

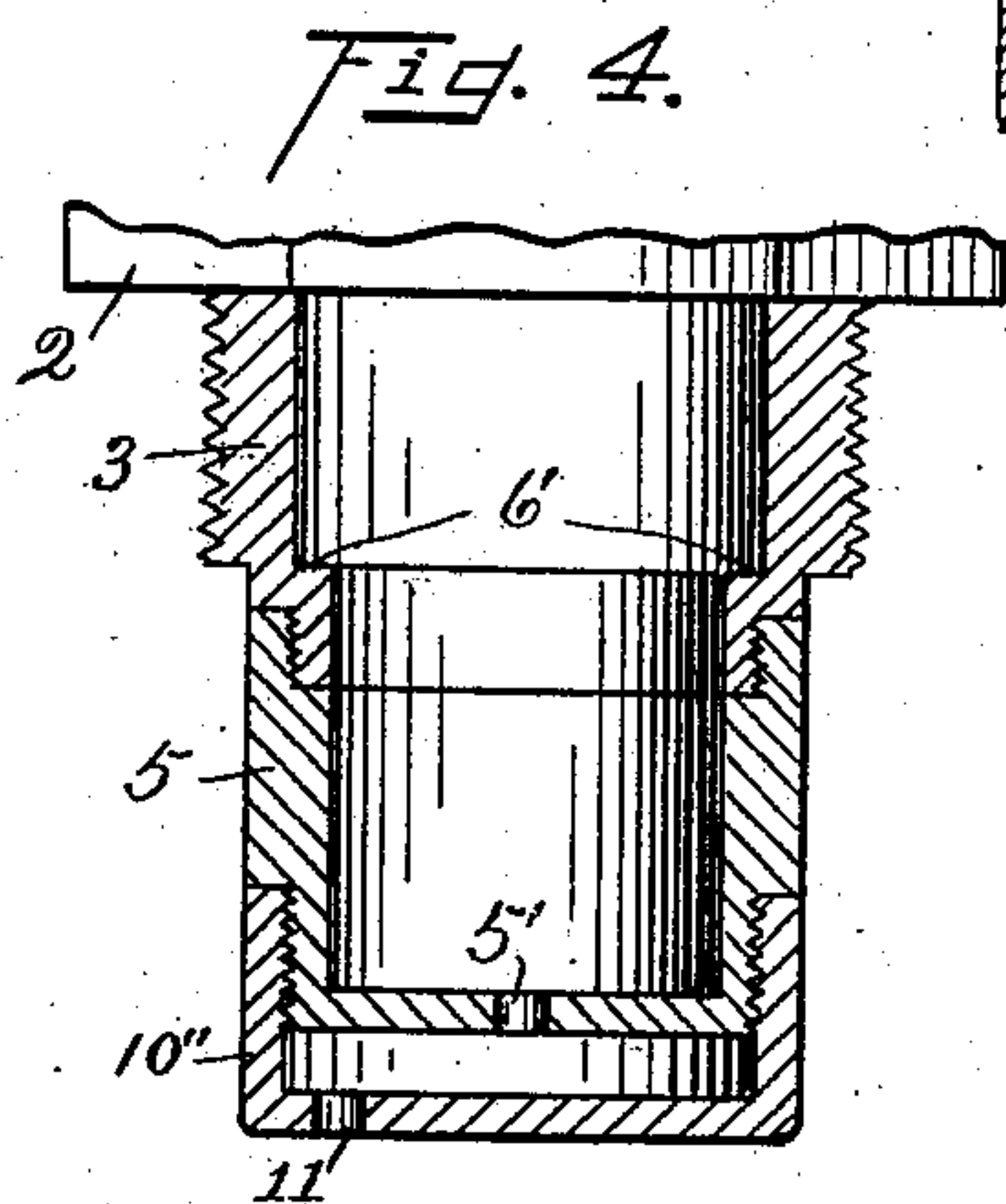
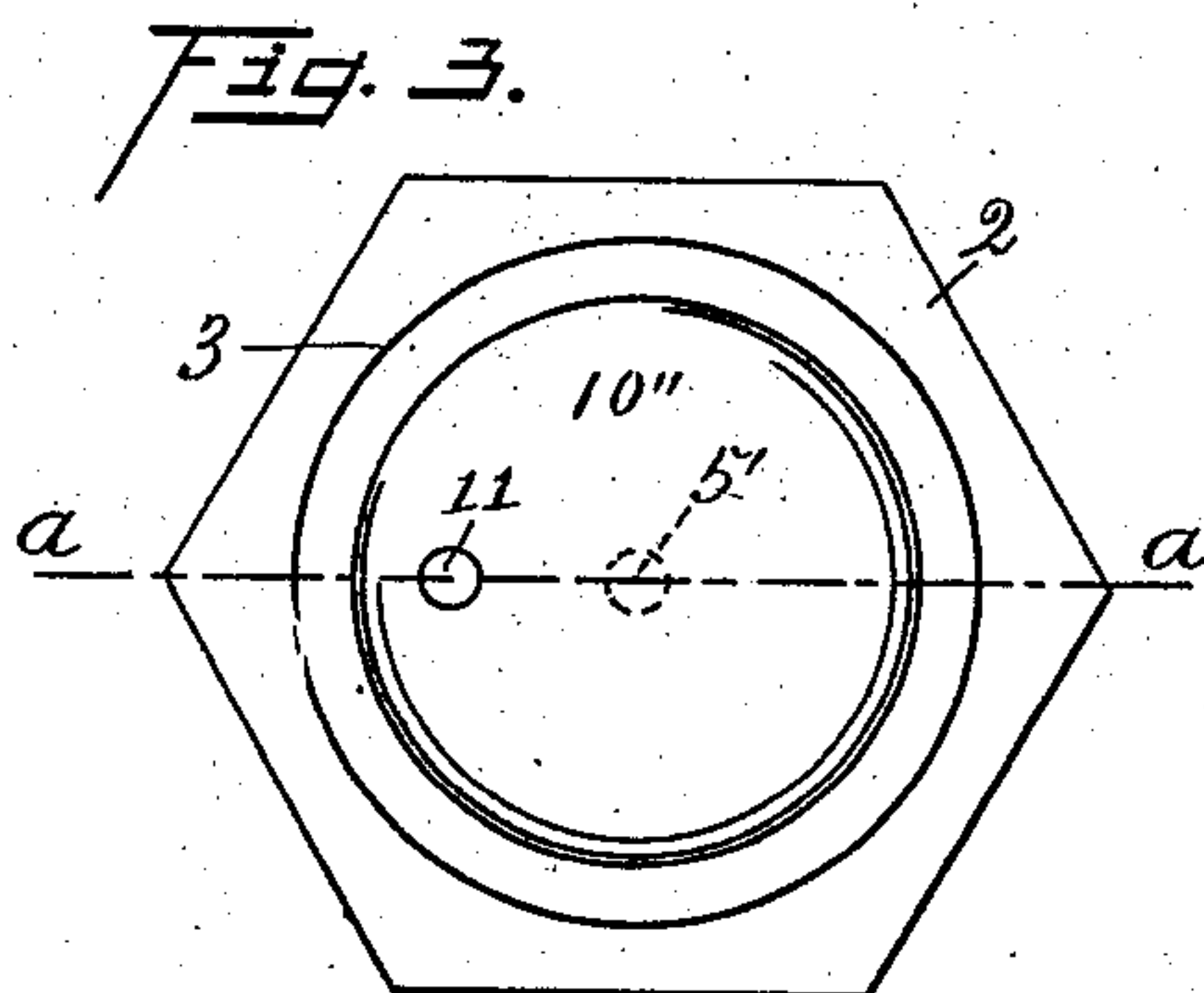
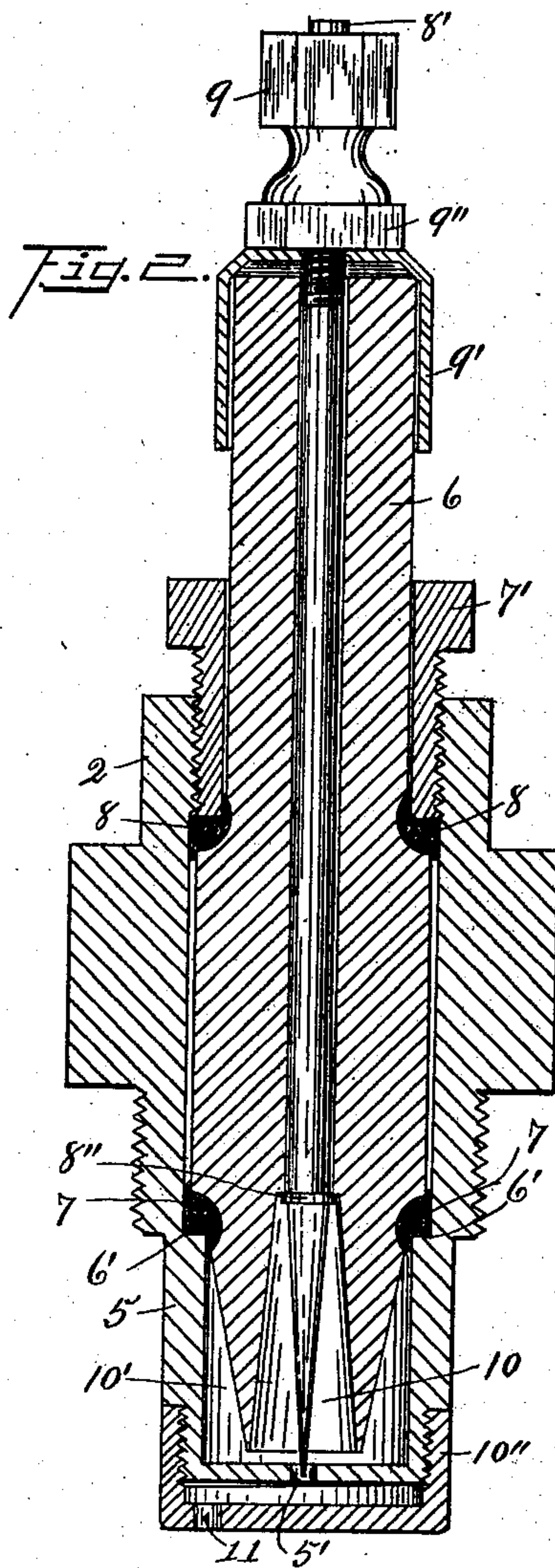
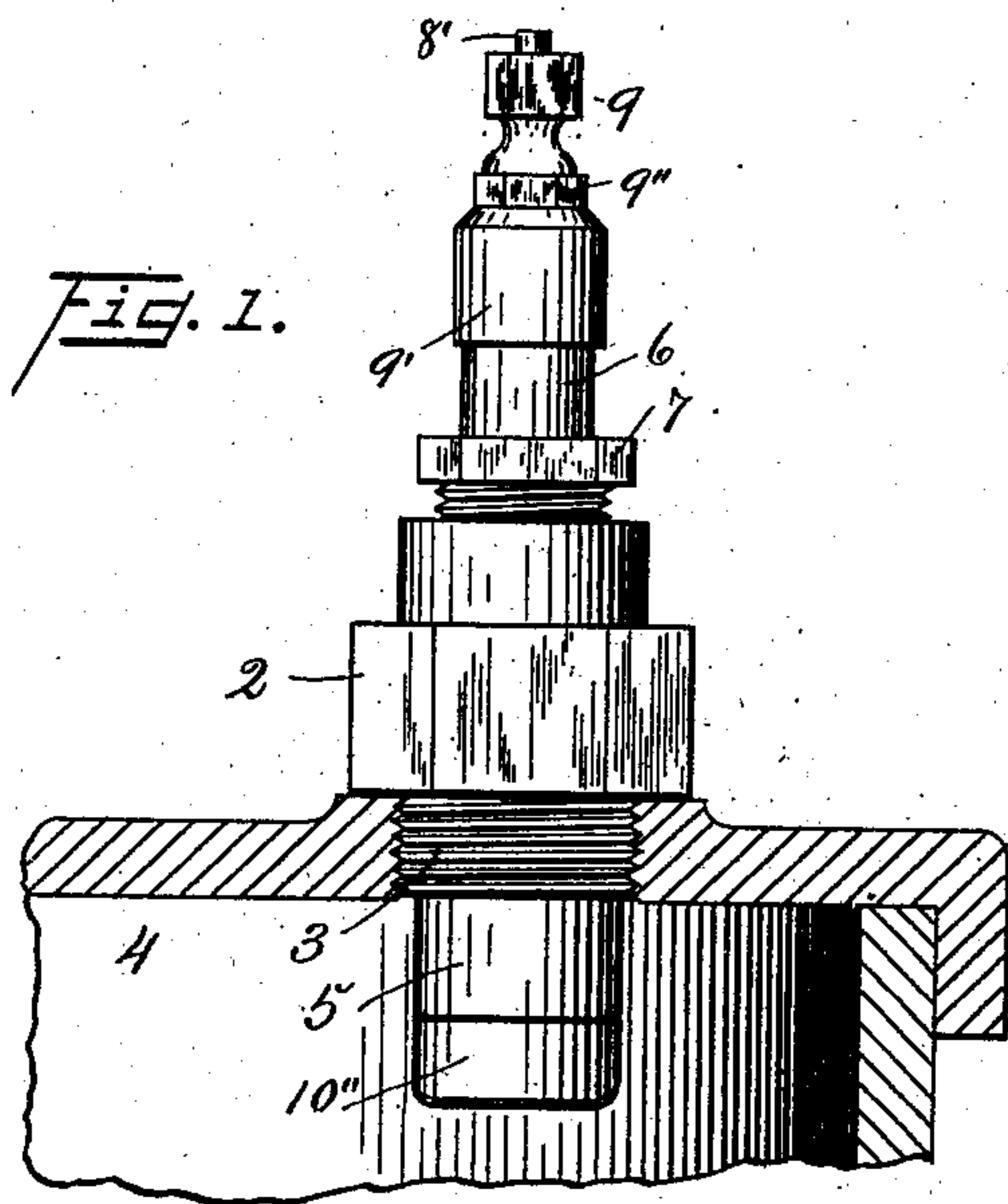
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J. H. LEHMAN.
JUMP SPARK IGNITION PLUG.

APPLICATION FILED FEB. 6, 1902.

NO MODEL.



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JUMP-SPARK IGNITION-PLUG.

SPECIFICATION forming part of Letters Patent No. 741,684, dated October 20, 1903.

Application filed February 6, 1902. Serial No. 92,791. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH H. LEHMAN, a citizen of the United States, and a resident of New York, Manhattan borough, in the county and State of New York, have invented certain new and useful Improvements in Jump-Spark Ignition-Plugs, which improvements are fully set forth in the following specification.

This invention relates to improvements in electrical devices employed in connection with the cylinders or explosion-chambers of so-called "explosive-engines" and whereby the power medium utilized, as gas, is duly ignited through the production at proper intervals within such cylinder or chamber containing such power medium of an electric jump-spark effect, the same being commonly known as "jump-spark ignition-plugs."

The object of this invention is to provide an ignition-plug of the character aforementioned which shall be simple, inexpensive, and novel as regards construction, which shall embody features of construction whereby shall be minimized the accumulation of products of combustion, lubricating elements, and the like at or upon points or surfaces of the plug where the same would operate to curtail or detract from the efficiency of the plug, thus insuring the maintenance of the normal or maximum efficiency of the plug practically throughout the life thereof, which shall be so constructed as to insure marked convenience to the user in gaining access to the various parts thereof when desired, and which shall possess certain well-defined advantages over prior analogous constructions.

The invention consists of certain novel constructions and combinations hereinafter described, and pointed out in the claims.

The invention is clearly illustrated in the accompanying drawings, wherein similar reference-numerals denote like parts throughout the several views.

In said drawings, Figure 1 is an elevation of an ignition-plug embodying my said improvements, a fragment of an engine-cylinder being shown in connection therewith to better disclose the practical application thereof. Fig. 2 is a central longitudinal section taken as along the line *a a* of Fig. 3. Fig. 3 is a bottom plan view of the plug, the same being intended to more clearly illustrate the

construction and relative disposition of the primary and secondary caps which I employ as elements of my improved ignition-plug. 55 Fig. 4 is a detail view illustrating a modification of my improved plug, the view being partly in section.

Reference being had to the accompanying drawings, 2 denotes a casing which is of metal 60 or other suitable conductor of electricity and has a screw-threaded portion 3, adapted to be screwed into a correspondingly-threaded opening in the cylinder 4, Fig. 1, of an explosion-engine. On that end of the casing 65 is a cap 5, which in the present instance is integral with the casing, the end of which cap is provided with a small perforation 5', preferably concentric with the cap, as shown. 6 is an insulating-core within said casing, of 70 porcelain, lava, or other suitable non-conducting material. It is shaped to rest against a shoulder 6', formed within the casing, or against suitable packing 7 at said shoulder. It is held in position within the casing by 75 means of a sleeve or nut 7' upon the core, this sleeve being screw-threaded and screwed into the end of the case, which is provided with corresponding threads, as seen in Fig. 2. I usually interpose a suitable packing 8 be- 80 between the inner end of the said sleeve and a shoulder of the core.

8' is a bar of metal or other suitable conductor of electricity that extends longitudinally through the core. This bar, which 85 will be hereinafter termed the "circuit-terminal," is detachably secured within the core by means of a collar 8'' and a threaded nut 9 on the end of the bar that projects from the casing, the said collar stopping against the 90 end portion of the core when the nut is screwed up against the core. I sometimes interpose a cap 9' and a check-nut 9'' between nut 9 and the core. The circuit-terminal is preferably made tapering to a point from the 95 bearing of the said collar, which point registers substantially with and is adjacent to the perforation 5' of the cap, as clearly shown in Fig. 2. In the casing 2 is a chamber with which the perforation 5' directly communi- 100 cates. This chamber is formed in the present instance as follows: The core is extended into the cap, with its free extremity but a short distance from the end of the said

cap, and this end is provided with a longitudinal concavity or recess 10, which is preferably conical, as seen in Fig. 2, while the peripheral part of said end of the core tapers forward away from the side of the casing, as also shown in said figure. Thus a space 10' is formed between that part of the core and the casing, which space communicates with the recess 10 between the end of the core and the cap, said space and recess forming practically a single chamber into which the gas will enter from the engine-cylinder solely by way of the perforation 5' of the cap when the engine is in operation. By the construction just described I not only secure a chamber within said cap for a purpose of my invention hereinafter explained, but I obtain other important advantages that will hereinafter appear.

Having thus described the construction of my invention, I shall now describe the mode of operation and the advantages thereof, as follows: The plug is applied to the cylinder 4 of the engine, as in Fig. 1, and is connected with a source of electrical energy in the manner usual with devices of the same general character, a suitable controller being employed to close and break the circuit at predetermined times. When the circuit is broken, a sparking occurs between the free end or point of the circuit-terminal 8' and the wall of the perforation 5' of the cap. This sparking is made to take place when the piston of the engine is adjacent to the plug. Simultaneously with the ignition or explosion of the gaseous mixture within the engine-cylinder 4 induced by the sparking ignition and explosion of the mixture within the chamber 10 10' occurs. As the piston moves back by the force of the explosion within the cylinder the gas or a portion of it within said chamber, being relieved to a certain extent of pressure, rushes out through the perforation 5' and in doing so blows off any burned oil or unconsumed charge that may be deposited upon the wall of said perforation and also such as may be deposited on the point of the circuit-terminal 8'. Thus these important surfaces are kept clean and bright, thereby insuring the certainty of the sparking action so long as the other parts of the plug remain in proper working condition. On the return movement of the engine-piston—i. e., toward the end of the cylinder in which the plug is inserted—a portion of any burned oil or unconsumed charge within said cylinder will or may be forced into the cap through the perforation 5'; but obviously such burned oil, &c., cannot form a bridge between the circuit-terminal and the side of the cap unless and until it (any burned oil, &c., that may be deposited and accumulate upon the core) shall extend continuously along the wall of the recess 10, from the bottom to the mouth thereof, and thence along the outside of the core to the side of the cap 5. It is manifestly desirable that such continuity of the accumulation

shall be prevented or at least that it be so delayed that the same cannot occur except at such long intervals of time as to be of little practical importance. Now as the perforation 5' of the cap is in direct line with the recess 10 of the core and the mouth of the recess is but a short distance from the end of the cap, as shown, the burned oil, &c., that may be forced through said perforation will pass directly into the recess, only a comparatively small quantity thereof going into the outer space 10'.

I have had several of my plugs constructed substantially as hereinbefore described in almost daily practical use for a period of many months and have found, on examination of the same, the outer side of the end of the core within the cap to be practically free from any deposit of burned oil or other deleterious matter, there being but a small quantity of the same at and adjacent to the free end. I further found that the deposit within the recess 10 extended inwardly from the mouth of the recess; but there was considerable space from the bottom of the latter that was entirely devoid of such deposit. I may also state that I found the pointed end of the circuit-terminal and the walls of the perforation of the cap 5 to be entirely devoid of any deposit of matter. If and when in the course of time sufficient of said matter should accumulate upon the core to form a "bridge," it (the core) may be readily detached from the casing and the deposit removed. By making the end of the core recessed and offsetting the same from the side of the cap, as shown and described, I obtain a very considerable area or distance that must be coated with the burned oil, &c., before a bridge can be formed. By making said recess conical and the outer side of the core tapering I not only secure the desired suitable chamber within the cap, but the wall of the recessed end of the core is made comparatively thick and strong except at the extreme end. Consequently there is little, if any, liability of fracture of said wall from the force of explosion of the gaseous mixture.

I sometimes attach to the cap 5 a supplemental cap 10'', having an orifice 11 near the side that is out of registry with the perforation 5' in cap 5, a space being left between the two caps, as shown in Figs. 2 and 4. The purpose of this supplemental cap is to prevent in a measure the burned oil, &c., from reaching and passing through the perforation 5' of the inner cap.

In Fig. 4 I have shown a slightly-modified form of my device, the modification consisting in so arranging the casing 2 and the cap 5 that the latter may be readily applied to or removed from the casing, the said cap having a screw-threaded connection with the casing.

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

1. In a jump-spark ignition-plug, the com-

5 bination of the casing, the cap on the end thereof, having the perforation, the insulating-core extending into and adjacent to the end of said cap and having the longitudinal recess with which said perforation communicates, together with the conductor-terminal within said core extending through said recess, and having its free end substantially in registry with and extending into said perforation of the cap and maintained out of contact with the latter, substantially as and for the purpose set forth.

15 2. In a device of the character recited, the combination of the casing, the cap on the end thereof having the perforation, the insulating-core extending into said cap and having its free end portion adjacent to the end thereof and having the longitudinal recess with which said perforation communicates, the 20 side of said free end portion being separated from the said cap, to form a space communicating with said recess, together with the conductor-terminal extending through said recess and having its free end substantially in registry with and adjacent to said perforation of the cap, substantially as and for the purpose set forth.

25 3. In a device of the character recited, the combination of the casing, the cap on the end

thereof, having the perforation, the insulating-core having its free end tapering and extending into said cap and having the conical recess with which said perforation communicates, together with the conductor-terminal extending through said recess and having its free end adjacent to and substantially in registry with said perforation, substantially as and for the purpose set forth.

4. In a device of the character recited, the combination of the casing, the insulating-core therein, the cap on the end of said casing, having the chamber into which said core extends, and having also the end perforation communicating with said chamber, the conductor-terminal within said core and having its free end substantially in registry with and adjacent to said perforation, together with the supplemental cap having the perforation out of registry with the perforation of said other cap, there being a space between the said caps with which the said perforations of said caps communicate, substantially as and for the purpose set forth.

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