 18 is a member 31 projecting radially from said sleeve and preferably in an upright direction therefrom when the device is installed on the engine. Formed on the sleeve 18 where the member 31 joins it are two lugs 32. Pivotaly connected to the lugs 32 at the angle is an angle lever 33 having one arm opposed to and matching the member 31 so that the said member 31 and arm constitute the two members of a hand hold, these two members being suitably shaped for the purpose, and are normally maintained one away from the other by means of an interposed spring 34 near the free end of the two members of the hand hold. The other end 35 of the lever 33 supports a pin 36 by means of suitable clamp nuts 37 and this pin is so located that one end is in operative relation to the serrated band 15 before referred to. The end of the pin 36 is designed to engage between the teeth or serrations of the band 15 and is suitably shaped for the purpose. Under normal conditions of rest the spring 34 forces the pin 36 in between the teeth or serrations of the band 15, but when the hand hold 31—33 is grasped and the spring 34 is compressed then the arm 35 has its free end lifted away from the band 15 and the corresponding end of the pin 35 is carried out of engagement with the teeth of such serrated band 15.

The parts are so proportioned that at a certain position of the pin or tooth 35 on the band 15 the spark is produced in such timed relation to the maximum compression of the explosive charge in the engine that the most efficient results are produced. By compressing the spring 34 and thereby permitting the movement of the corresponding portion of the lever 32 toward the member 31 the pin 36 is lifted out of engagement with the serrated band 15 and then the sleeve 18 may be rotated about the axis of the shaft 10 to any desired degree to be afterward locked in the adjusted position by relieving the grip on the members 31 and 33 when the spring 34 will force the tooth or pin 35 into engagement with the teeth of the band 15 and a new position of the point of engagement of the wiper 24 with the spring finger 26 as to its time relation with the point of maximum compression within the explosion chamber is fixed. By moving the sleeve 18 rotatively in the proper direction the spark may be retarded with relation to the point of maximum compression and by moving it in the other direction the spark may be advanced all in a manner well known to operators of explosion engines.

By housing the rotatable and fixed circuit terminals of the primary circuit of the induc-



tion coil in the sleeve 18 and making the latter rotatable to advance or retard the spark, these members which are particularly susceptible of injury or displacement are protected from both injury and accidental displacement which latter would interfere very materially with the operation of the device.

What is claimed is:—

1. In a spark timer for explosion or internal combustion engines, a bearing sleeve, a circumferentially slotted thimble rotatably mounted therein, a holding means coacting with the slot in the thimble for maintaining the latter in the bearing sleeve while permitting a limited rotation of the thimble, a serrated band secured to and embracing the sleeve, another sleeve carried by the thimble, a hand-hold carried by the last named sleeve and having one member in the form of an angle lever, a pin carried directly by said lever in operative relating to the serrated band, a shaft concentric with and extending through the thimble and provided with a head within the second named sleeve, and circuit terminals carried by the said head and by the second named sleeve respectively.

2. In a spark timer for explosion or internal combustion engines, a bearing sleeve, a circumferentially slotted thimble rotatably mounted therein, a holding means coacting with the slot in the thimble for maintaining

the latter in the bearing sleeve while permitting a limited rotation of the thimble, a serrated band secured to and embracing the sleeve, another sleeve carried by the thimble, a hand-hold carried by the last named sleeve and having one member in the form of an angle lever, a pin carried by said lever in operative relation to the serrated band, a shaft concentric with and extending through the thimble and provided with a head within the second named sleeve, a wiper carried by the head, and an elastic circuit terminal carried by the last named sleeve in the path of said wiper.

3. In a spark timer for explosion or internal combustion engines, a sleeve, a shaft concentric therewith and provided with a head interior to and in electric contact with the sleeve, a wiper carried by the head, a binding post carried by but insulated from the sleeve, a spring finger carried by the binding post within the sleeve and having its free end in the path of the wiper and an insulated strip interposed between the spring finger and the inner wall of the sleeve.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

EDWARD L. RANCOURT.

Witnesses:

FRED PORTER,  
ALBERT A. POULIN.