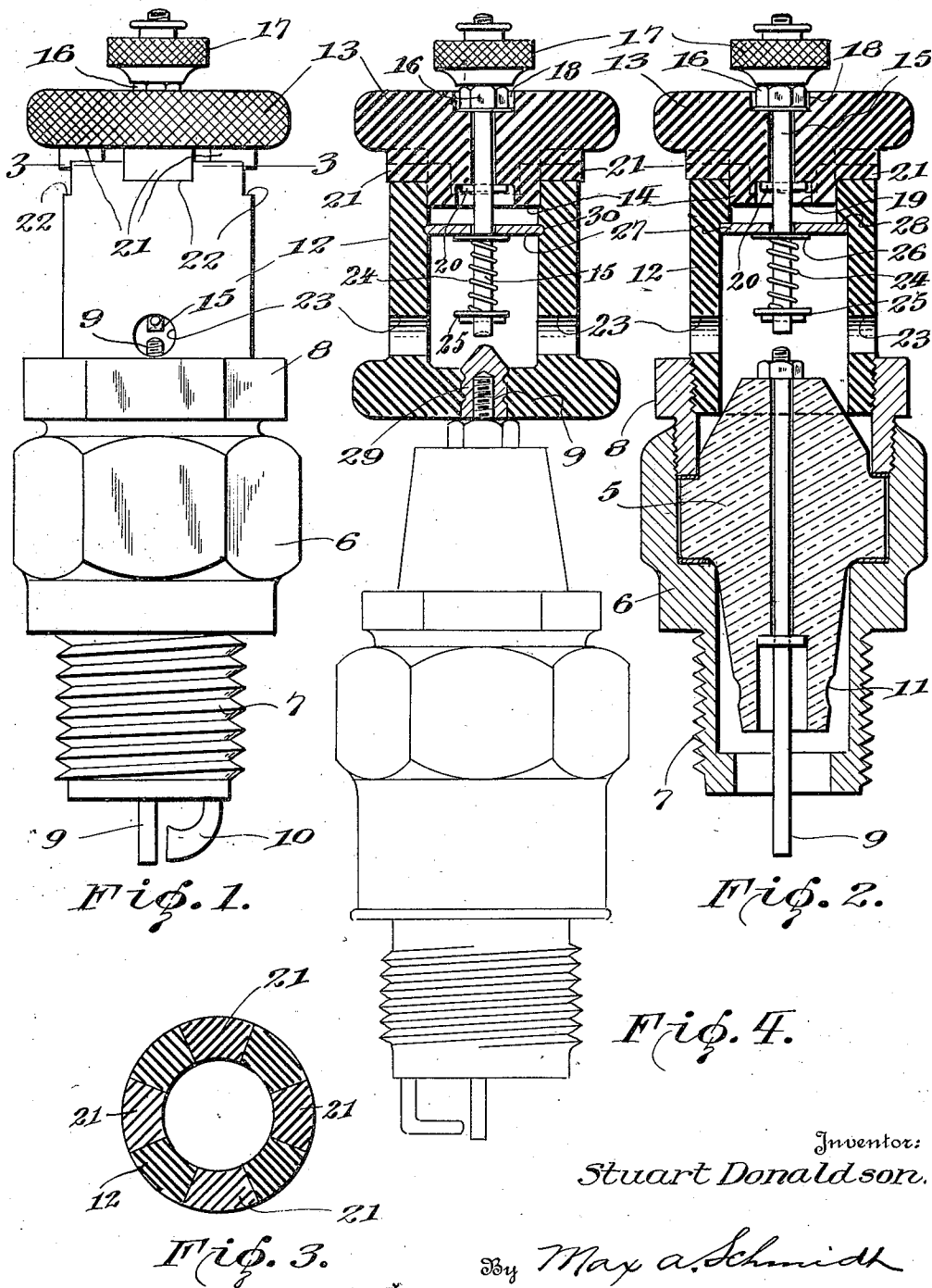


S. DONALDSON.
ATTACHMENT FOR SPARK PLUGS.
APPLICATION FILED APR. 1, 1921.

1,429,329.

Patented Sept. 19, 1922.

2 SHEETS—SHEET 1.



Inventor:
Stuart Donaldson.

By Max A. Schmidt

Attorneys.

1,429,329.

Patented Sept. 19, 1922.

2 SHEETS—SHEET 2.

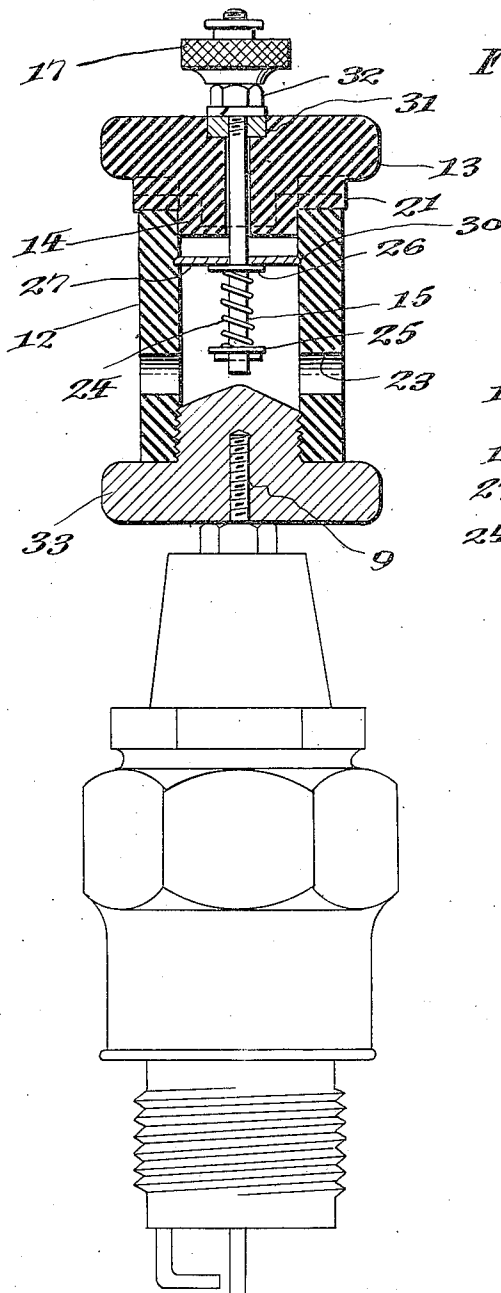


Fig. 6.

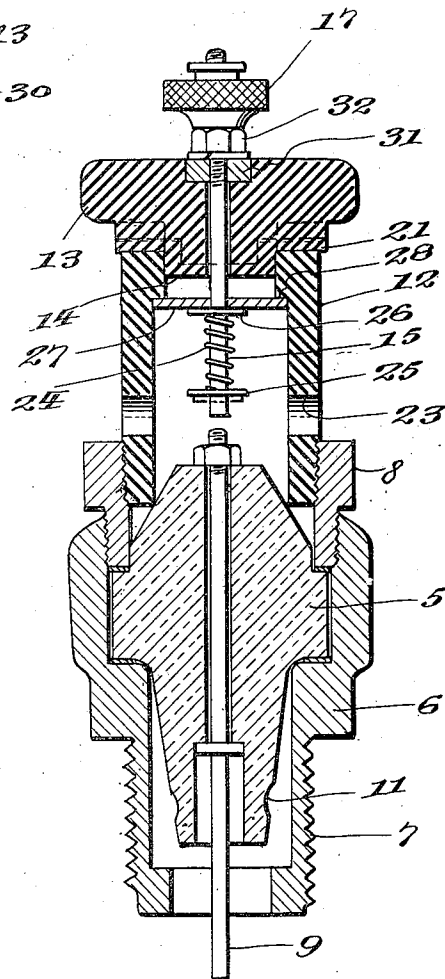


Fig. 5.

Inventor:
Stuart Donaldson.

By Max A. Schmidt

Attorney

UNITED STATES PATENT OFFICE.

STUART DONALDSON, OF CARNEGIE, PENNSYLVANIA.

ATTACHMENT FOR SPARK PLUGS.

Application filed April 1, 1921. Serial No. 457,783.

To all whom it may concern:

Be it known that I, STUART DONALDSON, a citizen of the United States, residing at Carnegie, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Attachments for Spark Plugs, of which the following is a specification.

This device which is the subject matter of the present application for patent is a novel and improved attachment for spark plugs having for its object to enable the plug to be tested for determining whether it is functioning properly, and so constructed and arranged that it may also be set to produce an auxiliary spark gap and thus act as a spark intensifier.

In order that the invention may be better understood, reference is had to the accompanying drawing forming a part of this specification, and in said drawing,

Fig. 1 is an elevation showing one embodiment of the invention; Fig. 2 is a central vertical section thereof; Fig. 3 is a horizontal section on the line 3—3 of Fig. 1; Fig. 4 is an elevation, partly in section showing another embodiment of the invention, and Figs. 5 and 6 are vertical sectional views showing further modifications.

In Figs. 1 and 2, the invention is shown as forming a part of an ordinary spark plug, whereas Fig. 4 shows the device as a unit separate from the spark plug and detachably connected thereto.

The spark plug shown in Figs. 1 and 2 consists of the usual porcelain body 5 carried by the metallic base shell 6 having a reduced threaded end 7 to screw into the engine cylinder, and formed with a stuffing box which receives a gland 8. The porcelain body 5 carries the main central terminal rod 9, the same projecting from the cylinder end of the plug and being here opposite the usual grounded side electrode 10 carried by the shell 6. These parts are all constructed and arranged in the usual manner, and hence a detailed description thereof is not necessary. The projecting cylinder end of the body 5 has an external annular groove 11 to prevent or reduce the tendency of carbon collecting in a solid surface on such projecting part.

The rod 9 projects from the outer end of the body 5, and over this end of said body is mounted a cylindrical housing 12 of suitable insulating material, having its inner

end open and externally threaded for attachment to the plug by being screwed into the outer end of the gland nut 8, the latter having its bore enlarged sufficiently and screw-threaded to receive the threaded inner end of the housing as shown in Fig. 2. The housing 12 therefore seats over the outer end of the body 5 and encloses the projecting end of the rod 9.

The outer end of the housing 12 is closed by a cap 13 having a reduced central portion 14 which extends for a short distance into the housing. This cap carries a terminal rod 15 which is in alinement with the rod 9, and when in contact with the latter it forms a continuation thereof, whereas when spaced a suitable distance there is produced an auxiliary spark gap between the opposite ends of the rods.

The outer end of the rod 15 projects from the back of the cap 13, and it is here fitted with a lock nut 16 and a clamping nut 17 for attachment of the current wire. The nut 16 seats in a recess 18 in the back of the cap, and in the inner end of the part 14 of the cap is a recess 19 in which seats a cross pin 20 carried by and projecting sidewise from the rod 15. It will therefore be seen that the cap 13 and the rod 15 are rigidly connected when the nut 16 is screwed down to draw the cross pin 20 and the inner end of the cap together.

That portion of the cap 13 which seats on the outer edge of the housing 12 has a number of depending lugs 21, and the edge of the housing has corresponding recesses 22. Two diametrically opposite recesses are made deeper than the other two and the lugs are made correspondingly longer and shorter. The arrangement is such that when the long lugs are seated in the shallow recesses, as shown in Figs. 1 and 2, the rods 9 and 15 are separated and the auxiliary spark gap is obtained, whereas when the cap is rotated so that the short lugs are seated in the shallow recesses, and the long lugs in the deep recesses, the cap 13 is moved inwardly a distance to bring the inner end of the rod 15 in contact with the outer end of the rod 9. The cap 13 is in this manner adjustable in the direction of the length of the housing 12 to carry the rod 15 into and out of contact with the rod 9. In order that the spark at the auxiliary gap may be observed, the side of the housing 12 has sight openings 23.

When the cap 13 is adjusted to bring the rods 9 and 15 together, the latter form a continuous conductor for the passage of the electric current, and the spark plug now functions in the same manner as any ordinary single-gap spark plug. If it is desired to test the plug, the cap 13 is moved back to separate the rods 9 and 15 as hereinbefore described, and if the plug is properly functioning, a spark will be observed at the auxiliary gap between the rods, the spark being visible through the openings 23. If the device is to function as a spark intensifier, the rods 9 and 15 may be left separated to maintain the auxiliary gap.

In order to firmly lock the cap 13 in adjusted position, there is fitted around the inner end of the rod 15 a coiled spring 24 seating at one end against an abutment 25 on said rod, and at its other end against a washer 26 loose on the rod, said washer bearing on a disk 27 which latter seats against a shoulder 28 on the inside of the housing 12. The pressure of the spring 24 against the abutment 25 draws the rod 15 inwardly, and as said rod is fastened to the cap 13, the latter is held firmly seated on the housing 12 with its lugs 21 in the recesses 22, so that the cap cannot be jarred loose to disturb the position of the rod 15 with respect to the rod 9. The rod 15 is advanced or retracted by a slight outward pull on the cap 13 and a quarter turn to seat the lugs 21 in the proper recesses 22 required for the desired position of the rod 15.

Fig. 4 shows the device as a complete unit separate from the spark plug. In this embodiment of the invention, the housing 12 is closed at its inner end and here fitted with a central terminal stud 29 which has a threaded aperture on the outside of the housing end so that it may be screwed on the projecting threaded end of the center electrode or terminal rod 9. The stud 29 extends slightly into the housing so as to be opposite the inner end of the rod 15. When the rod 15 is spaced from the stud 29, the auxiliary spark gap is obtained, whereas when the rod is brought into contact with the stud, a continuous conductor for the passage of the electric current is had.

The disk 27 is held in place in the housing 12 by being snapped into an internal annular groove 30.

The last described device can be readily attached to any standard spark plug, and it affords a simple and efficient means for testing the plug and also for converting the same into a double-gap plug.

Figs. 5 and 6 illustrate a different method of attaching the terminal rod 15 to the housing cap 13. The cross pin 20 is left off, and a nut 31 is built into the cap 13,

the upper end of the rod 15 being threaded so that it may be screwed into the nut. A lock nut 32 is mounted on the threaded portion of the rod, and when it is screwed down tight against the nut 31, the cap 13 and the rod 15 are rigidly connected. This construction also permits any necessary longitudinal adjustment of the rod 15.

Fig. 6 also illustrates a modification of the device shown in Fig. 4. Instead of stud 29 shown in Fig. 4, the inner end of the housing 12 is fitted with a metallic cap 33, the same being threaded to screw into the housing. That end of the cap which extends into the housing is made pointed and located opposite the inner end of the rod 15 for the same purpose as the stud 29. The cap 33 also has a threaded aperture on the outside so that it may be screwed on the projecting threaded end of the center electrode or terminal rod 9 of the spark plug, in the same manner as the stud 29 of Fig. 4.

I claim:

1. An attachment for spark plugs, comprising a housing having a sight opening, a cap rotatably and slidably fitted to one end of the housing, means at the other end of the housing for attaching the same to a spark plug, lugs on the under side of the cap opposite the housing end, said housing end having recesses to seat said lugs, said recesses and lug varying in depth and length to gage the extent of the sliding movement of the cap relative to the housing, an electrode rod carried by the cap and extending into the housing, and means for connecting a current conductor to the electrode rod, said rod being adjustable by the sliding movement of the cap to establish an electric connection with the main terminal rod of the spark plug in one position of the cap, and to form an auxiliary spark gap in another position of the cap.

2. An attachment for spark plugs, comprising a housing having a sight opening, a cap rotatably and slidably fitted to one end of the housing, means at the other end of the housing for attaching the same to a spark plug, lugs on the under side of the cap opposite the housing end, said housing end having recesses to seat said lugs, said recesses and lugs varying in depth and length to gage the extent of the sliding movement of the cap relative to the housing, an electrode rod carried by the cap and extending into the housing, means for connecting a current conductor to the electrode rod, said rod being adjustable by the sliding movement of the cap to establish an electric connection with the main terminal rod of the spark plug in one position of the cap, and to form an auxiliary spark gap in another position of the cap, and a spring coiled around the electrode rod for holding the cap seated, the rod hav-

ing an abutment against which one end of the spring bears, and the housing containing an abutment for the other end of the spring.

5 3. An attachment for spark plugs, comprising a supporting member having recesses at one end, means at the other end of said member for attaching the same to a spark plug, an electrode rod, and a slidable and rotatable support for the electrode rod seating on the recessed end of the supporting member, and provided with lugs to seat in the recesses, said lugs and recesses varying in length and depth to gage the extent of the sliding movement of the electrode rod support in a direction to advance and to retract the electrode rod relative to the main terminal rod of the spark plug.

10 4. An attachment for spark plugs, comprising a supporting member having recesses at one end, means at the other end of said member for attaching the same to a spark plug, an electric rod, a slidable and rotatable support for the electrode rod seating on the recessed end of the supporting member, and provided with lugs to seat in the recesses, said lugs and recesses varying in length and depth to gage the extent of the sliding movement of the electrode rod support in a direction to advance and to retract the electrode

rod relative to the main terminal rod of the spark plug, and a spring coiled around the electrode rod for holding the support thereof seated, said rod having an abutment against which one end of the spring bears, and the supporting member carrying an abutment for the other end of the spring.

5 5. An attachment for spark plugs, comprising a housing having a sight opening, a cap rotatably and slidably fitted to one end of the housing, means at the other end of the housing for attaching the same to a spark plug, lugs on the under side of the cap opposite the housing end, said housing end having recesses to seat said lugs, said recesses and lugs varying in depth and length to gage the extent of the sliding movement of the cap relative to the housing, an electrode rod carried by the cap and extending into the housing, said rod being longitudinally adjustable relative to the cap, and means for connecting a current conductor to the electrode rod, said rod being adjustable by the sliding movement of the cap to establish an electric connection with the main terminal rod of the spark plug in one position of the cap, and to form an auxiliary spark gap in another position of the cap.

In testimony whereof I affix my signature.

STUART DONALDSON.