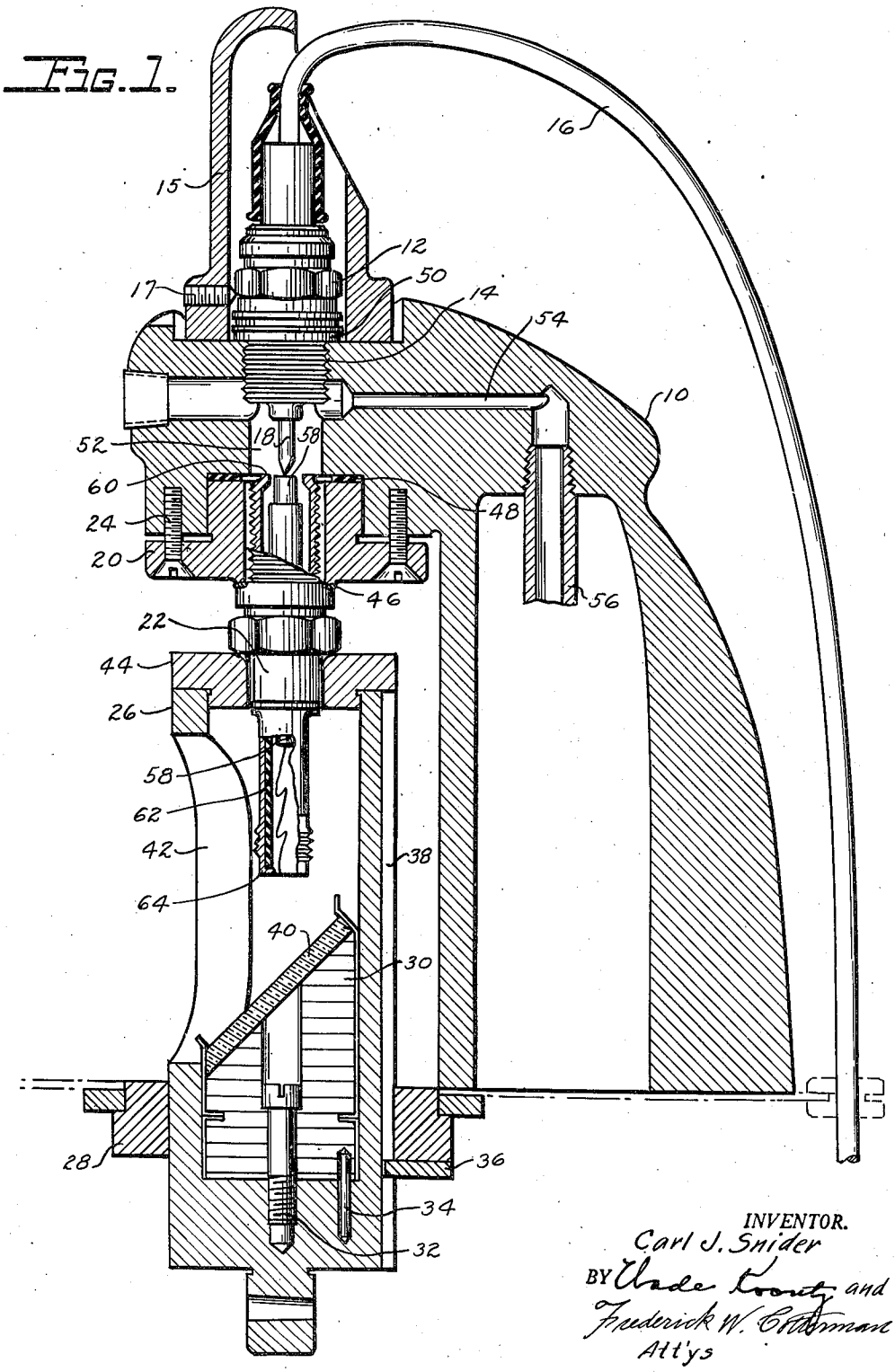
Jan. 27, 1948. C. J. SNIDER 2,434,969

SPARK PLUG TESTER

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FIG. 1.



INVENTOR.
Carl J. Snider
BY Wade Long and
Frederick W. Coffman
Att'ys

Jan. 27, 1948. C. J. SNIDER 2,434,969

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FIG. 2.

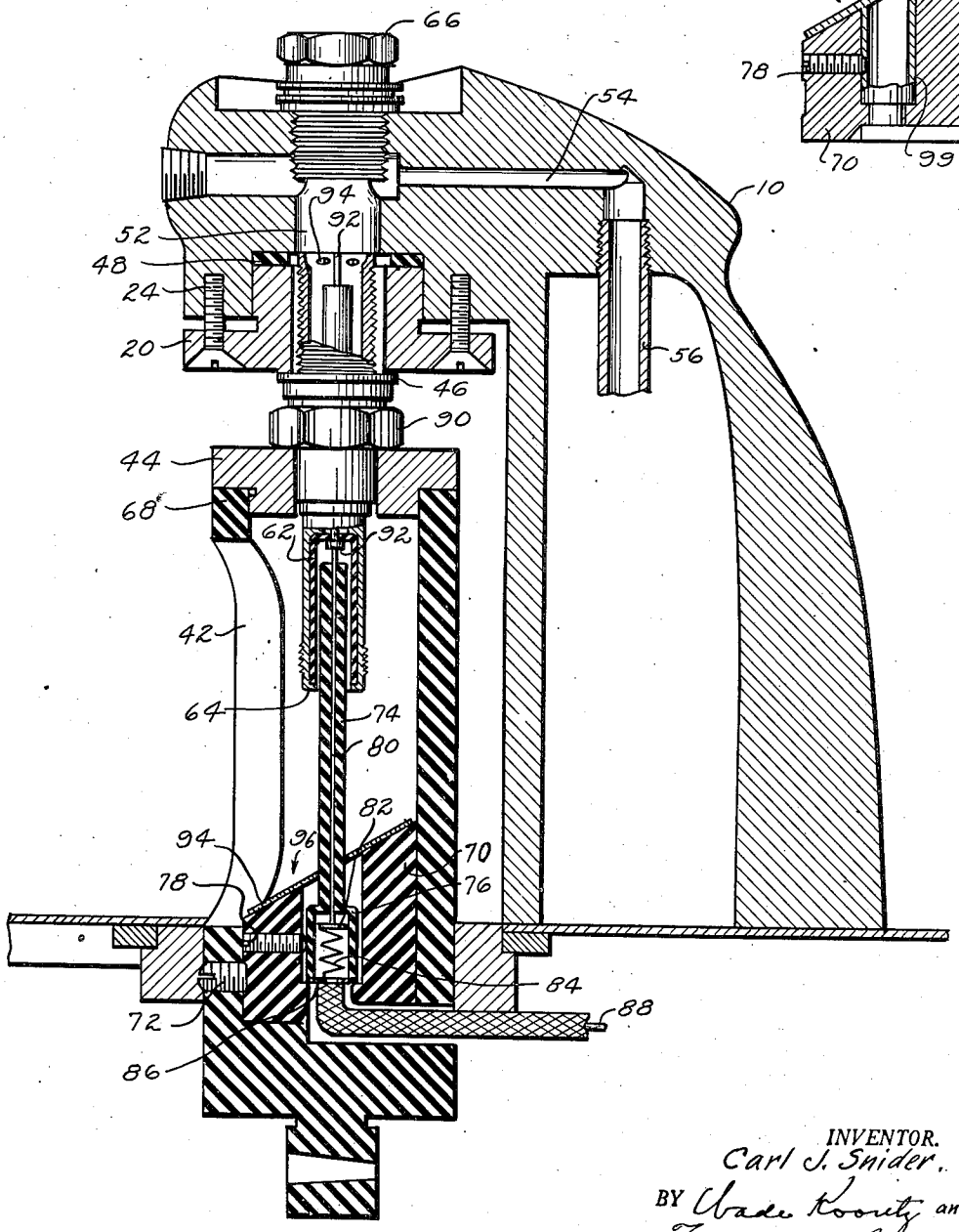


FIG. 3.

INVENTOR.
Carl J. Snider.
BY Wade Koontz and
Frederick W. Cotterman
Att'ys

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SPARK PLUG TESTER

Carl Jacob Snider, Brooklyn, N. Y.

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3 Claims. (Cl. 175—183)

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The invention described herein may be manufactured and used by or for the Government for governmental purposes without payment to me of any royalty thereon.

This invention relates to a testing device for aircraft type shielded spark plugs, being particularly adapted for use with a "Denison hydraulic spark plug test stand," or any similar stand.

An object of the invention is to provide means for increasing the scope of a test machine of this character.

Other objects and advantages will become evident as the invention is further described with reference to the drawing, wherein:

Fig. 1 is an axial section through a standard "Denison hydraulic spark plug test stand" with a conventional shielded spark plug in place for test, the machine being shown as it appears before application of my invention thereto.

Fig. 2 shows the same machine as Fig. 1 but with my improvement applied thereto, and with a special type of shielded spark plug in place which may not conveniently be tested in the standard machine.

Fig. 3 shows a detail part by means of which the machine may be reconverted with minimum trouble to the Fig. 1 condition when conventional or older type plugs are to be tested.

Like reference characters refer to like parts throughout the several views of the drawings.

The standard spark plug test stand shown in Fig. 1 comprises a frame 10, having a vertical bore therethrough into the upper end of which a contact member 12 is screw threaded at 14. A guard 15 surrounds the contact member 12 and is held in place by a screw 17. A cable 16 delivers the current to the pointed electrode 18 which is spring pressed (spring not shown) downward to a lower position when no spark plug is in the machine.

An adapter 20 is internally bored to freely receive the operative end of a conventional shielded spark plug 22. Screws 24 hold the adapter in place in the frame.

A cylindrical member 26 is vertically movable with respect to the frame 10 by a hydraulic ram (ram not shown). The member 26 is slidable in a collar 28 which is supported in the frame 10. A mirror support 30 is secured in the bottom of the member 26 by a screw 32. A pin 34 prevents rotation of the mirror support 30 in the member 26, while a key 36 extends into a keyway 38 to prevent rotation of the member 26 with respect to the frame 10.

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The upper end of the mirror support 30 is at an angle with the axis, thereby holding the mirror 40 at a suitable angle to be viewed through the window 42.

A plate 44, fitted to the upper end of the member 26, is internally bored to freely receive a portion of the spark plug 22, whereby when the member 26 is forced upward hydraulically, the pointed electrode 18 of the machine makes contact with the insulated electrode of the spark plug and the plug is forced upwardly against the bottom of the adapter 20.

Gaskets 46, 48 and 50 seal against pressure leakage from the chamber 52 which is formed around the pointed electrode 18 and the operative end of the spark plug 22. A passageway 54 leads to the chamber 52, pressure being supplied through the pipe 56.

In operation, a plug 22 is inserted and the member 26 raised hydraulically with sufficient pressure to seal the chamber 52 at the gasket 46. Air pressure of approximately seven hundred pounds per sq. inch is then introduced into the chamber 52 which effectively prevents a sparking from the insulated terminal 58 to the grounded terminals 60 of the plug. The current will therefore jump from the lower end of the insulated terminal 58, past the lower end of the insulation sleeve 62 to the ground at 64, that is, it will jump this distance if it finds no easier passage to the ground intermediate the upper and lower end of the insulated terminal 58. When the current jumps from the lower end of the insulated terminal 58 to the ground at 64 it may be viewed in the mirror 40 through the window 42. This sparking seen in the mirror indicates a good plug. When no sparking appears at this part, the plug is rejected.

The standard machine, shown in Fig. 1 and above described, is adequate for testing the type of shielded spark plug therein shown or any type of shielded spark plug having an insulated terminal which is of fairly large diameter on the working end as at 58, so that the pointed electrode 18 will be sure to rest on the end of the terminal without sliding off the edge. There is, however, a more recently developed type of spark plug in which the insulated terminal is so small on the end, some being not more than one thirty second of an inch in diameter, that it is impossible to be sure that the pointed electrode 18 is resting on the end of the insulated terminal when the plug has been clamped in place. My improvement, shown in Fig. 2 overcomes this difficulty with respect to this newer type of plug.

In order to adapt the machine shown in Fig. 1 for testing the special or newer type of plug, the machine is changed as in Fig. 2. The contact member 12 is first removed and replaced with a solid plug 66. The cylindrical member 26 of Fig. 1 is then replaced with a similar member 68 of phenolic material. The exchangeable adapted 20 and plate 44 of Fig. 2 remain as in Fig. 1 but may both be eliminated by making them integral with the parts to which they are attached if the machine is intended for use in testing plugs all of the same diameter. Similarly the opening in the top of the frame which is closed by the plug 66 together with the plug may be omitted in favor of a solid construction if the machine is to be used for testing plugs which are all of the same type. A removable mirror support 70 of phenolic material is held in place in the member 68 by a screw 72. A plastic sleeve 74, preferably of transparent plastic, has an enlarged lower end 76 which is held in place in the mirror support 70 by a screw 78. A long electrode 80 is vertically slidable in the sleeve 74 and at the lower end has a head 82 resting on the upper end of a spring 84. The lower end of the spring 84 rests on a washer 86 to which the cable 88 is brought and soldered, welded or similarly fastened.

The operation of the device of Fig. 2 is as follows:

A special type shielded plug 90 is placed in the machine and the member 68 raised to the position shown, whereby the chamber 52 is sealed against leakage at the top by the plug 66 and at the bottom by the gasket 46. The pressure in chamber 52 is then raised to seven hundred p. s. i. whereby no spark may jump the gap between the upper end of the insulated terminal 92 to the ground at 94.

The current will therefore jump from the lower end of the insulated terminal 92 between the plastic sleeve 74 and the insulation wall 62, to the ground at 64 as it does in the apparatus Fig. 1, unless it finds a path to the ground of less resistance within the length of the terminal 92. When the current jumps from the point 92 to the ground at 64, the spark may be viewed in the mirror 94 through the window 42.

If, for any reason, it becomes desirable to rearrange the machine for testing the older type of plug shown at 22, Fig. 1, the solid plug 66 of Fig. 2 is removed and replaced by the contact member 12 of Fig. 1, the cylindrical member 68 is let down to its lower position and the plate 44 lifted off. The screw 72 is then backed away and the entire assembly 96 which comprises the mirror 94, mirror support 70, plastic sleeve 74, electrode 80, screw 78, spring 84 and washer 86 lifted upward and out of the cylindrical member 68 drawing the cable 88 after it.

The assembly 96 is now replaced with an assembly 98, Fig. 3, which comprises a mirror support 70, a screw 78, and a mirror 100 having a long tubular pilot 99 which may be engaged by the screw 78. The machine is now reconverted to its original use. It is noted that the cylindrical member 68 need not be removed in reconverting the machine but may remain a permanent part of the machine for both of its uses.

It will be understood that Fig. 1 shows a standard test machine which is currently commercially available and is therefore not herein claimed and is merely shown for illustrative purposes.

Having described my invention, I claim:

1. A device for testing the insulation of shielded spark plugs which comprises a frame, a high pressure chamber in said frame for receiving the operative end of the plug to apply pressure thereto, a dielectric member movable along the plug axis, a dielectric sleeve carried by said dielectric member, said sleeve being coaxial with but slightly smaller in diameter than the inside of the shielding well of the plug and of greater length than the depth of the shielding well, one end of said sleeve being secured to said dielectric member for movement therewith, an electrode slidable within and extending beyond the ends of said sleeve, a spring having one end acting against one end of said electrode urging said electrode toward the free end of said sleeve, a high tension cable in electrical communication with the other end of said spring, a mirror carried by said dielectric member the plane of said mirror being such as to reflect rays emanating from the shielding well back at an angle with the plug axis, and means to move said dielectric member axially with respect to the plug.

2. A device for testing the insulation of shielded spark plugs which comprises a frame, a high pressure chamber in said frame for receiving the operative end of the plug to apply pressure thereto, a dielectric cylinder concentric with and movable along the plug axis, a dielectric sleeve carried by said dielectric cylinder, said sleeve being coaxial with but slightly smaller in diameter than the inside of the shielding well of the plug and of much greater length than the depth of the shielding well, one end of said sleeve being anchored in said dielectric cylinder for movement therewith, an electrode slidable within and extending beyond the ends of said sleeve, a head on said electrode at the anchored end of said sleeve, a spring having one end acting against said head urging said electrode toward the free end of said sleeve, a high tension cable havinga washer like end in electrical communication with the other end of said spring, a mirror carried in said dielectric cylinder, the plane of said mirror being abnormal to the cylinder axis so as to reflect rays emanating from the shielding well back at an angle with the cylinder axis, and means to move said dielectric cylinder axially with respect to the plug.

3. A device for testing the insulation of shielded spark plugs which comprises a frame, a high pressure chamber in said frame having one side open for receiving the operative end of the plug to apply pressure thereto, means to seal said plug where it enters said chamber, a hollow dielectric cylinder movable along the plug axis, a hollow dielectric sleeve carried by said dielectric cylinder, said sleeve being coaxial with but slightly smaller in diameter than the inside of the shielding well of the plug and of much greater length than the depth of the shielding well, one end of said sleeve being anchored in said dielectric cylinder for movement therewith, an electrode slidable within and extending beyond the ends of said sleeve, a head on said electrode at the anchored end of said sleeve, a spring having one end acting against said head urging said electrode to extend beyond the free end of said sleeve, a high tension cable having a washer like end in electrical communication with the other end of said spring, a mirror carried in said dielectric cylinder, the mirror having a central opening through which said sleeve passes, and the plane of said mirror being at an angle with the axis of the cylinder so as to reflect rays emanating from the shielding well back at an angle with the cyl-

inder axis, and means to move said dielectric cylinder axially with respect to the plug.

CARL JACOB SNIDER.

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