

T. C. LUCE.
SPARK PLUG.

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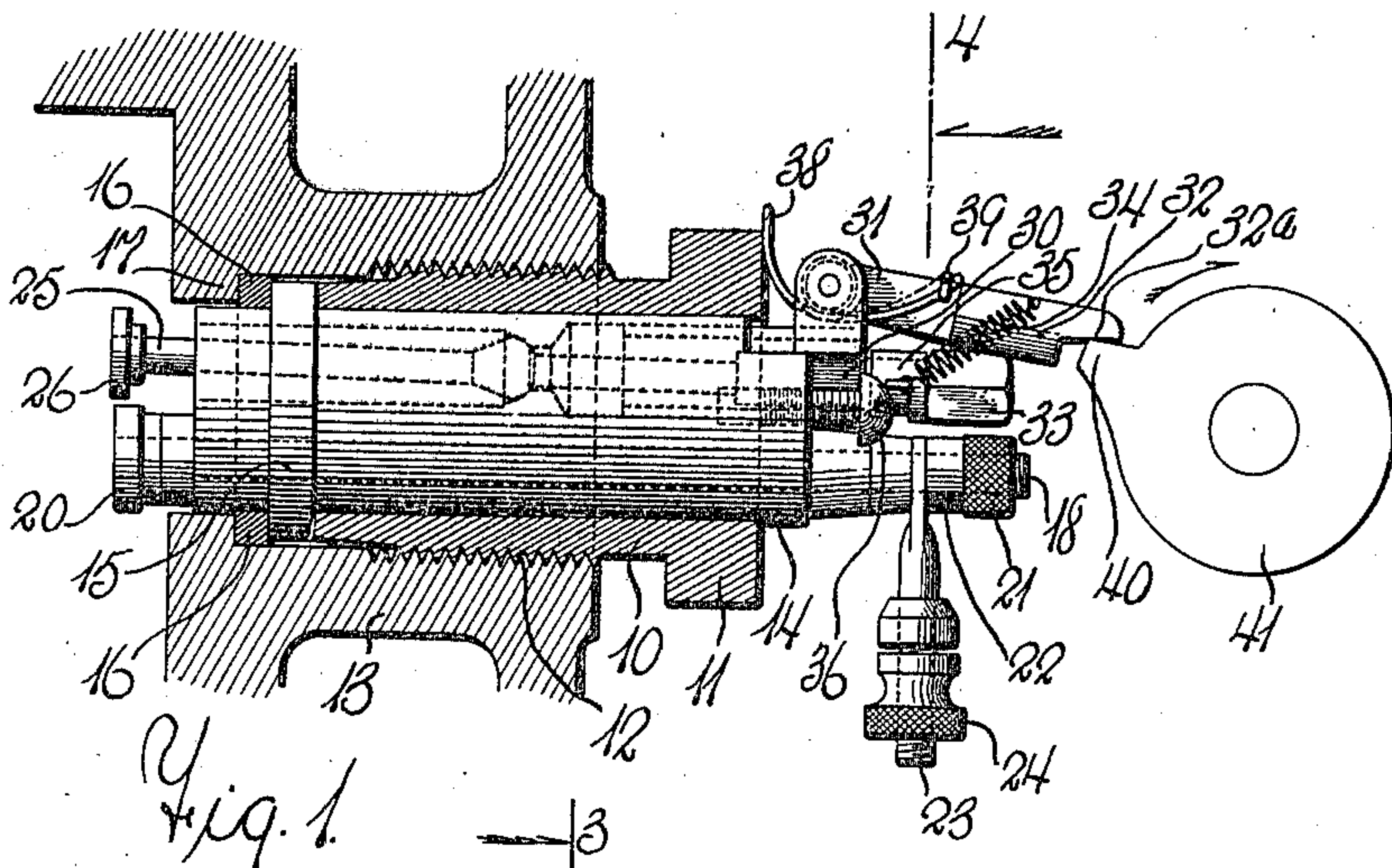


Fig. 1.

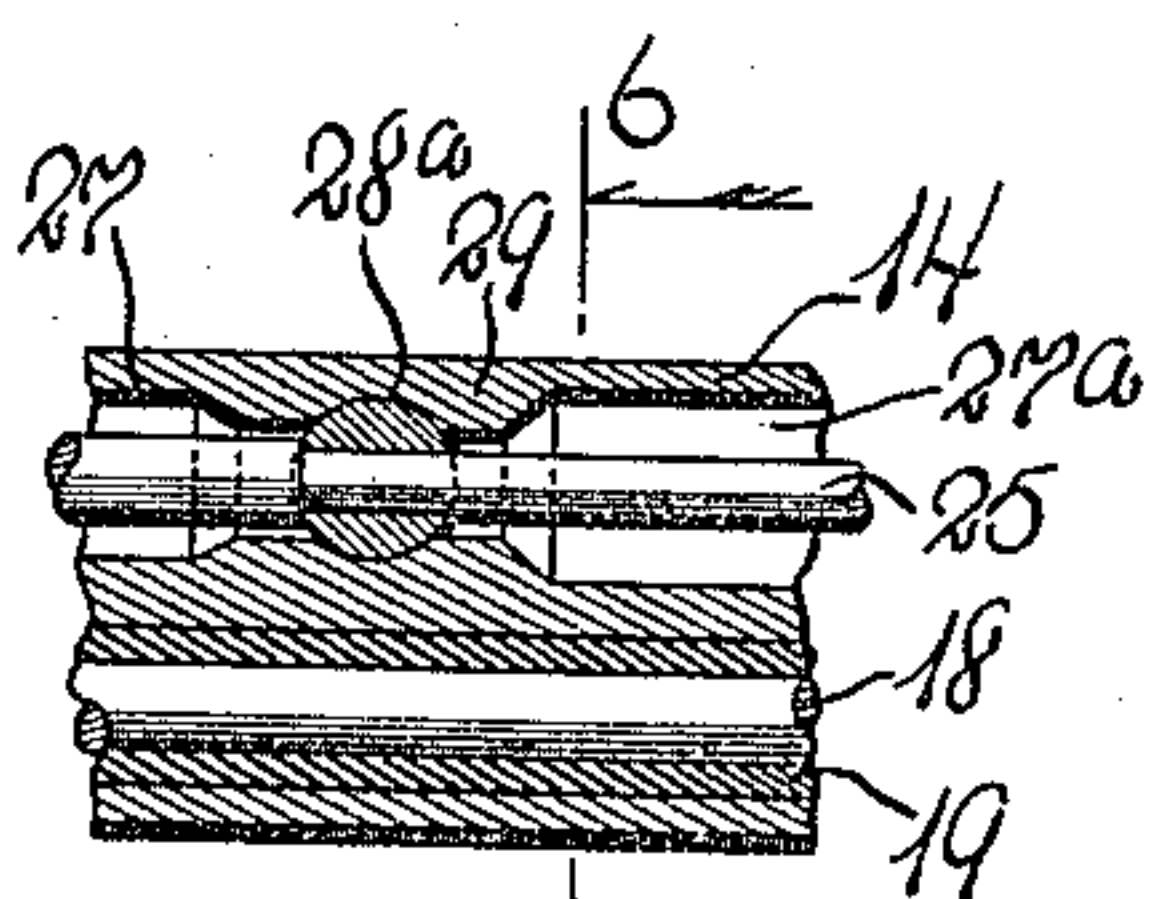


Fig. 5.

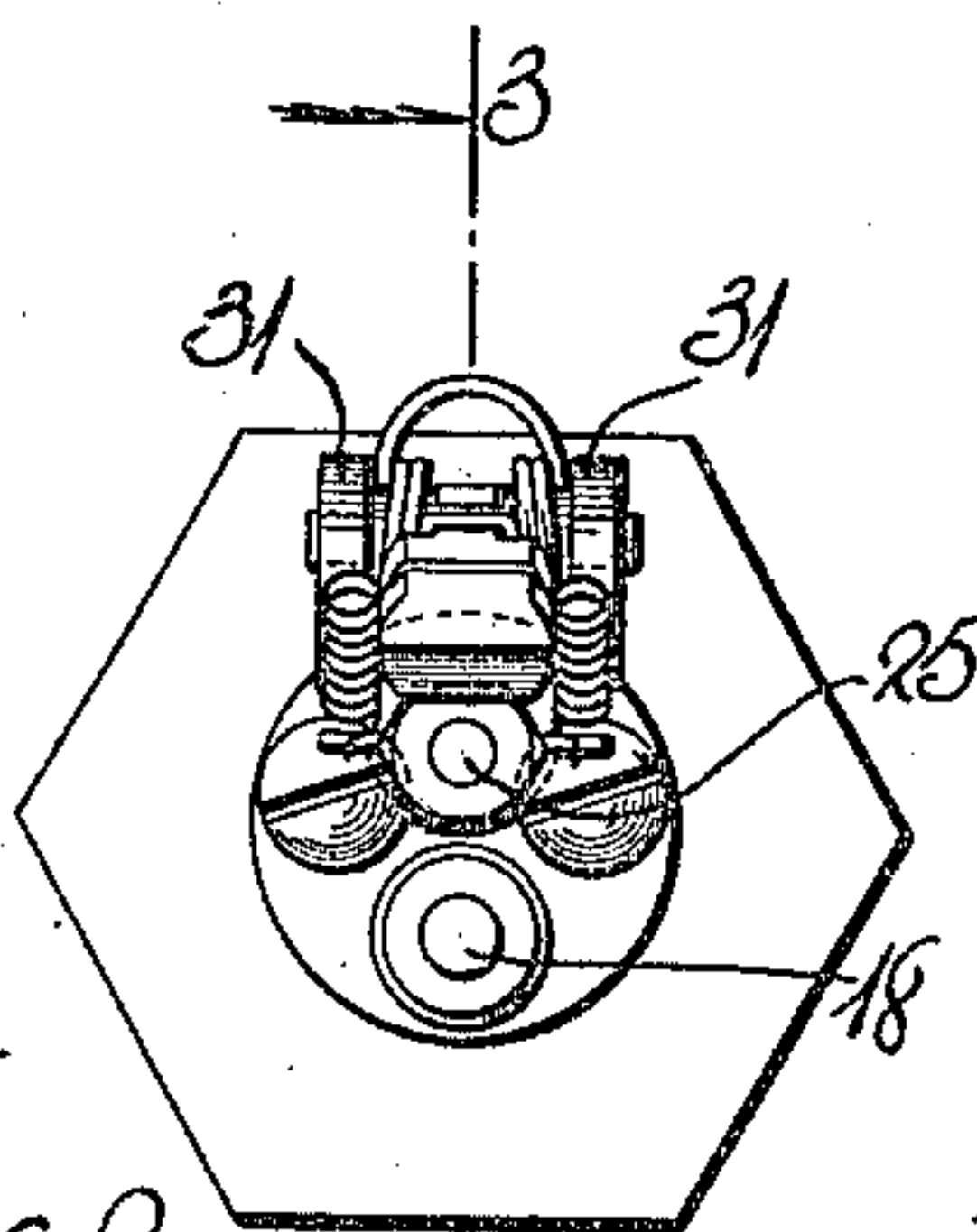


Fig. 2.

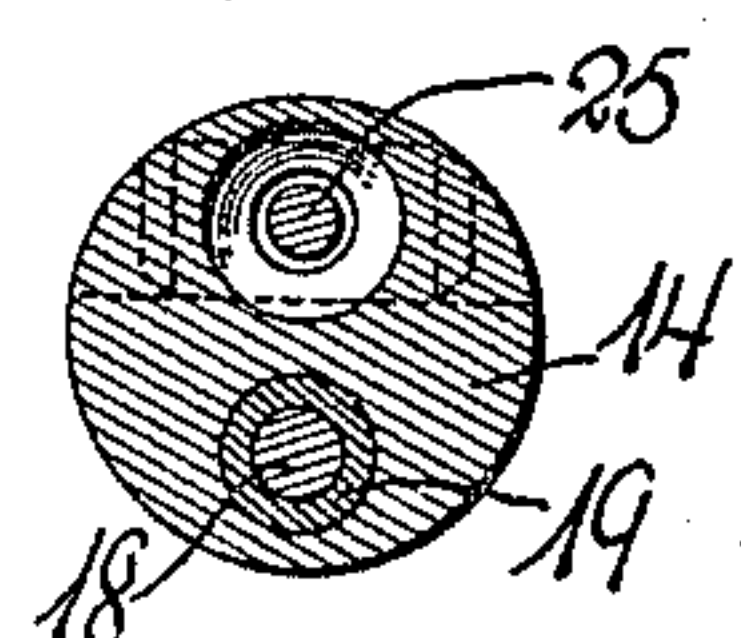


Fig. 6.

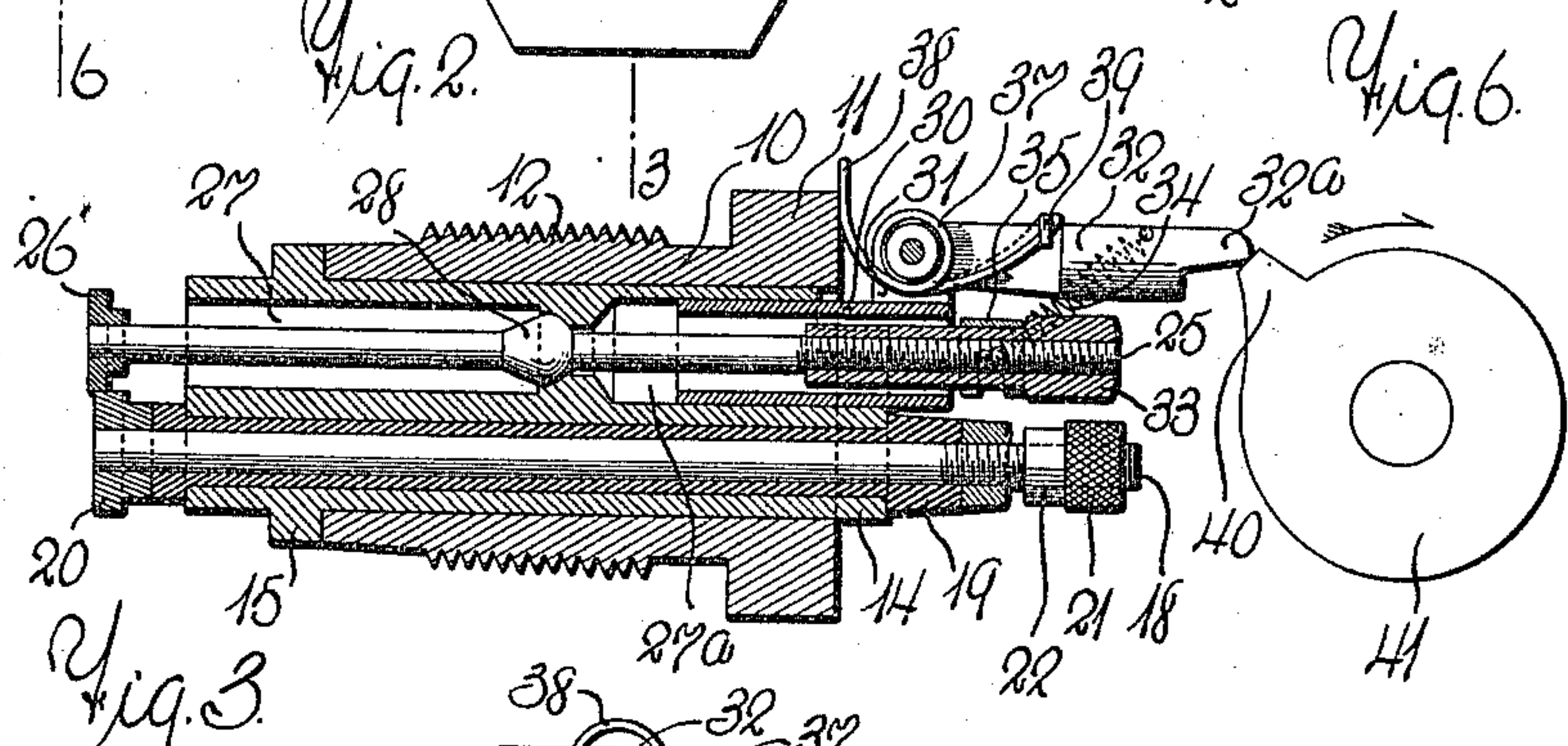


Fig. 3.

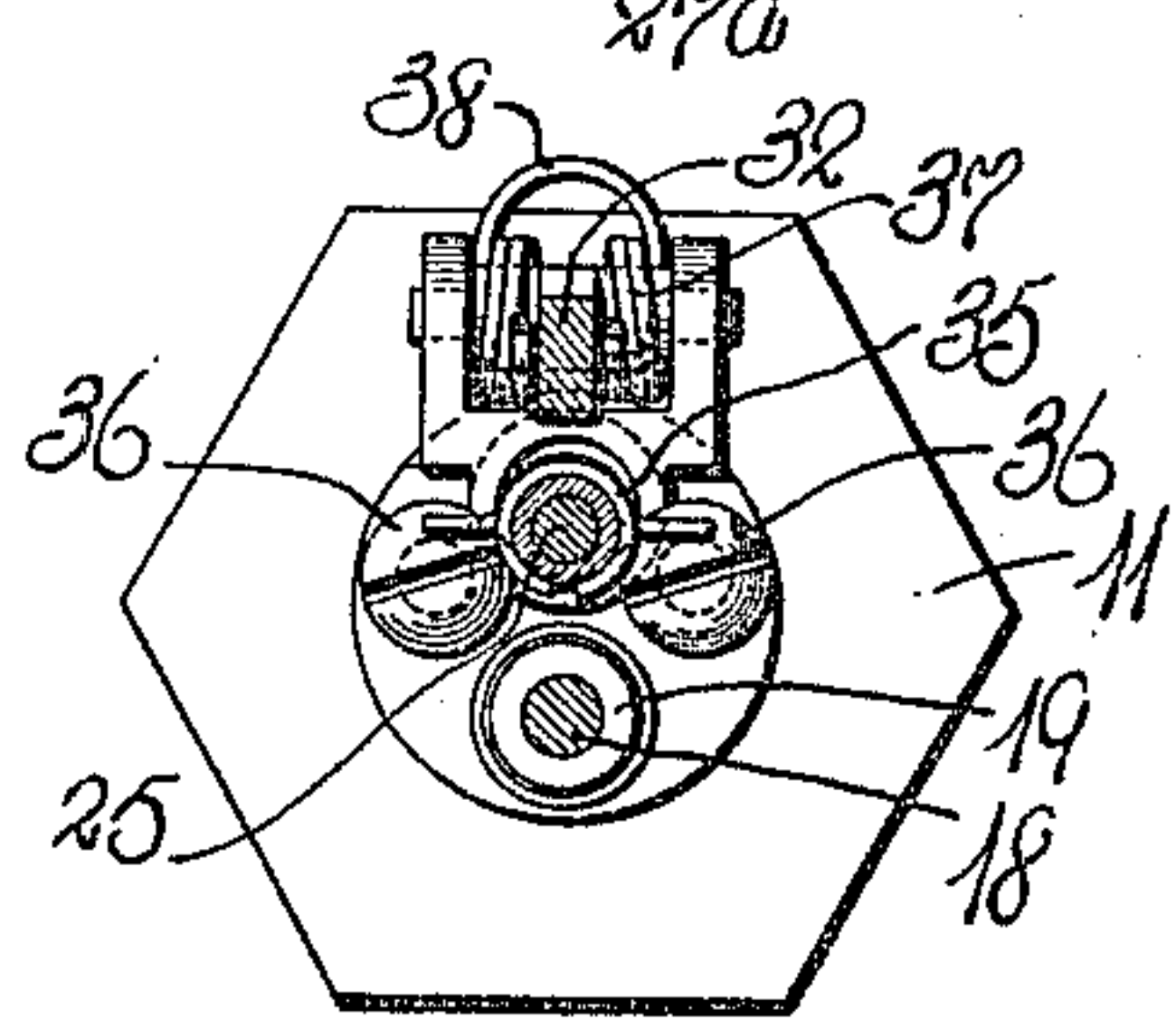


Fig. 4. Thomas C. Luce, Inventor.

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UNITED STATES PATENT OFFICE.

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SPARK-PLUG.

974,802.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, THOMAS C. LUCE, of Dalton, Berkshire county, in the Commonwealth of Massachusetts, have invented a new and useful Improvement in Spark-Plugs, of which the following is a full, clear, and exact description.

My invention relates to improvements in spark plugs such as are used for projecting sparks into the cylinder of an explosive engine.

The object of my invention is to produce a spark plug which is of simple construction and easily applied, but especially to produce a plug in which the contacting parts can be easily shifted so as to bring new surfaces opposite each other, thus making it an easy matter to produce clean surfaces when the adjacent parts have become fouled or oxidized.

A further object of my invention is to produce a spark plug in which the movable parts are positively yet resiliently held, and in which the sparking action is produced by the rotation of a shaft connected with the engine in some way, and in which in case the shaft is reversed, no injury is done to the sparking mechanism.

My invention is also intended to produce a spark plug in which the proper relation of the parts can be easily maintained and adjusted, all to the end that a spark-plug may be produced which is more reliable in its operations than the spark plugs generally used.

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

Figure 1 is a sectional elevation of the spark plug embodying my invention, the same being shown as applied to the cylinder. Fig. 2 is an outside end view of the spark plug. Fig. 3 is a longitudinal section on the line 3—3 of Fig. 2. Fig. 4 is a partial cross section on the line 4 of Fig. 1. Fig. 5 is a detail longitudinal section showing a slight modification of the invention, and Fig. 6 is a cross section on the line 6—6 of Fig. 5.

The spark plug has a cylindrical casing 10 with a squared or faceted head 11 to re-

ceive a wrench, and with a screw threaded portion 12 which enables it to be screwed firmly into the cylinder 13. The casing 10 contains a shell 14 which is also preferably cylindrical, and which is longer than the casing so as to project from both ends thereof, and the shell has an exterior rib 15 which abuts with a gasket 16 fitting against a shoulder 17 on the cylinder, so that the rib is bound firmly between the gasket or washer 16 and the inner end of the casing 10.

Extending longitudinally through the shell 14 is one of the contact rods 18, which is held in an insulating sleeve 19, and the latter extends also through the length of the shell 14, and is enlarged at the ends to prevent it from being displaced. On the inner ends of the rod 18 is a contact 20, preferably in disk form, and this can be made of any suitable conductor, preferably steel. The outer end of the rod 18 is provided with a milled nut 21 and collar 22, both of which screw thereon, and a wire can be gripped between the two parts 21 and 22, or if desired a link 23 can serve as a binding post and be pivoted on the rod 18 as shown in Fig. 1, and the link can be provided with a suitable binding nut 24 so that the connection can be made here if preferred.

Extending longitudinally through the shell in a direction generally parallel with the rod 18, is a second contact rod 25 which is of about the same length as the rod 18, and which at its inner end carries a contact disk 26 adapted to contact with the disk 20. The shell 14 is chambered out as shown at 27 and 27^a, to provide for a tilting movement of the rod 25, and is restricted in the center to form a bearing for the ball 28 which is fast on the rod 25 and which permits the rod to be easily tilted or turned as desired. If preferred the rod 25 can have its bearing ball 28^a held against longitudinal movement and turning in a bearing portion 29 of the shell 14, as shown in Figs. 5 and 6.

Encircling but not contacting with the rod 25 is a sleeve 30 which is movable in and out in the chamber 27^a of the shell 14, and the outer end of the sleeve has ears 31, between which is pivoted the striking arm 32, though

obviously this can have a pivotal connection in any other preferred way. The striking arm has a reduced end 32^a, although the configuration of the arm is not essential, and it is movable on its pivot by a cam hereinafter referred to and is brought into and out of contact with an elongated nut 33 which is screwed to the outer end of the rod 25. Normally the striking arm 32 is pressed against the nut 33 by springs 34 which are secured to the arm 32 and also to the collar 35 on the shank of the nut 33. The tension of these springs is regulated somewhat, and the timing of the spark is controlled by screws 36 which enter the end of the shell 14, and the heads of these overlap the outer end of the sleeve 30 so that by setting these screws in more or less, the position of the sleeve 30 can be controlled and the speed of movement of the striking arm 32 thereby regulated. The striking arm is also forced toward the nut 33 on the rod 25 by a spring 37 which is coiled around the pivot of the arm 32 between the ears 31, and which has one doubled free end pressing against the back of the striking arm 32, while another doubled free end presses against the end of the casing 10. This spring 37 has a double function. It assists in forcing the striking arm against the end of the rod 25, that is the nut 33 on the rod, and it also has a tendency to push out the sleeve 30 and the striking arm which it carries. At the same time it permits the sleeve and the striking arm to be forced inward, in case any of the projecting parts of the striking arm are struck in the wrong direction. It will be seen that this makes a very resilient and yet very positive means of hanging the striking arm in relation to its contact rod or the nut 33 thereon, because the striking arm can move freely both to swing and to move bodily in and out, and the arrangement described permits the rod 25 to be turned independently of the parts which operate it. This same statement is true with reference to the rod 18, so that either of these rods can be turned to bring fresh portions of the disks 20 and 26 opposite each other. Normally the striking arm is held in contact with the outer end portion of the rod 25 or with the head 33 thereof, which in the present instance is in the form of a nut, by the pressure of the springs 34 and 37, and this brings the contacts 20 and 26 out of engagement as shown in Fig. 1, but when the striking arm is raised and the tension of the springs relieved momentarily, the parts 20 and 26 come into contact as shown in Fig. 3. This relief is best effected by means of the nose 40 of the cam 41 which is carried by the shaft operated from the engine. It will be seen that this quickly passes the striking arm so that the parts 20 and 26 are separated and a spark struck.

If, however, the cam 41 should rotate in the wrong direction, it will strike the end of the arm 32 and causes this and the sleeve 30 to move inward against the tension of the spring 37, so as to permit the cam to pass without danger.

It will be readily seen that the particular formation of the contact rods and their ends, and the shape or configuration of the nuts, striking arm, and other accessories, is not essential, the important thing being to have the contact rods turn in relation to each other and to have the resilient means shown for supporting one of the contact rods and for tilting and moving it.

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

1. A spark plug comprising a shell or body portion having a pair of contact rods extending horizontally therethrough and generally parallel with each other, one of said rods being tiltable in relation to the other, a spring pressed striking arm for tilting one of the rods, and means operated by the engine for moving the striking arm.

2. A spark plug comprising a body portion having two contact rods extending longitudinally therethrough, and generally parallel with each other, one of said rods being tiltable in relation to the other and each being turnable on its longitudinal axis.

3. A spark plug comprising a shell, a contact rod extending longitudinally therethrough, a second contact rod extending through the shell and generally parallel with the first rod and adapted to contact with the first rod, means for supporting the second rod so as to permit it to rotate on its longitudinal axis to tilt in relation to the first rod, and to move longitudinally in relation to the shell.

4. A spark plug, having a shell with contact rods extending longitudinally through it, and generally parallel with each other, one of said rods being held to tilt and turn in the shell, a spring-pressed striking arm normally engaging said contact rod, and holding it out of engagement with the other rod, and means for operating the striking arm.

5. A spark plug comprising a shell having two contact rods extending longitudinally therethrough and generally parallel with each other, one of said rods being tiltable and turnable and movable longitudinally, a spring pressed striking arm for tilting and moving said rod, and means operated by the engine for moving the striking arm.

6. A spark plug comprising a shell, a contact rod extending longitudinally through the shell and held to turn therein, a second contact rod extending longitudinally through the shell and held to turn and tilt therein, a

support movable in and out in the shell, a spring pressed striking arm mounted on the support and adapted to engage and tilt the second rod, and means for actuating the striking arm.

7. A spark plug comprising a shell, a contact rod extending longitudinally there-through and held to turn therein, a second contact rod held to turn and tilt in the shell and adapted to strike the first contact rod, a striking arm pivotally and resiliently supported in the shell so as to move in and out with relation thereto, means for holding the striking arm in resilient contact with the second rod, and means for actuating the striking arm.

8. A spark plug comprising a shell, a contact rod extending through the shell and insulated therein, said rod being held to turn in the shell, a second contact rod held to turn and tilt in the shell, a sleeve movable in and out in the shell and encircling the second contact rod, a striking arm pivoted on the sleeve and pressed normally into engagement with the second contact rod, spring actuated means for holding the sleeve

in its outward position, and means for actuating the striking arm.

9. A spark plug comprising a shell, a contact rod extending longitudinally through and turnable in the shell, a second contact rod opposite the first, said rod being held to turn and tilt in the shell, a support movable in and out in the shell, means for limiting the movement of the support, and a spring pressed striking arm mounted in the support and normally engaging the outer end of the second contact rod.

10. A spark plug, having essentially parallel contact rods extending longitudinally therethrough, and turning with relation to each other, and one of said rods being tilt-able in relation to the other, contact disks on the inner ends of the rods, and a spring-pressed striking arm pivoted opposite one of the rods and arranged to normally hold the contact disks out of touch.

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