

No. 881,862

PATENTED MAR. 10, 1908.

R. HUFF.  
ELECTRIC IGNITION APPARATUS.  
APPLICATION FILED MAY 31, 1907.

2 SHEETS—SHEET 1.

Fig. 1.

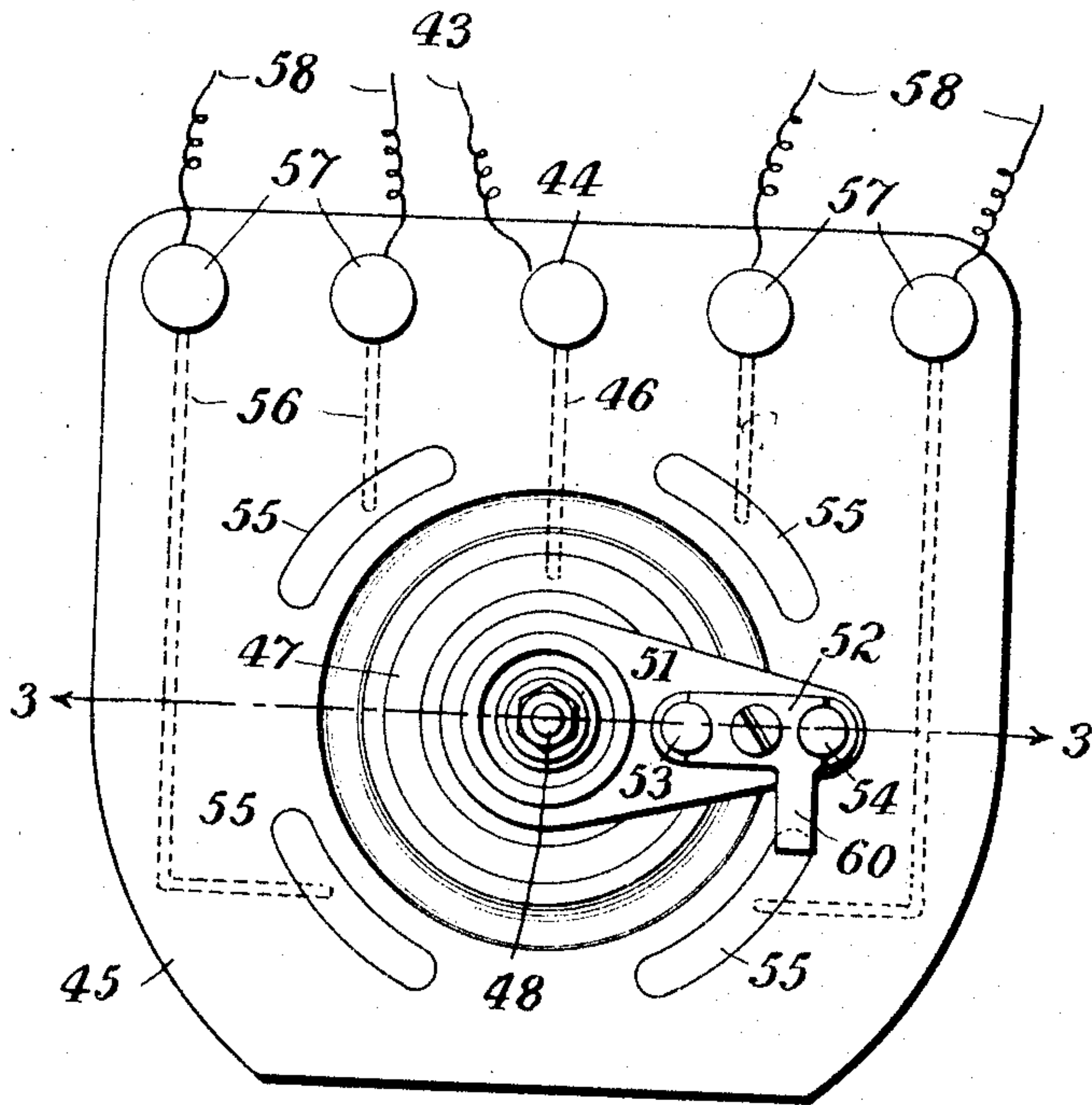


Fig. 2.

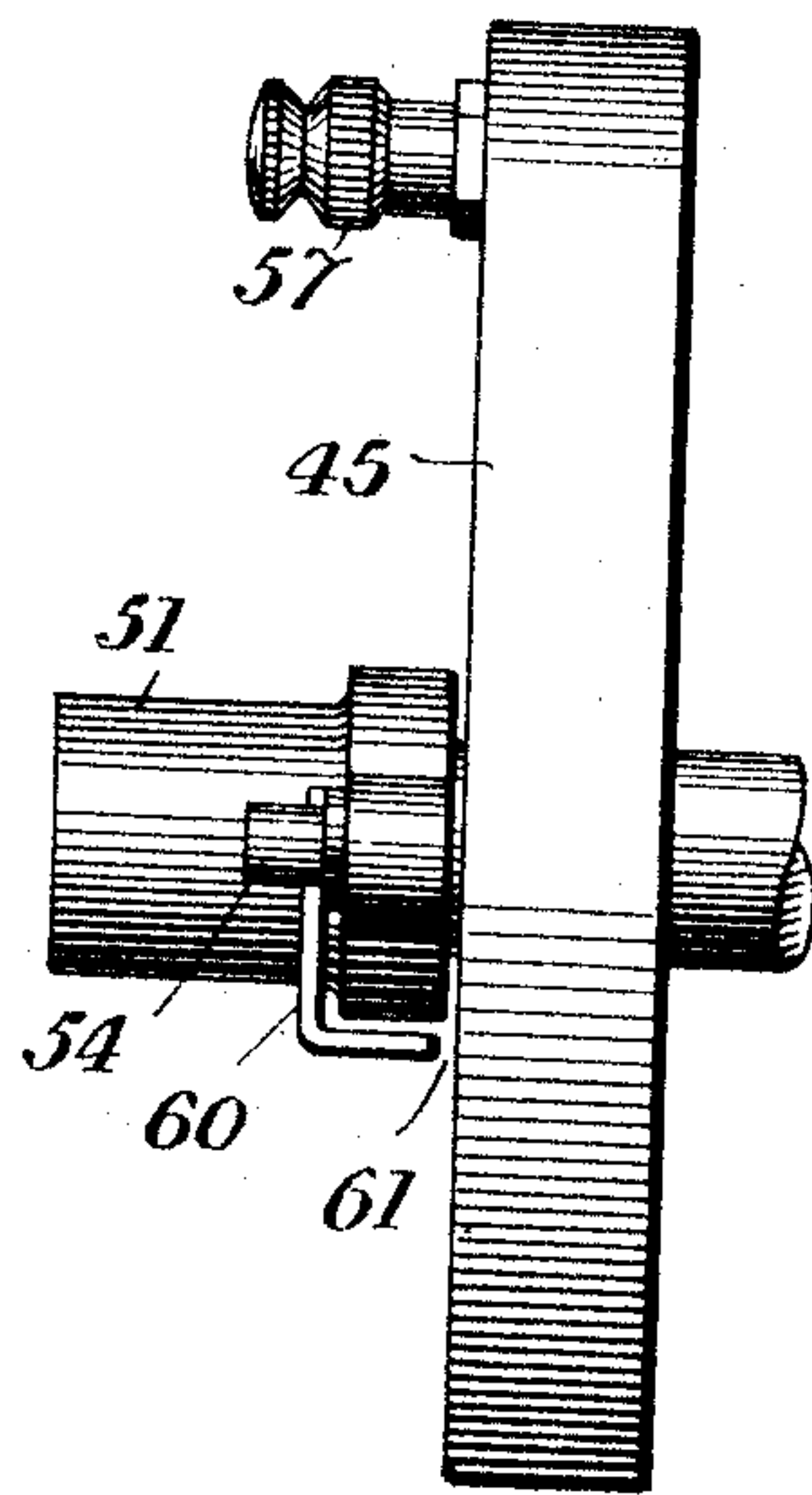
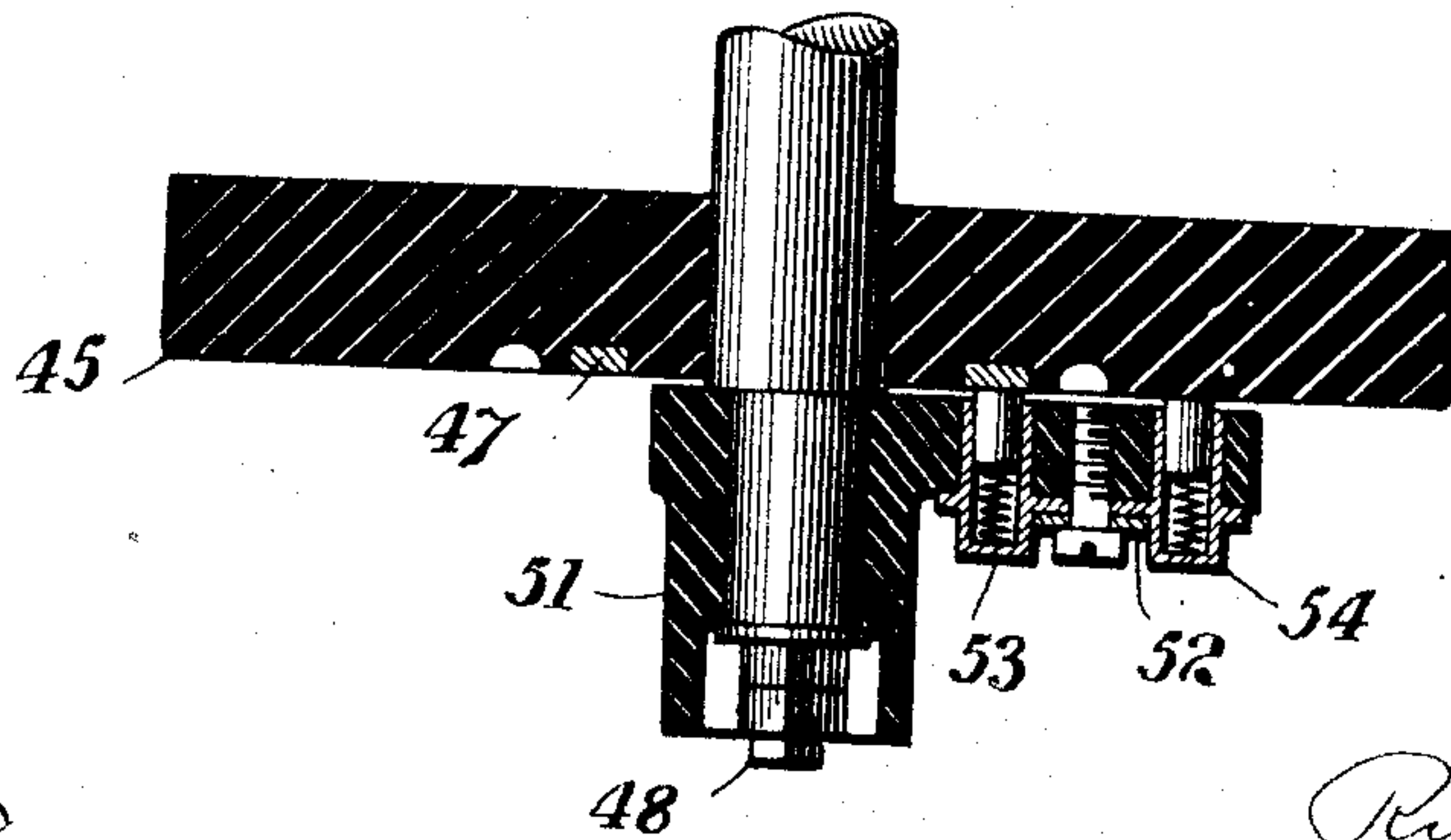


Fig. 3.



Witnesses  
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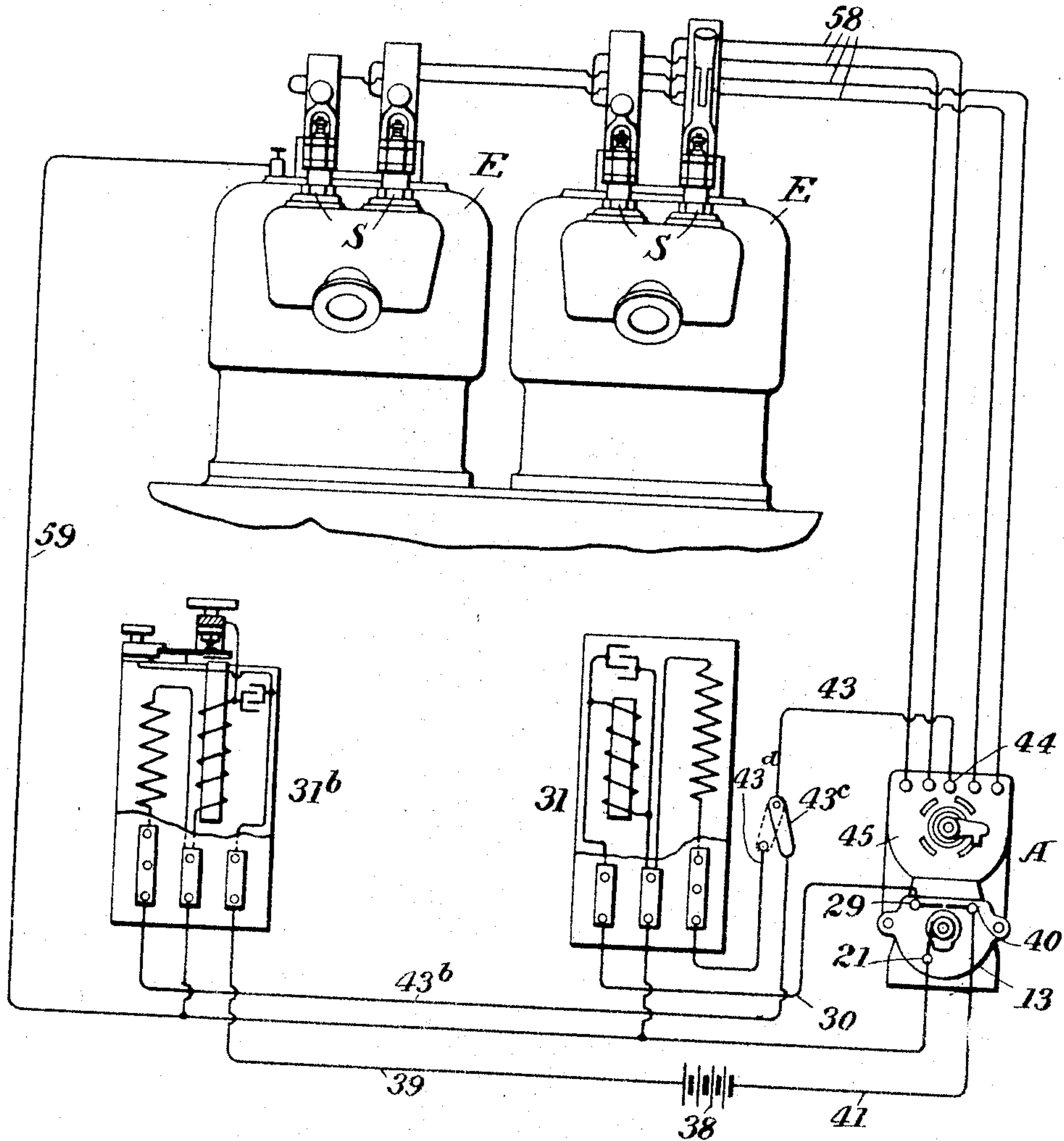
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2 SHEETS—SHEET 2.

Fig. 4.



Witnesses

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# UNITED STATES PATENT OFFICE.

RUSSELL HUFF, OF DETROIT, MICHIGAN, ASSIGNOR TO PACKARD MOTOR CAR COMPANY,  
OF DETROIT, MICHIGAN, A CORPORATION OF WEST VIRGINIA.

## ELECTRIC IGNITION APPARATUS.

No. 881,862.

Specification of Letters Patent.

Patented March 10, 1908.

Original application filed December 22, 1906, Serial No. 349,190. Divided and this application filed May 31, 1907.  
Serial No. 376,547.

*To all whom it may concern:*

Be it known that I, RUSSELL HUFF, a citizen of the United States, and resident of Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Electric Ignition Apparatus, of which the following is a specification.

This application is a division of my former application, Serial No. 349,190, filed December 22, 1906, and the invention relates to electric ignition apparatus for multiple cylinder hydrocarbon engines, and more particularly for engines adapted for driving motor vehicles and motor boats.

The invention will be described in connection with the accompanying drawing, in which:

Figure 1 is an elevation of a distributor illustrating the present invention; Fig. 2 is a right side elevation of the distributor shown in Fig. 1, Fig. 3 is a horizontal sectional view on the line 3—3, Fig. 1, and Fig. 4 is a diagrammatic view illustrating the cylinders of the hydrocarbon engines and the various circuits.

Referring to the drawings, A represents a magneto generator of any desired type, such for instance as that illustrated in Letters Patent Number 780,221, to J. W. Packard, and upon the face of said generator are mounted the face plate 13 of a circuit breaker of suitable construction and the distributor plate 45 through which latter plate passes a shaft 48 gear driven from the engine shaft at proper relative speed both to the engine shaft and to the circuit breaker.

The circuit breaker is adapted for operation with either the magneto current or current from the battery 38; in the first instance the current in the armature circuit passing from the circuit breaker plate 13 through post 29 and conductor 30, through the primary coil of a transformer 31 and back to the armature shaft by way of post 21; and in the second instance the current from the battery 38 passing through conductor 39, the primary coil of the transformer 31<sup>b</sup>, binding post 21, through the contact breaker and out by way of post 40 and conductor 41 to the battery.

It will be understood that the magneto current is only available when the motor is operating, the magneto being driven from

the motor, and for starting the motor the battery is used.

On the distributor plate 45 above referred to is a conductor ring 47 electrically connected through the secondary coil of one of the transformers 31, 31<sup>b</sup>, with a ground on the engine E; and concentric with said ring are mounted four segmental conducting plates or contacts 55 on the distributor plate, which plates 55 are respectively connected by conductors 56 with binding posts 57. The adjacent ends of the plates 55 must be separated by a sufficient distance or interval to prevent the current from leaping forward from the one in circuit to the next and thereby producing preignition and a "back kick". From the posts 57 the conductors 58 lead respectively to the spark plugs of the motor cylinders E, one element of each spark plug being grounded on the engine, and the circuit returns from the engine to the transformers 31, 31<sup>b</sup> through conductor 59. From the transformers the secondary or high tension circuit passes through conductors 43<sup>b</sup> and 43<sup>d</sup> respectively, to a switch 43<sup>c</sup> and thence through conductor 43 to post 44 and through conductor 46 to the ring 47 on the distributor plate 45.

From the above it will be readily understood by one skilled in the art that a high tension circuit will be closed through one of the motor spark plugs upon electrically connecting the ring 47 with one of the segmental plates 55.

On the rotating shaft 48 is an arm 51 of insulating material carrying a plate 52 of conducting material. Mounted on the plate 52 is a brush 53 which is constantly in contact with the ring 47 and another brush 54 which is adapted to make contact successively with the plates 55.

In using a high tension current as above set forth a great difference of potential will occur between the brush 54 and the segments when the brush is traveling between two of them, which would tend to cause a spark to leap from the brush to the next succeeding segment across which it is to rub and thus cause preignition and a "back kick" in the cylinder having its spark plug connected with said succeeding segment. To avoid this a safety device in the form of a finger 60, connected electrically with the plate 52, is mounted on the arm 51, which



finger trails after the brush 54. The finger 60, as shown in Fig. 2, has its point close to, but not in contact with the face of the distributor plate, there being an air-gap 61 between the finger and the contact plates 55. This air gap is preferably provided to prevent wearing away of the finger 60 and to simplify the construction thereof, but the same result is obtained if the finger is arranged to bear on the plates 55. In other words, the finger 60 is an elongation or extension of the brush 54, but it has a special function all its own, viz. that of causing a second spark in the cylinder making its working stroke in preference to preigniting the partially compressed charge in the next succeeding cylinder. Thus if the difference of potential between the brush 54 and one of the contact plates 55 becomes sufficient to cause a spark to leap from one to the other, the current, choosing the path of least resistance, will pass from the finger 60 to the contact segment which has just been left by the brush 54, causing an additional spark in the cylinder which is making its working stroke and thus avoiding a premature explosion in the succeeding cylinder, such as would occur if the spark were permitted to leap ahead to the contact plate in advance of the brush 54. The function of the finger or brush extension or elongation 60 is to carry the current to the contact in rear of the brush until it is possible to transmit current through the succeeding contact without producing a premature explosion in the cylinder having its spark plug in circuit with such succeeding contact.

This safety device may be variously modified without departing from the spirit or taking it without the scope of the invention. It is apparent, for instance, that the finger 60 is practically a part of the brush 54, being in electrical communication therewith and cooperating with the same contacts. This being the case any rearward extension of the brush having the same function is the equivalent of said finger.

I claim:

1. In an ignition apparatus for multiple cylinder hydrocarbon engines; a distributor comprising a traveling brush and a series of separated contacts over which the brush travels in succession, said brush being provided with means for transmitting current through each contact in turn while the forward part of the brush is traveling over a portion of the succeeding interval between contacts, for the purpose set forth.

2. In an ignition apparatus for multiple

cylinder hydrocarbon engines, a distributor comprising a traveling brush and a series of separated contacts over which the brush travels in succession, said brush having a trailing extension through which current may pass to each contact in turn while the forward part of the brush is traveling over a portion of the succeeding interval between contacts, for the purpose set forth.

3. In an ignition apparatus for hydrocarbon engines, the combination with a distributor having a series of contacts and a brush adapted to engage said contacts successively, of a conductor in communication with the brush and adapted to follow said brush over the contacts, said conductor being separated from the contacts by an air gap, whereby preignition of the explosive charges in the cylinders is prevented.

4. In an ignition apparatus for hydrocarbon engines, the combination with a distributor having a series of segmental contacts and a brush adapted to move over said contacts successively, of a finger extending rearwardly from the brush and having its free end separated from the contact by an air gap, said finger being in electrical communication with the brush, whereby preignition of the explosive charges in the cylinders is prevented.

5. In an ignition apparatus for hydrocarbon engines, the combination with a distributor having a series of segmental contact pieces mounted thereon, said contact pieces being respectively in circuit with the spark plugs of the engines, and with a brush adapted to travel over and in engagement with said contact pieces successively, of means for producing a high tension current through said brush and contact pieces, and a conducting finger extending rearwardly from the brush and having its free end separated from the contact pieces by an air gap, for the purpose set forth.

6. In an ignition apparatus for hydrocarbon engines, the combination with a distributor having a series of contacts and a brush adapted to engage said contacts successively, of a conductor in electrical communication with the brush and adapted to follow said brush over the contacts, whereby preignition of the explosive charges in the cylinders is prevented.

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

RUSSELL HUFF.

Witnesses:

ALLEN LOOMIS,  
L. C. TENNEY.