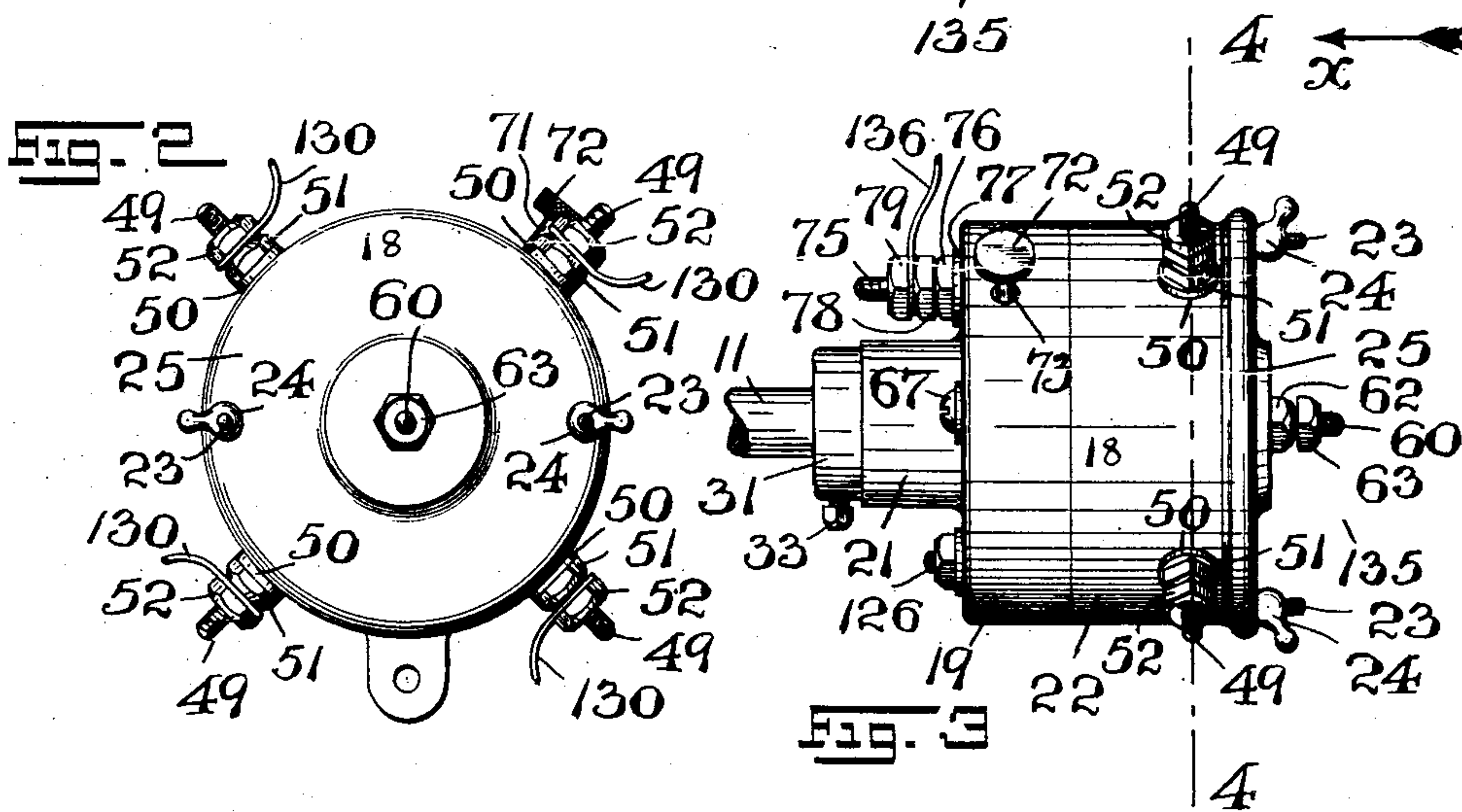
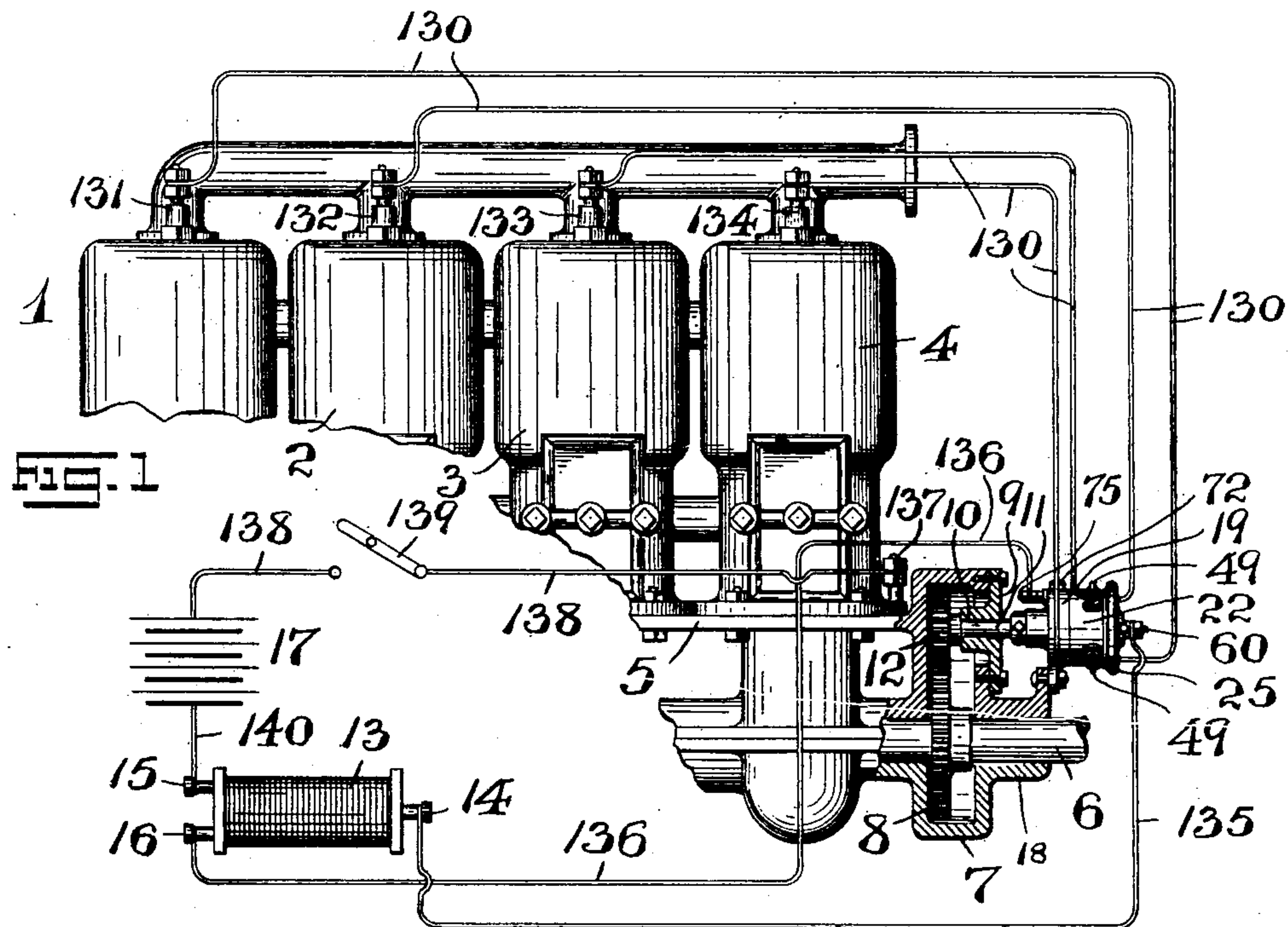


J. M. SMITH.
CURRENT DISTRIBUTER AND TIMER.
APPLICATION FILED MAY 15, 1909.

969,731.

Patented Sept. 6, 1910.

4 SHEETS—SHEET 1.



WITNESSES:

Frederick H. W. Fraentzel
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INVENTOR:

James M. Smith,

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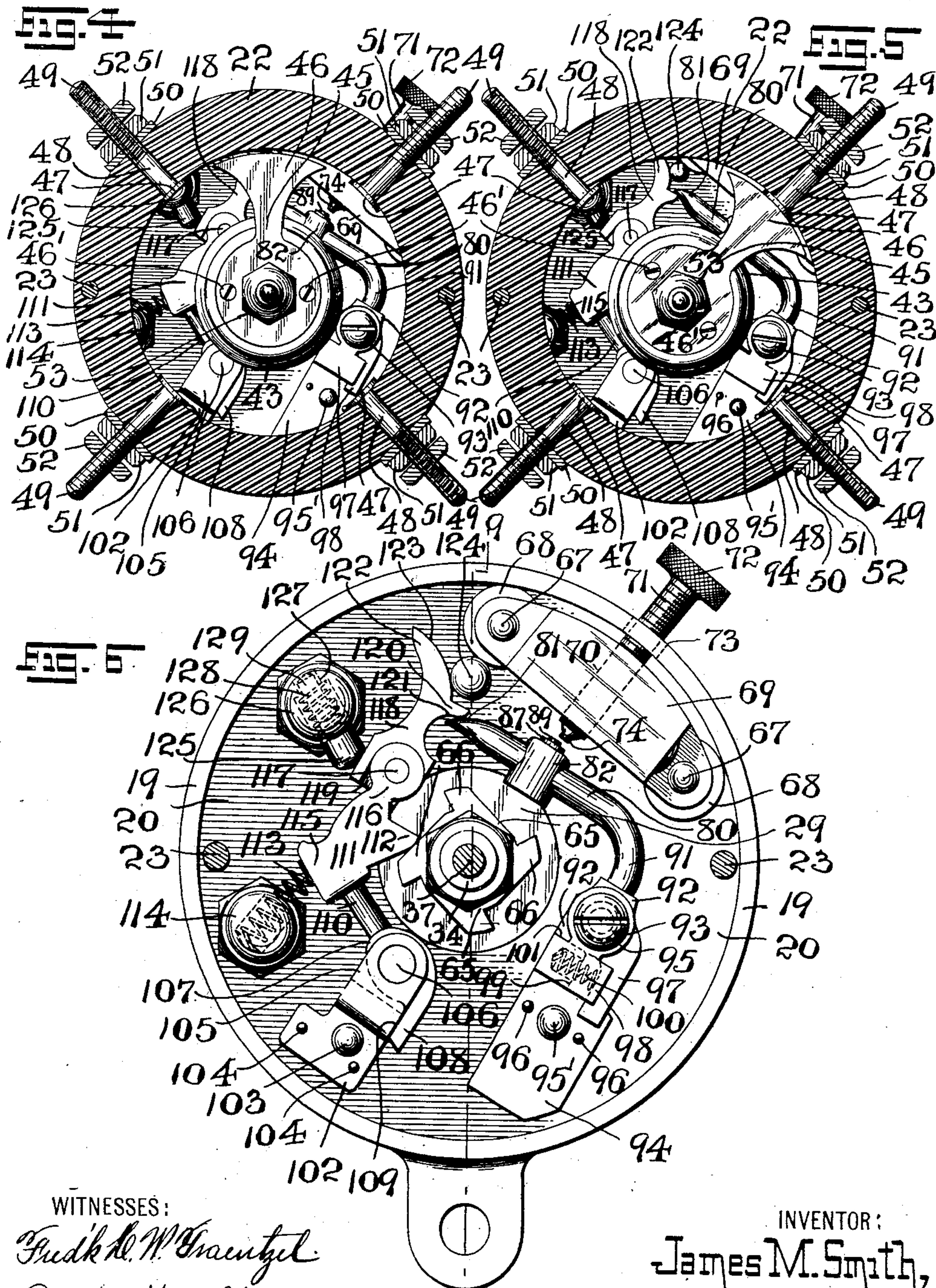
Fraentzel and Richards
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4 SHEETS—SHEET 2.



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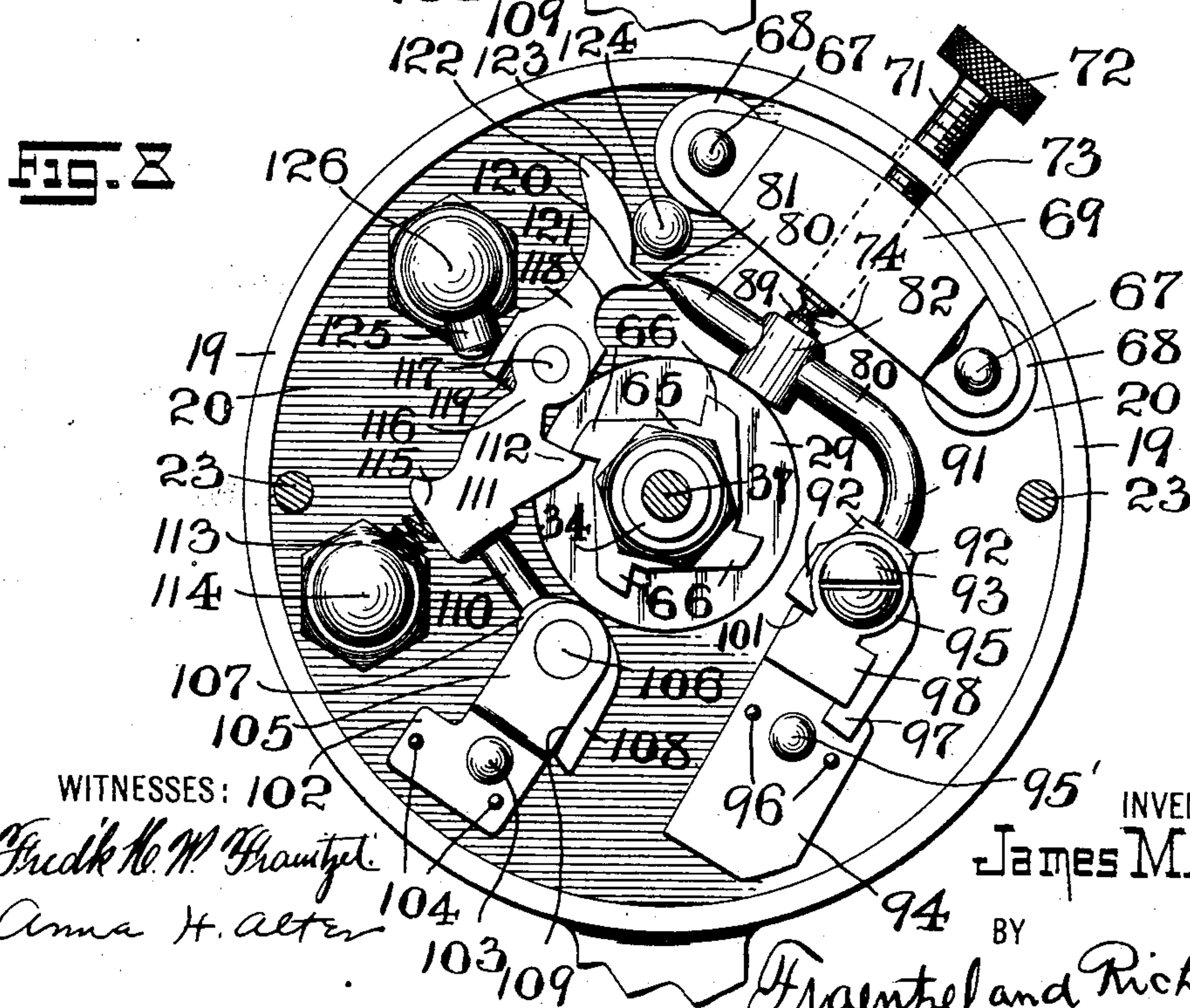
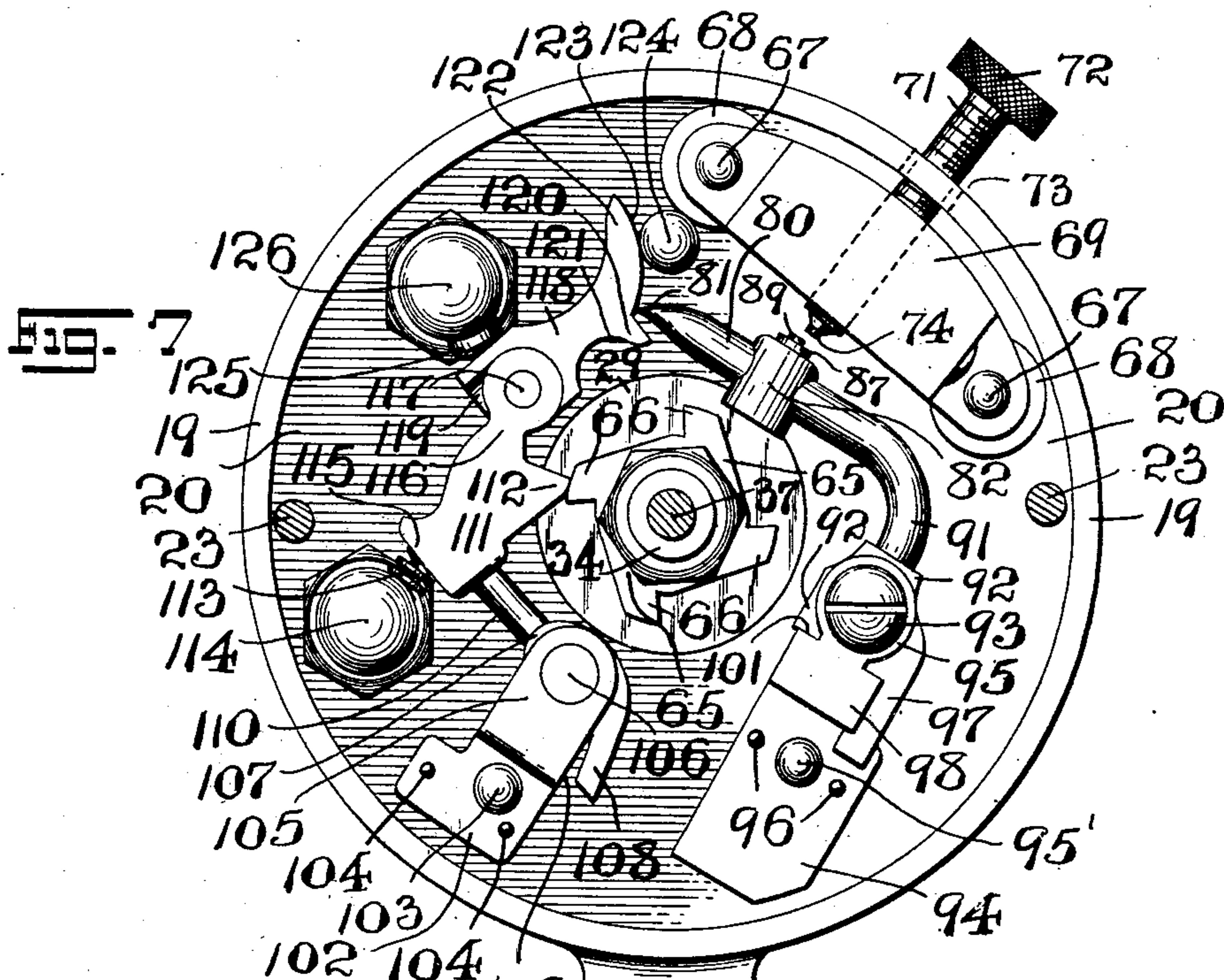
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4 SHEETS—SHEET 3.



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4 SHEETS—SHEET 4.

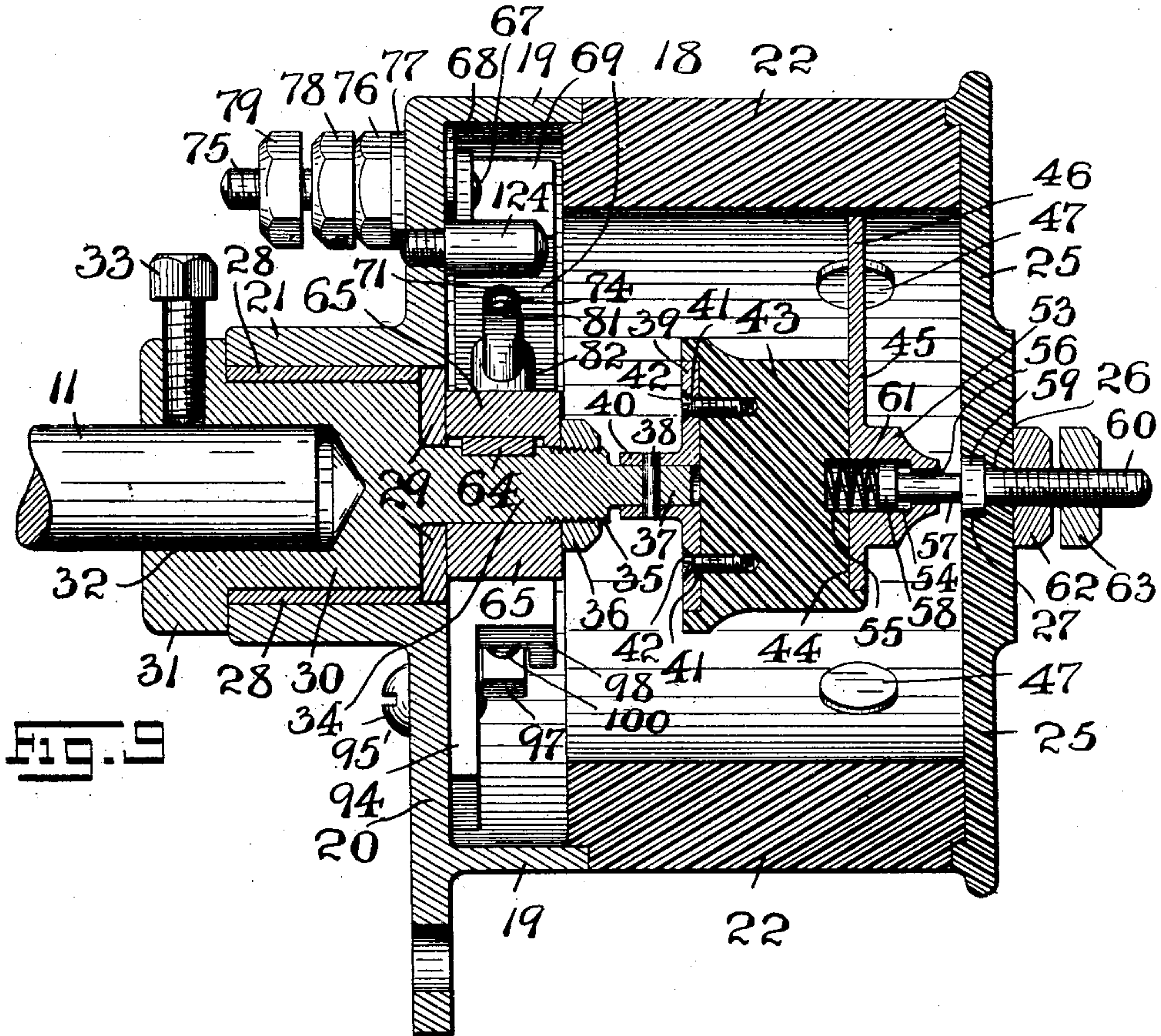


FIG. 9

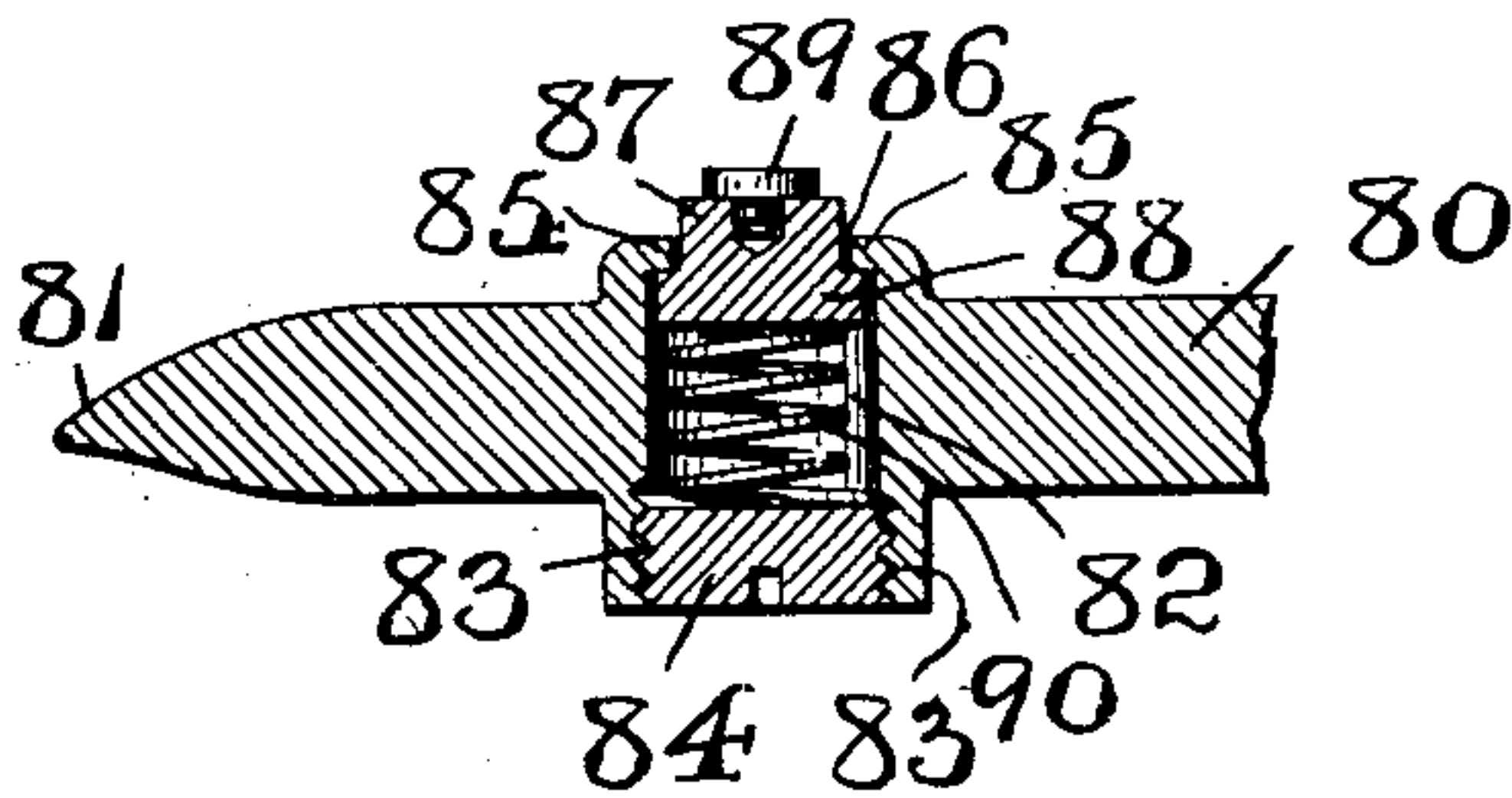


FIG. 10

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UNITED STATES PATENT OFFICE.

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CURRENT DISTRIBUTER AND TIMER.

969,731.

Specification of Letters Patent.

Patented Sept. 6, 1910.

Application filed May 15, 1909. Serial No. 496,129.

To all whom it may concern:

Be it known that I, JAMES M. SMITH, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Current Distributers and Timers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to characters of reference marked thereon, which form a part of this specification.

This invention has reference, generally, to improvements in that class of electrical devices known in the art as timing and distributing apparatus for explosive gas-engines; and, the present invention relates, more particularly, to a novel and simply constructed automatic timing and distributing means for controlling an electric current to intermittently make and break the circuit thereof, and successively connect the sparking terminals or devices of a number of engine-cylinders with the main source of electrical generation, so as to successively ignite or explode the charges of explosive element in the explosion chambers of a multi-cylinder engine.

The present invention has for its principal object to provide a novel and simple, as well as an effectively operating mechanism or device of the general construction hereinafter more particularly set forth, which is adapted to be geared with the shaft of an explosive gas engine in such a manner, so that its various parts will move in proper time-relation to the movements of the different pistons in the several cylinders of the engine, so as to properly time and distribute the electric current successively to the sparking terminals within the several cylinders; and, furthermore, to provide a timing and distributing mechanism in which the actions and movements of the several parts of the mechanism take place in very rapid succession, and in which the one vibratory contact-making and breaking element is cushioned or spring-supported, so that it will yieldingly act upon the other contact-making and breaking element without jamming or other deteriorating effects, and still pro-

duce, at proper intervals, instantaneous electrical connections.

The invention has for its further object to provide an automatically operating device by means of which an electric current may be taken from the electric batteries, when such are the source of generation, and distributed successively from a single spark or vibrator-coil to a number of sparking devices or terminals of a multi-cylinder explosive engine, whereby a number of such spark or vibrator-coils corresponding to the number of sparking terminals is clearly obviated.

Other objects of this invention not at this time more particularly enumerated will be clearly understood from the following detailed description of the present invention.

With the various objects of this invention in view, the said invention consists, primarily, in the novel electric current timing and distributing mechanism or device hereinafter set forth; and, the invention consists, furthermore, in the arrangements and combinations of the various devices and parts, as well as in the details of the construction of the same, all of which will be more fully described in the following specification, and then finally embodied in the clauses of the claims which are appended to and which form an essential part of this specification.

The invention is clearly illustrated in the accompanying drawings, in which:—

Figure 1 is a view of a multi-cylinder explosive-engine, a portion of the same being represented broken away, and another portion of the engine-frame being shown in vertical section, said view showing in side elevation an automatic timer or distributor, embodying the principles of the present invention, and said view illustrating also in proper electrical connection therewith and with the several sparking terminals of the engine, a source of electrical generation, as a battery, and a single induction coil with its primary and secondary circuits. Fig. 2 is a front face view of the said automatic timing and distributing mechanism, and Fig. 3 is a side elevation of the same, both of said views being drawn on an enlarged scale. Fig. 4 is a transverse vertical section, taken on line 4—4 in said Fig. 3, looking in the direction of the arrow *x*, said view being made

on a larger scale, and showing the general arrangement of the interior mechanism of the device, the parts being represented in their normal initial positions; and Fig. 5 is a similar view of the same parts, when in a position to distribute the electric current to one of the sparking terminals of the engine. Fig. 6 is an elevation of the device, made on a still larger scale, with the end-shell of the casing and devices therein omitted from said view, said view showing in elevation the various parts of the device in said end-shell in their normal initial positions before establishing electrical contact at the contact-making and breaking elements. Fig. 7 is a similar view of the same parts indicated in said Fig. 6, and showing the first operation of the parts, termed the "kick-off," just before the making of the electrical contact at the contact-making and breaking elements; and Fig. 8 is a similar view of same parts, showing their relative positions at the time of making the electrical contact at the contact-making and breaking elements. Fig. 9 is a longitudinal vertical section, said section being taken on line 9—9 in said Fig. 6; and Fig. 10 is a detail vertical sectional representation of a portion of a vibratory contact-arm with which the cushion or spring-supported contact-making or breaking element is connected.

Similar characters of reference are employed in all of the above described views, to indicate corresponding parts.

Referring now to the several figures of the drawings, the reference-characters 1, 2, 3 and 4, indicate in this case the four cylinders of an internal combustion or explosive-engine, and 5 indicates any suitable form of engine-frame. The reference-character 6 indicates the said shaft of the engine, and 7 is a suitable casing, in which is arranged a gear-wheel 8 suitably mounted upon the said main-shaft 6. The said casing 7 is provided with a cover or plate 9 formed with a bearing 10 in which is mounted and revolves therein a spindle 11 which is also provided with a gear-wheel 12 in mesh with and driven by the gear-wheel 8.

The reference-character 13 indicates any usual form of single induction coil, the binding-post 14 indicating the secondary winding of the coil, and the binding-posts 15 and 16 indicating the primary windings of the said coil.

The reference-character 17 indicates a suitable battery which is arranged in the primary circuit wired up with my novel form of automatic electrical current timer and distributor, in the manner hereinafter more fully described. The said current timer and distributor, which embodies the principles of the present invention, is indicated by the reference-character 18, and the same comprises a suitable end-shell 19, which is made

of a suitable metal, preferably aluminum and the said end-shell or member being formed with an end-wall 20 which is provided with a tubular hub 21, substantially as shown. Suitably connected with the said end-shell or member 19, is a ring-shaped shell or casing-element 22, the latter being made from a material which is a non-conductor of electricity; and, detachably secured upon the outer open end-portion of the said shell or element 22, by means of screw-threaded shanks 23 and suitably formed nuts 24, is a cover 25, which is also made from a material which is a non-conductor of electricity. The said cover 25 is provided with a centrally disposed opening 26, and a recess-portion 27 for the purposes to be presently more particularly described. Suitably arranged within the said previously-mentioned tubular hub 21 is a suitable sleeve 28 and a disk or washer 29, and rotatably disposed in said sleeve 28 is a bushing 30, which is formed with an annular portion 31 fitted against the end of the hub 21 and the said sleeve 28, and is provided with a socketed receiving portion 32 in which is arranged and secured therein in its fixed position by means of a set screw 33, the end-portion of the previously mentioned spindle 11. The said bushing 30 is also provided with a reduced portion or member 34, forming a suitable shank, which extends through the central opening of the disk or washer 29, and into the chambered part of the device or apparatus formed by the two shells or casing-elements 19 and 22. The said shank is also provided with a screw-threaded part 35, upon which is screwed a lock-nut 36. Projecting from the said screw-threaded portion of the said shank 34 is another reduced extension, as 37, upon which is mounted and secured, by means of a fastening pin 38, or other suitable fastening means, a receiving socket or tubular hub 40 of a disk or plate 39. This disk or plate 39 is provided with suitable screw-holes 41, for the reception of suitable screws 42 by means of which a suitably formed hub-member 43, which is made from an insulating material, so as to be a non-conductor of electricity, is suitably fixed in place upon the previously mentioned disk or plate 39, and revolves with the said disk or plate, and the remaining parts of the bushing 30, operated from the spindle 11, all of which will be clearly evident from an inspection of Fig. 9 of the drawings. Suitably secured in the preferably recessed end 44 of the said hub-member 43, by means of screws 46¹, is a contact making and breaking element 45, the same being formed with a laterally extending and preferably fan-shaped contact-making and breaking arm 46, adapted to be moved over and in contact with the surfaces of certain suitably

disposed contact-disks or plates 47 which are arranged upon the inner end-portions of shanks or pins 48 extending through the sides of the said shell or casing-element 22.

5 Each shank or pin is also made with a screw-threaded portion 49, upon which are arranged a suitable washer 50 and a pair of binding nuts 51 and 52, as clearly illustrated in Fig. 5 of the drawings. The said contact-making and breaking element 45 is also
10 provided with a centrally disposed hub-like portion or element 53 which is formed with a socketed part 54 in alinement with and corresponding to a socketed portion 55 in
15 the hub-like member 43. Movably arranged in a tubular portion 56 in the said hub-like portion or element 53 is a contact making member or pin 57, said member 57 having a portion extending into the said socketed
20 part 54 and provided with an enlargement or bead 58 which forms a suitable guide, as will be clearly evident. The forward and contacting end-portion of the said pin is pressed in contact with the surface of the
25 head or enlargement 59 of a screw-threaded shank or pin 60 arranged in the portions 27 and 26 of the cover 25, substantially as shown in Fig. 9 of the drawings, by means of a suitably coiled spring 61 which is ar-
30 ranged in the socketed portions 55 and 54 hereinbefore mentioned, back of the head or enlargement 58 of the contact-making pin 57, substantially in the manner illustrated. The said screw-threaded shank has
35 arranged thereon a pair of binding nuts 62 and 63.

Suitably secured upon the previously mentioned shank-portion 34 of the bushing 30, preferably by means of a key 64, so as
40 to turn with the said shank-portion and held thereon against lateral displacement by the previously mentioned lock-nut 36, is a suitably formed trip-device 65, which as will be seen more particularly from an in-
45 spection of Figs. 7, 8 and 9 of the drawings, is made with the peripheral projections or extensions 66, which form tripping members of the said device. In the present con-
50 struction I have shown the device provided with four of such tripping members 66, the number of such members corresponding to the number of sparking devices and number of cylinders of the engine. It will be under-
55 stood, that this number of tripping elements may be departed from and that a larger or smaller number of such tripping elements may be used, according to the number of sparking devices and cylinders of the engine with which the timing and distributing
60 mechanism is to be employed.

Suitably secured upon the inner face of the wall 20 of the end-shell or member 19, by means of screw 67 or other suitable fast-
35 ening means, and insulated from the said wall 20 by means of suitable fiber disk 68,

is a block 69, the said block being provided with a screw-threaded part 70 in which is adjustably arranged a screw threaded shank 71 which is provided with a fingerpiece or head 72. This screw-threaded shank 71 ex-
70 tends through an opening 73 in the side of the said end-shell or member 19, the said opening being larger than the cross-sectional area of the shank 71, so that the said shank cannot establish a short circuit or electrical
75 contact with the metallic end-shell 19. This screw-threaded shank 71, which, as will be clearly evident, forms one of the electrical contact making and breaking elements of the device, is provided at its opposite end with
80 a suitably formed contact making and breaking portion or element 74. One of the said previously mentioned screws 67 is formed with a screw-threaded shank 75 which extends beyond the outer face of the wall
85 of the said end shell 19. Suitably disposed upon the said screw-threaded shank 75 is a fastening nut 76 and washer 77, and also a pair of binding nuts 78 and 79. The other contact making and breaking element con-
90 sists essentially of a vibratory arm 80 which is made with the tapered end-portion 81, for the purposes to be presently more fully set forth. The said arm 80 is also made with a socketed or chambered portion 82, as
95 clearly illustrated in Fig. 10 of the drawings. At one end, the said portion 82 is internally screw-threaded, as at 83, said screw-threaded part being closed by means of a removable screw-plug 84. The opposite
100 part of said chambered portion 82 is made with an annular internal flange 85 which encircles an opening 86. Movably disposed in said opening 86 is a plug 87 which is formed with an enlargement or head 88,
105 said head being placed in the chamber of said part 82, and the plug 87 being prevented from falling out of said chamber by said enlargement or head 88 coming in contact with the flange 85. Suitably connected
110 with that portion of the plug 87 which extends from said opening 86 is a contact-member or element, as 89, which is adapted to be brought yieldingly in contact with the previously mentioned contact-making and
115 breaking element 74. A suitable cushion, preferably in the form of a coiled spring 90, is placed in the chamber of said part 82, said spring being arranged between the face of said enlargement or head 88 and the
120 screw-plug 84. The said vibratory arm 80 is provided at its opposite end with a downwardly projecting portion 91 which is provided with a perforated member 92 and is pivoted upon a pivot-pin or screw 93 be-
125 tween a pair of perforated lugs or ears 95 of a plate 94, said plate being secured to the wall 20 by means of a screw 95', and held in a fixed position against turning upon
130 said wall 20 by a pair of retaining pins 96

which have their end-portions fastened in said wall 20. Extending from said member 92, at the one side thereof, is a finger 97, said finger having a portion movably disposed between a projection 98 and in front of a connecting member 99, a coiled spring 100, said spring being disposed and its coils being sufficiently compressed between said finger 97 and said connecting member 99, which forces an angular portion 101 of said member 92 directly upon the upper surface of the connecting member 99, whereby the said vibratory arm 80 is retained in its normal initial position, illustrated more particularly in Fig. 6 of the drawings.

The previously mentioned "kick-off" device comprises several pivotally connected members, and the device consists, essentially, of a plate 102 which is secured to the wall 20 by means of a screw 103, and is held in a fixed position against turning upon said wall 20 by a pair of retaining pins 104 which have their end-portions fastened in said wall 20. The said plate 102 is provided with a pair of perforated ears 105 upon which is mounted, and extends across the space between said ears, a pivot-pin 106. Oscillating upon said pin 106 is a perforated member or element 107 which is provided with a downwardly extending finger or projection 108 normally in engagement with the edge or solid portion 109 located upon said plate 102, directly below said ears 105, as clearly shown in Fig. 6 of the drawings. Extending at an angle and in an upward direction from said perforated member or element 107 is a post or rod 110, upon the free end-portion of which is mounted a suitably formed dog 111. This dog is formed with a tooth-like projection or extension, as 112, normally in slidable engagement with the peripheral tripping members or extensions 66 of the trip-device 65, substantially as illustrated in Figs. 6, 7 and 8 of the drawings. A suitable and preferably coiled spring, as 113, extending from the side of a post or lug 114, which is secured upon the said wall 20, presses upon the end or shoe 115 of the said dog 111, whereby the parts just described are maintained in their normal initial positions represented in said Fig. 6. The said dog 111 is also provided with a pair of perforated ears 116 with which is connected a pivot-pin 117. These ears 116 embrace a web 119 of a "kick-off" dog 118, being pivotally connected therewith by means of said pin 117 which is secured to and extends upon the opposite sides of said web 119. The said "kick-off" dog 118 is also provided with a lug or projection 120 having a curved edge 121 resting normally upon the tapered end-portion 81 of the vibratory arm 80. The said dog 118 is also formed with a horn 122, having a

convexed edge-portion 123 which is adapted to ride against and upon the side of a cylindrically formed stop-post or pin 124 secured to and extending from the inner face of the wall 20. The said pivoted "kick-off" dog 118 is held in its normal initial position, as shown in Fig. 6 of the drawings, by means of a plug 125 which is forced against the said dog 118 by means of a spring 128 which is arranged and secured in a socketed portion 127 of a post 126, also secured upon said wall 20, and encircles the reduced portion or shank 129 of the plug 124, as indicated in dotted outline in said Fig. 6.

Referring now more particularly to Figs. 1, 2 and 3 of the drawings, it will be seen, that there are secured to the respective shanks 49 of the several contact-plates 47, between the binding nuts 51 and 52 thereon, suitable circuit-wires or electrical conductors 130 which respectively lead to and are connected electrically with the sparking terminals or devices 131, 132, 133 and 134, of the respective cylinders 1, 2, 3 and 4 of the engine. Connected with the said screw-threaded shank or pin 60, between the binding nuts 62 and 63 thereon, is the end of a wire or electrical conductor 135 of a secondary circuit which is connected at its other end with the binding post 14 of the single induction coil 13. Connected with the screw-threaded shank 75 of the screw 67 and secured thereto by means of the nuts 78 and 79 is the end of a wire or electrical conductor 136, forming part of the primary circuit leading from the binding post 16 of said coil 13.

From Fig. 1 it will be seen that the engine-frame 5 is provided with a suitable ground-binding post 137 to which is attached one end of a circuit-wire or electrical conductor 138 which is connected at its other end with one of the poles of the electric battery 17. In this circuit-wire or electrical conductor 138 may be placed any usual cut-off switch 139. The opposite pole of the battery 17 is connected by means of a circuit-wire or electrical conductor 140 with the binding post 15 of the induction coil 13, thus completing the primary circuit, as will be clearly evident.

Having in the foregoing description set forth the general construction and the arrangement of the electrical circuits of the automatically operating timer and distributor, I will now briefly set forth the use and operation of the said device.

Assuming the switch 139 to have been closed so that the electrical circuits are completed and subject to the control of the automatic timer and distributor, the electric current from the battery 17 then passes through the wire 140 and the binding post 15 into the primary winding of the coil 13, the primary circuit or current passing out of

the said coil at the binding-post 16, into the wire 136 and thence to the screw-threaded shank 75 of the screw 67, and by means of the same into the block 70, into the screw 71 in said block and to the contact-making and breaking element 74 at the end of the said screw 71. During the rotation of the spindle 11 and the trip-device 65 thereon, the peripheral projections 66 of the trip-device 65 in their slidable engagement with the tooth-like projection or extension 112 of the dog 111, will move the dogs 111 and 118 first from their normal initial positions shown in Fig. 6 to the positions, indicated in Fig. 7, whereby the curved edge 121 of the lug or projection 120 slides over the tapered end-portion 81 of the vibratory arm 80 so as to present the lug 120 back of the tapered end-portion 81 of said arm 80 ready to operatively engage the same so as to move forward the arm 80 upon the return movement of the dogs 111 and 128 to their normal initial positions. As soon, however, as the peripheral projection or extension 66 of the trip-device 65 has passed beyond the tooth-like projection 112 of the dog 111, the springs 113 and 128 will bring the two dogs 111 and 118 into the straightened out relation shown in Fig. 8 of the drawings. The movement of the dog 118 brings its lug or projection 120 in sliding engagement with the end-portion of the vibratory arm 80, as illustrated in said Fig. 8, producing an electrical contact between the contact-making and breaking elements 89 and 74. At the same time, the spring 100 has been still further compressed between the finger 97 and the connecting member, whereby, as soon as the projection 120 has passed beyond the end-portion of the arm 80, the said spring 100 will return the said arm 80 and its parts connected therewith to the normal initial position shown in Fig. 6, whereby the electrical contact between the elements 89 and 74 is again interrupted, the springs 113 and 128 retaining the two dogs 111 and 118 in their operative positions, ready for the next actuation of the arm 80, when the next succeeding peripheral projection 66 of the trip-device 65 is brought in sliding engagement with the tooth-like projection 112 of the dog 111.

At the time that the electrical contact is made between the elements 74 and 89, the electric current passes through the arm 80, and its parts, into the shell-member 19 of the casing, into the bushing 30 and spindle 11, and thence to the ground-binding post 137. The primary circuit is at that moment completed, the electric current returning through the circuit-wire 138, and the closed switch 139, back to the battery 17. The primary circuit being thus completed in the coil 13, the secondary circuit is thereby generated. The electric current passes from

the binding post 14, through the circuit-wire 135 into the screw-threaded shank or pin 60 and to the head or enlargement 59 of the same, which being in contact with the contact-making member or pin 57, carries the electric current through the hub-like portion or element 53 into the contact-making and breaking element 45, and the fan-shaped end-portion of the arm 46. While these parts are connected with the revolving shank or stem 34 of the bushing 30, but are insulated therefrom by means of the hub-like member 43, the fan-shaped end-portion of the arm 46 will be caused to slide over and in contact with the several contact-disks or plates 47, as will be clearly evident. The electric circuit is thus completed through the shank or pin 48, at which such intermittent contact is being made, through the respective circuit-wire 130, the respective sparking-device or igniter, as 131, and the respective cylinder, as 1, and framework of the engine to the ground binding-post 137, the secondary circuit being finally completed through the circuit-wire 138, the closed switch 139, the battery 17, and the circuit-wire 140, with the coil 13. In its operation, the relation of the said fan-shaped end-portion of the arm 46 is such that the secondary circuit is completed at the time that the instantaneous primary circuit is established, so that an electric spark will be produced at the proper sparking terminal or device within the proper cylinder of the engine, so as to explode the charge of the explosive mixture within said cylinder. The moment, the fan-shaped end-portion of the arm 46 passes over and away from the disk or plate 47, the electrical contact is broken and the secondary circuit is interrupted. Simultaneously, the electrical contact between the elements 74 and 89, owing to the workings of the dogs 111 and 118, is broken, so that the primary circuit is also interrupted. The said fan-shaped end-portion of the arm 46 thereupon passes on to the next contact-disk or plate 47, in its path of rotation, and when making electrical contact therewith, the two elements 74 and 89 also again establish an electrical contact, so as to again complete the primary circuit. Immediately the secondary circuit is once more established to and through another sparking terminal or device, as 132, and the cylinder 2, in the manner just described, to explode the explosive charge or mixture within said cylinder. Thus, it will be clearly evident, that the primary circuit is intermittently and automatically closed and broken, and the electric current through the secondary circuit is successively distributed to the sparking terminals 131, 132, 133 and 134 of the respective engine-cylinders 1, 2, 3 and 4, by means of the rotating fan-like projection of the arm 46 as it is

brought successively in electrical contact with the several contact-disks or plates 47. It will thus be readily understood, that the electrical energy developed in the secondary circuit of a single coil may be utilized to electrically operate the sparking-terminals or devices of any suitable number of engine-cylinders, all in proper time and rotation or succession.

From the foregoing description, it will be seen, that I have produced a very efficient device for the purposes stated; and, furthermore, the arrangement of the screw-pin 71 is such that it is adjustable within the block, whereby the time of contact between the elements 74 and 89 can be varied, at will, so as to establish a longer or shorter electric primary circuit, and accordingly varying the electric sparks produced in the secondary circuit. The arrangement of a cushioned or spring-supported contact-making and breaking device as connected with the arm 80 also prevents any undue friction between the elements 74 and 89, due to a wiping-contact between these parts, and provides a means in which the danger of the inoperativeness of the parts is, if not entirely eliminated, greatly minimized. Furthermore, the system of compound dogs 111 and 118 is such that their movements are quick and positive, and not sluggish, as in most devices of this character, so that the kick-off action of the dog 118 upon the arm 80 causes the latter to move with a positive and very effective action toward the block 69, and thereby produces a perfect and non-failing electric contact between the two elements 74 and 89.

Of course it will be understood that changes may be made in the arrangements and combinations of the various devices and parts, as well as in the details of the construction of the same, without departing from the scope of the present invention as set forth in the foregoing specification, and as defined in the claims which are appended to the said specification. Hence, I do not limit my present invention to the exact arrangements and combinations of the devices and parts as described in the said specification, nor do I confine myself to the exact details of the construction of the said parts as illustrated in the accompanying drawings.

I claim:—

1. A timer and distributor for ignition systems of explosive gas engines comprising a casing, a trip-device revolubly arranged in said casing, a supporting block within said casing, but insulated therefrom, a contact-making and breaking element connected with said block, a vibratory arm mounted within said casing, a contact-making and breaking element carried by said arm, and a kick-off device comprising a pair of pivotally connected spring-controlled dogs, one of which is actuated from said trip-device,

and means connected with the other dog adapted to be brought in engagement with a portion of said vibratory arm for actuating said arm.

2. A timer and distributor for ignition systems of explosive gas engines comprising a casing, a trip-device revolubly arranged in said casing, a supporting block within said casing, but insulated therefrom, a contact-making and breaking element connected with said block, a vibratory arm mounted within said casing, a contact-making and breaking element carried by said arm, and a kick-off device comprising a pair of pivotally connected spring-controlled dogs, one of which is actuated from said trip-device, means connected with the other dog adapted to be brought in engagement with a portion of said vibratory arm for actuating said arm, and a stop-post in said casing with which a portion of said last-mentioned dog is brought in engagement so as to arrest the movement of the same.

3. A timer and distributor for ignition systems of explosive gas engines comprising a casing, a trip-device revolubly arranged in said casing, a supporting block within said casing, but insulated therefrom, a contact-making and breaking element connected with said block, a vibratory arm mounted within said casing, a contact-making and breaking element carried by said arm, and a kick-off device comprising a plate secured within said casing, said plate having perforated ears, a pivot-pin connected with said ears, an oscillatory element mounted upon said pin, a rod extending from said element, a trip-dog connected with said rod, said trip-dog being adapted to be actuated from said trip-device, a kick-off dog pivotally connected with said trip-dog, and means connected with said kick-off dog adapted to be brought in engagement with a portion of said vibratory arm for actuating said arm.

4. A timer and distributor for ignition systems of explosive gas engines comprising a casing, a trip-device revolubly arranged in said casing, a supporting block within said casing, but insulated therefrom, a contact-making and breaking element connected with said block, a vibratory arm mounted within said casing, a contact-making and breaking element carried by said arm, and a kick-off device comprising a plate secured within said casing, said plate having perforated ears, a pivot-pin connected with said ears, an oscillatory element mounted upon said pin, a rod extending from said element, a trip-dog connected with said rod, said trip-dog being adapted to be actuated from said trip-device, a kick-off dog pivotally connected with said trip-dog, means connected with said kick-off dog adapted to be brought in engagement with a portion

of said vibratory arm for actuating said arm, and a stop-post in said casing with which a portion of said last-mentioned dog is brought in engagement so as to arrest the movement of the same.

5 5. A timer and distributor for ignition systems of explosive gas engines comprising a casing, a trip-device revolubly arranged in said casing, a supporting block within
10 said casing, but insulated therefrom, a contact-making and breaking element connected with said block, a vibratory arm mounted within said casing, a contact-making and breaking element carried by said arm, and
15 a kick-off device comprising a plate secured within said casing, said plate having perforated ears, a pivot-pin connected with said ears, an oscillatory element mounted upon said pin, a rod extending from said element,
20 a trip-dog connected with said rod, said trip-dog being adapted to be actuated from said trip-device, a kick-off dog pivotally connected with said trip-dog, means connected with said kick-off dog adapted to be
25 brought in engagement with a portion of said vibratory arm for actuating said arm, a post extending from said casing, a spring between said post and said trip-dog, a second post extending from said casing, and
30 a spring-actuated plug between said second post and said kick-off dog.

6. A timer and distributor for ignition systems of explosive gas engines comprising a casing, a trip-device revolubly arranged
35 in said casing, a supporting block within said casing, but insulated therefrom, a contact-making and breaking element connected with said block, a vibratory arm mounted within said casing, a contact-making and
40 breaking element carried by said arm, and a kick-off device comprising a plate secured within said casing, said plate having perforated ears, a pivot-pin connected with said ears, an oscillatory element mounted upon
45 said pin, a rod extending from said element, a trip-dog connected with said rod, said trip-dog being adapted to be actuated from said trip-device, a kick-off dog pivotally connected with said trip-dog, means connected
50 with said kick-off dog adapted to be brought in engagement with a portion of said vibratory arm for actuating said arm, a post extending from said casing, a spring between said post and said trip-dog, a second post extending from said casing, a
55 spring-actuated plug between said second post and said kick-off dog, and a stop-post in said casing with which a portion of said last-mentioned dog is brought in engagement
60 so as to arrest the movement of the same.

7. A timer and distributor for ignition systems of explosive gas engines comprising a casing, said casing being provided with a tubular hub, a bushing revolubly arranged
65 in said hub, said bushing being provided

with a shank extending into said casing a trip-device mounted upon said shank, said device being provided with circumferentially disposed tripping-members, a supporting block within said casing, but insulated
70 therefrom, a contact-making and breaking element connected with said block, a vibratory arm mounted within said casing, a contact-making and breaking element carried by said arm, and a kick-off device comprising a pair of pivotally connected, spring-controlled dogs, a tooth-like projection on one of said dogs adapted to be engaged by said tripping members of said trip-device, and a lug extending from said other dog
75 adapted to be brought in engagement with a portion of said vibratory arm for actuating said arm.

8. A timer and distributor for ignition systems of explosive gas engines comprising
85 a casing, said casing being provided with a tubular hub, a bushing revolubly arranged in said hub, said bushing being provided with a shank extending into said casing, a trip-device mounted upon said shank,
90 said device being provided with circumferentially disposed tripping-members, a supporting block within said casing, but insulated therefrom, a contact-making and breaking element connected with said block,
95 a vibratory arm mounted within said casing, a contact-making and breaking element carried by said arm, and a kick-off device comprising a pair of pivotally connected and spring-controlled dogs, a tooth-like projection on one of said dogs adapted to be engaged by said tripping members of said trip-device, a lug extending from said other dog adapted to be brought in engagement with a portion of said vibratory arm for
100 actuating said arm, and a stop-post in said casing with which a portion of said last-mentioned dog is brought in engagement so as to arrest the movement of the same.

9. A timer and distributor for ignition
110 systems of explosive gas engines comprising a casing, said casing being provided with a tubular hub, a bushing revolubly arranged in said hub, said bushing being provided with a shank extending into said casing, a
115 trip-device mounted upon said shank, said device being provided with circumferentially disposed tripping-members, a supporting block within said casing, but insulated therefrom, a contact-making and breaking
120 element connected with said block, a vibratory arm mounted within said casing, a contact-making and breaking element carried by said arm, and a kick-off device comprising a plate secured within said casing, said
125 plate having perforated ears, a pivot-pin connected with said ears, an oscillatory element mounted upon said pin, a rod extending from said element, a trip-dog connected with said rod, a tooth-like projection on
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said trip-dog adapted to be engaged by said tripping members of said trip-device, a kick-off dog pivotally connected with said trip-dog, and a lug extending from said
 5 kick-off dog adapted to be brought in engagement with a portion of said vibratory arm for actuating said arm.

10. A timer and distributor for ignition system of explosive gas engines comprising
 10 a casing, said casing being provided with a tubular hub, a bushing revolubly arranged in said hub, said bushing being provided with a shank extending into said casing, a
 15 trip-device mounted upon said shank, said device being provided with circumferentially disposed tripping-members, a supporting block within said casing, but insulated therefrom, a contact-making and breaking
 20 element connected with said block, a vibratory arm mounted within said casing, a contact-making and breaking element carried by said arm, and a kick-off device comprising
 25 a plate secured within said casing, said plate having perforated ears, a pivot-pin connected with said ears, an oscillatory element mounted upon said pin, a rod extending
 30 from said element, a trip-dog connected with said rod, a tooth-like projection on said trip-dog adapted to be engaged by said
 35 tripping members of said trip-device, a kick-off dog pivotally connected with said trip-dog, a lug extending from said kick-off dog adapted to be brought in engagement
 40 with a portion of said vibratory arm for actuating said arm, and a stop-post in said casing with which a portion of said last-mentioned dog is brought in engagement
 45 so as to arrest the movement of the same.

11. A timer and distributor for ignition
 40 systems of explosive gas engines comprising a casing, said casing being provided with a tubular hub, a bushing revolubly arranged in said hub, said bushing being provided
 45 with a shank extending into said casing, a trip-device mounted upon said shank, said device being provided with circumferentially disposed tripping-members, a supporting
 50 block within said casing, but insulated therefrom, a contact-making and breaking element connected with said block, a vibratory arm mounted within said casing, a contact-making
 55 and breaking element carried by said arm, and a kick-off device comprising a plate secured within said casing, said plate having perforated ears, a pivot-pin connected with
 60 said ears, an oscillatory element mounted upon said pin, a rod extending from said element, a trip-dog connected with said rod, a tooth-like projection on said trip-dog
 65 adapted to be engaged by said tripping members of said trip-device, a kick-off dog pivotally connected with said trip-dog, and a lug extending from said kick-off dog
 adapted to be brought in engagement with a portion of said vibratory arm for actuating

said arm, a post extending from said casing, a spring between said post and said trip-dog, a second post extending from said casing, and a spring-actuated plug between
 70 said second post and said kick-off dog.

12. A timer and distributor for ignition systems of explosive gas engines comprising
 a casing, said casing being provided with a tubular hub, a bushing revolubly arranged
 75 in said hub, said bushing being provided with a shank extending into said casing, a trip-device mounted upon said shank, said device being provided with circumferentially
 80 disposed tripping-members, a supporting block within said casing, but insulated therefrom, a contact-making and breaking element connected with said block, a vibratory
 85 arm mounted within said casing, a contact-making and breaking element carried by said arm, and a kick-off device comprising a plate secured within said casing, said plate
 having perforated ears, a pivot-pin connected with said ears, an oscillatory element
 90 mounted upon said pin, a rod extending from said element, a trip-dog connected with said rod, a tooth-like projection on said trip-dog adapted to be engaged by said tripping
 95 members of said trip-device, a kick-off dog pivotally connected with said trip-dog, and a lug extending from said kick-off dog adapted to be brought in engagement with a
 100 portion of said vibratory arm for actuating said arm, a post extending from said casing, a spring between said post and said trip-dog, a second post extending from said casing, a
 105 spring-actuated plug between said second post and said kick-off dog, and a stop-post in said casing with which a portion of said last-mentioned dog is brought in engagement
 for actuating said arm.

13. A timer and distributor for ignition systems of explosive gas engines comprising
 a casing, a trip-device revolubly arranged in
 110 said casing, a supporting block within said casing, but insulated therefrom, a contact-making and breaking element connected with said block, a vibratory arm mounted
 115 within said casing, a contact-making and breaking element carried by said arm, and a kick-off device comprising a plate secured within said casing, said plate having perforated
 120 ears, a pivot-pin connected with said ears, an oscillatory element mounted upon said pin, a finger extending downwardly from said oscillatory element, said finger being
 125 normally in engagement with a portion of said plate, a rod extending from said oscillatory element, a trip-dog connected with said rod, said trip-dog being adapted to be
 130 actuated from said trip-device, a kick-off dog pivotally connected with said trip-dog, and means connected with said kick-off dog adapted to be brought in engagement
 with a portion of said vibratory arm for actuating said arm.

14. A timer and distributor for ignition systems of explosive gas engines comprising a casing, a trip-device revolubly arranged in said casing, a supporting block within
 5 said casing, but insulated therefrom, a contact-making and breaking element connected with said block, a vibratory arm mounted within said casing, a contact-making and
 10 breaking element carried by said arm, and a kick-off device comprising a plate secured within said casing, said plate having perforated ears, a pivot-pin connected with
 15 said ears, an oscillatory element mounted upon said pin, a finger extending downwardly from said oscillatory element, said finger being normally in engagement with a portion of said plate, a rod extending from
 20 said oscillatory element, a trip-dog connected with said rod, said trip-dog being adapted to be actuated from said trip-device, a kick-off dog pivotally connected with
 25 said trip-dog, means connected with said kick-off dog adapted to be brought in engagement with a portion of said vibratory arm for actuating said arm, and a stop-post in said casing with which a portion of said
 last-mentioned dog is brought in engagement so as to arrest the movement of the same.

15. A timer and distributor for ignition systems of explosive gas engines comprising a casing, a trip-device revolubly arranged in said casing, a supporting block within
 30 said casing, but insulated therefrom, a contact-making and breaking element connected with said block, a vibratory arm mounted within said casing, a contact-making and
 35 breaking element carried by said arm, and a kick-off device comprising a plate secured within said casing, said plate having perforated ears, a pivot-pin connected with said
 40 ears, an oscillatory element mounted upon said pin, a finger extending downwardly from said oscillatory element, said finger being normally in engagement with a portion of said plate, a rod extending from said
 45 oscillatory element, a trip-dog connected with said rod, said trip-dog being adapted to be actuated from said trip-device, a kick-off dog pivotally connected with said trip-dog, means connected with said kick-off dog
 50 adapted to be brought in engagement with a portion of said vibratory arm for actuating said arm, a post extending from said casing, a spring between said post and said
 55 trip-dog, a second post extending from said casing, and a spring-actuated plug between said second post and said kick-off dog.

16. A timer and distributor for ignition systems of explosive gas engines comprising a casing, a trip-device revolubly arranged in said casing, a supporting block within
 60 said casing, but insulated therefrom, a contact-making and breaking element connected with said block, a vibratory arm mounted within said casing, a contact-making and
 65 breaking element carried by said arm, and a kick-off device comprising a plate secured within said casing, said plate having perforated ears, a pivot-pin connected with said ears, an oscillatory element mounted upon said pin, a finger extending downwardly from said oscillatory element, said finger being normally in engagement with a portion of said plate, a rod extending from said oscillatory element, a trip-dog connected with said rod, said trip-dog being adapted to be actuated from said trip-device, a kick-off dog pivotally connected with said trip-dog, means connected with said kick-off dog adapted to be brought in engagement with a portion of said vibratory arm for actuating said arm, and a stop-post in said casing with which a portion of said last-mentioned dog is brought in engagement so as to arrest the movement of the same.

breaking element carried by said arm, and a kick-off device comprising a plate secured within said casing, said plate having perforated ears, a pivot-pin connected with
 70 said ears, an oscillatory element mounted upon said pin, a finger extending downwardly from said oscillatory element, said finger being normally in engagement with a portion of said plate, a rod extending from said oscillatory element, a trip-dog
 75 connected with said rod, said trip-dog being adapted to be actuated from said trip-device, a kick-off dog pivotally connected with said trip-dog, means connected with said kick-off dog adapted to be brought in
 80 engagement with a portion of said vibratory arm for actuating said arm, a post extending from said casing, a spring between said post and said trip-dog, a second post extending from said casing, a spring-actuated
 85 plug between said second post and said kick-off dog, and a stop-post in said casing with which a portion of said last-mentioned dog is brought in engagement so as to arrest the movement of the same.

17. The herein described timer and distributor for ignition systems of explosive gas engines comprising a casing consisting of a metallic end-shell, and a front-shell and cover both being made of a material
 95 which is a non-conductor of electricity, said end-shell being provided with a tubular hub, a bushing revolubly arranged in said hub, said bushing being provided with a shank extending into said casing, a series of contact-plates connected with said front shell,
 100 and a shank connected with each contact-plate and each shank extending through the wall of said front-shell, a hub-like member of an insulating material connected with the shank of said bushing, a socketed contact-making element secured to said hub-like
 105 member, an arm connected with said socketed contact-making element, said arm having a fan-shaped end-portion adapted to be brought in sliding contact with said contact-plates, a spring-controlled contact-plug connected with said socketed element, and a shank in said cover with which said plug is in electrical contact, a trip-device mounted
 115 upon the shank of said bushing, said device being provided with circumferentially disposed tripping members, a supporting block secured to said end-shell, but insulated therefrom, a contact-making and breaking element connected with said block, a vibratory arm pivoted within said end-shell, said arm being formed with a chambered part, a plug yieldingly disposed in said chambered part,
 120 a spring in engagement with said plug, and a contact-making and breaking element connected with said plug, and a kick-off device comprising a pair of pivotally connected dogs, a tooth-like projection on one of said dogs adapted to be engaged by said tripping
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members of said trip device, and a lug extending from said other dog adapted to be brought in engagement with a portion of said vibratory arm for actuating said arm.

5 18. The herein described timer and distributor for ignition systems of explosive gas engines comprising a casing consisting of a metallic end-shell, and a front-shell and cover both being made of a material which
10 is a non-conductor of electricity, said end-shell being provided with a tubular hub, a bushing revolubly arranged in said hub, said bushing being provided with a shank extending into said casing, a series of contact-
15 plates connected with said front shell, and a shank connected with each contact-plate and each shank extending through the wall of said front-shell, a hub-like member of an insulating material connected with the shank
20 of said bushing, a socketed contact-making element secured to said hub-like member, an arm connected with said socketed contact-making element, said arm having a fan-shaped end-portion adapted to be brought
25 in sliding contact with said contact-plates, a spring-controlled contact-plug connected with said socketed element, and a shank in said cover with which said plug is in electrical contact, a trip-device mounted upon
30 the shank of said bushing, said device being provided with circumferentially disposed tripping members, a supporting block secured to said end-shell, but insulated therefrom, a contact-making and breaking element connected with said block, a vibratory
35 arm pivoted within said end-shell, said arm being formed with a chambered part, a plug yieldingly disposed in said chambered part, a spring in engagement with said plug, and
40 a contact-making and breaking element connected with said plug, and a kick-off device comprising a pair of pivotally connected dogs, a tooth-like projection on one of said dogs adapted to be engaged by said tripping
45 members of said trip-device, a lug extending from said other dog adapted to be brought in engagement with a portion of said vibratory arm for actuating said arm, and a stop-post in said casing with which a portion of
50 said last-mentioned dog is brought in engagement so as to arrest the movement of the same.

19. The herein described timer and distributor for ignition systems of explosive
55 gas engines comprising a casing consisting of a metallic end-shell, and a front-shell and cover both being made of a material which is a non-conductor of electricity, said end-shell being provided with a tubular
60 hub, a bushing revolubly arranged in said hub, said bushing being provided with a shank extending into said casing, a series of contact-plates connected with said front shell, and a shank connected with each contact-plate and each shank extending through

the wall of said front-shell, a hub-like member of an insulating material connected with the shank of said bushing, a socketed contact-making element secured to said hub-like member, an arm connected with said
70 socketed contact-making element, said arm having a fan-shaped end-portion adapted to be brought in sliding contact with said contact-plates, a spring-controlled contact-plug connected with said socketed element,
75 and a shank in said cover with which said plug is in electrical contact, a trip-device mounted upon the shank of said bushing, said device being provided with circumferentially disposed tripping members, a
80 supporting block secured to said end-shell, but insulated therefrom, a contact-making and breaking element connected with said block, a vibratory arm pivoted within said end-shell, said arm being formed with a
85 chambered part, a plug yieldingly disposed in said chambered part, a spring in engagement with said plug, and a contact-making and breaking element connected with said plug, and a kick-off device comprising a pair
90 of pivotally connected spring-controlled dogs, a tooth-like projection on one of said dogs adapted to be engaged by said tripping members of said trip-device, and a lug extending from said other dog adapted to be
95 brought in engagement with a portion of said vibratory arm for actuating said arm.

20. The herein described timer and distributor for ignition systems of explosive
100 gas engines comprising a casing consisting of a metallic end-shell, and a front-shell and cover both being made of a material which is a non-conductor of electricity, said end-shell being provided with a tubular hub, a bushing
105 revolubly arranged in said hub, said bushing being provided with a shank extending into said casing, a series of contact-plates connected with said front shell, and a shank connected with each contact-plate and each shank extending through the wall of said
110 front-shell, a hub-like member of an insulating material connected with the shank of said bushing, a socketed contact-making element secured to said hub-like member, an arm connected with said socketed contact-making
115 element, said arm having a fan-shaped end-portion adapted to be brought in sliding contact with said contact-plates, a spring-controlled contact-plug connected with said socketed element, and a shank in
120 said cover with which said plug is in electrical contact, a trip-device mounted upon the shank of said bushing, said device being provided with circumferentially disposed tripping members, a supporting block secured
125 to said end-shell, but insulated therefrom, a contact-making and breaking element connected with said block, a vibratory arm pivoted within said end-shell, said arm being formed with a chambered part, a plug
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yieldingly disposed in said chambered part, a spring in engagement with said plug, and a contact-making and breaking element connected with said plug, and a kick-off device comprising a pair of pivotally connected spring-controlled dogs, a tooth-like projection on one of said dogs adapted to be engaged by said tripping members of said trip-device, and a lug extending from said other dog adapted to be brought in engagement with a portion of said vibratory arm for actuating said arm, and a stop-post in said casing with which a portion of said last-mentioned dog is brought in engagement so as to arrest the movement of the same.

21. The herein described timer and distributor for ignition systems of explosive gas engines comprising a casing consisting of a metallic end-shell, and a front-shell and cover both being made of a material which is a non-conductor of electricity, said end-shell being provided with a tubular hub, a bushing revolubly arranged in said hub, said bushing being provided with a shank extending into said casing, a series of contact-plates connected with said front shell, and a shank connected with each contact-plate and each shank extending through the wall of said front-shell, a hub-like member of an insulating material connected with the shank of said bushing, a socketed contact-making element secured to said hub-like member, an arm connected with said socketed contact-making element, said arm having a fan-shaped end-portion adapted to be brought in sliding contact with said contact-plates, a spring-controlled contact-plug connected with said socketed element, and a shank in said cover with which said plug is in electrical contact, a trip-device mounted upon the shank of said bushing, said device being provided with circumferentially disposed tripping members, a supporting block secured to said end-shell, but insulated therefrom, a contact-making and breaking element connected with said block, a vibratory arm pivoted within said end-shell, said arm being formed with a chambered part, a plug yieldingly disposed in said chambered part, a spring in engagement with said plug, and a contact-making and breaking element connected with said plug, and a kick-off device comprising a plate secured within said casing, said plate having perforated ears, a pivot-pin connected with said ears, an oscillatory element mounted upon said pin, a rod extending from said element, a trip-dog connected with said rod, a tooth-like projection on said trip-dog adapted to be engaged by said tripping members of said trip-device, a kick-off dog pivotally connected with said trip-dog, and a lug extending from said kick-off dog adapted to be brought in engagement with a portion of said vibratory arm for actuating said arm, and a stop-post in said casing with which a portion of said last-mentioned dog is brought in engagement so as to arrest the movement of the same.

22. The herein described timer and distributor for ignition systems of explosive gas engines comprising a casing consisting of a metallic end-shell, and a front-shell and cover both being made of a material which is a non-conductor of electricity, said end-shell being provided with a tubular hub, a bushing revolubly arranged in said hub, said bushing being provided with a shank extending into said casing, a series of contact-plates connected with said front shell, and a shank connected with each contact-plate and each shank extending through the wall of said front-shell, a hub-like member of an insulating material connected with the shank of said bushing, a socketed contact-making element secured to said hub-like member, an arm connected with said socketed contact-making element, said arm having a fan-shaped end-portion adapted to be brought in sliding contact with said contact-plates, a spring-controlled contact-plug connected with said socketed element, and a shank in said cover with which said plug is in electrical contact, a trip-device mounted upon the shank of said bushing, said device being provided with circumferentially disposed tripping members, a supporting block secured to said end-shell, but insulated therefrom, a contact-making and breaking element connected with said block, a vibratory arm pivoted within said end-shell, said arm being formed with a chambered part, a plug yieldingly disposed in said chambered part, a spring in engagement with said plug, and a contact-making and breaking element connected with said plug, and a kick-off device comprising a plate secured within said casing, said plate having perforated ears, a pivot-pin connected with said ears, an oscillatory element mounted upon said pin, a rod extending from said element, a trip-dog connected with said rod, a tooth-like projection on said trip-dog adapted to be engaged by said tripping members of said trip-device, a kick-off dog pivotally connected with said trip-dog, and a lug extending from said kick-off dog adapted to be brought in engagement with a portion of said vibratory arm for actuating said arm, and a stop-post in said casing with which a portion of said last-mentioned dog is brought in engagement so as to arrest the movement of the same.

23. The herein described timer and distributor for ignition systems of explosive gas engines comprising a casing consisting of a metallic end-shell, and a front-shell and cover both being made of a material which is a non-conductor of electricity, said end-shell being provided with a tubular hub, a bushing revolubly arranged in said hub, said bushing being provided with a shank extending into said casing, a series of contact-plates connected with said front shell, and

a shank connected with each contact-plate and each shank extending through the wall of said front-shell, a hub-like member of an insulating material connected with the shank of said bushing, a socketed contact-making element secured to said hub-like member, an arm connected with said socketed contact-making element, said arm having a fan-shaped end-portion adapted to be brought in sliding contact with said contact-plates, a spring-controlled contact-plug connected with said socketed element, and a shank in said cover with which said plug is in electrical contact, a trip-device mounted upon the shank of said bushing, said device being provided with circumferentially disposed tripping members, a supporting block secured to said end-shell, but insulated therefrom, a contact-making and breaking element connected with said block, a vibratory arm pivoted within said end-shell, said arm being formed with a chambered part, a plug yieldingly disposed in said chambered part, a spring in engagement with said plug, and a contact-making and breaking element connected with said plug, and a kick-off device comprising a plate secured within said casing, said plate having perforated ears, a pivot-pin connected with said ears, an oscillatory element mounted upon said pin, a rod extending from said element, a trip-dog connected with said rod, a tooth-like projection on said trip-dog adapted to be engaged by said tripping members of said trip-device, a kick-off dog pivotally connected with said trip-dog, and a lug extending from said kick-off dog adapted to be brought in engagement with a portion of said vibratory arm for actuating said arm, a post extending from said casing, a spring between said post and said trip-dog, a second post extending from said casing, and a spring-actuated plug between said second post and said kick-off dog.

24. The herein described timer and distributor for ignition systems of explosive gas engines comprising a casing consisting of a metallic end-shell, and a front-shell and cover both being made of a material which is a non-conductor of electricity, said end-shell being provided with a tubular hub, a bushing revolubly arranged in said hub, said bushing being provided with a shank extending into said casing, a series of contact-plates connected with said front shell, and

a shank connected with each contact-plate and each shank extending through the wall of said front-shell, a hub-like member of an insulating material connected with the shank of said bushing, a socketed contact-making element secured to said hub-like member, an arm connected with said socketed contact-making element, said arm having a fan-shaped end-portion adapted to be brought in sliding contact with said contact-plates, a spring-controlled contact-plug connected with said socketed element, and a shank in said cover with which said plug is in electrical contact, a trip-device mounted upon the shank of said bushing, said device being provided with circumferentially disposed tripping members, a supporting block secured to said end-shell, but insulated therefrom, a contact-making and breaking element connected with said block, a vibratory arm pivoted within said end-shell, said arm being formed with a chambered part, a plug yieldingly disposed in said chambered part, a spring in engagement with said plug, and a contact-making and breaking element connected with said plug, and a kick-off device comprising a plate secured within said casing, said plate having perforated ears, a pivot-pin connected with said ears, an oscillatory element mounted upon said pin, a rod extending from said element, a trip-dog connected with said rod, a tooth-like projection on said trip-dog adapted to be engaged by said tripping members of said trip-device, a kick-off dog pivotally connected with said trip-dog, and a lug extending from said kick-off dog adapted to be brought in engagement with a portion of said vibratory arm for actuating said arm, a post extending from said casing, a spring between said post and said trip-dog, a second post extending from said casing, and a spring-actuated plug between said second post and said kick-off dog, and a stop-post in said casing with which a portion of said last-mentioned dog is brought in engagement so as to arrest the movement of the same.

In testimony, that I claim the invention set forth above I have hereunto set my hand this 13th day of May, 1909.

JAMES M. SMITH.

Witnesses:

FRED'K. H. W. FRAENTZEL,
FREDK. C. FRAENTZEL.