Sept. 16, 1941. A. A. GUZIEL 2,256,086

COMBINATION TOOL WITH IGNITION TESTER

Filed Jan. 22, 1940

FIG. 1.

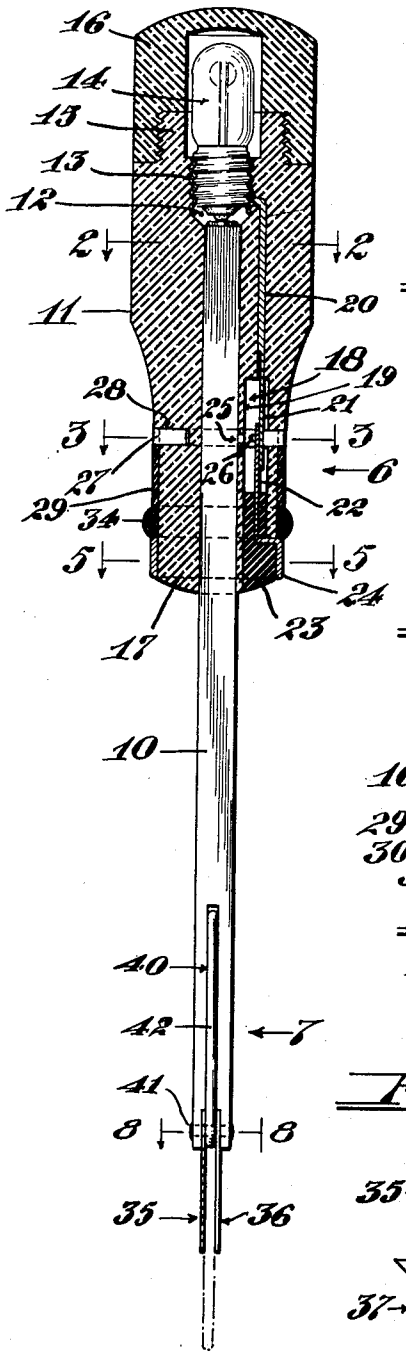


FIG. 2.

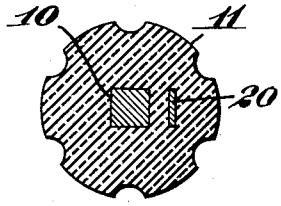


FIG. 3.

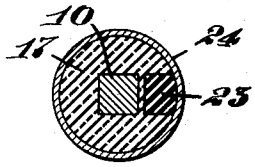


FIG. 5.

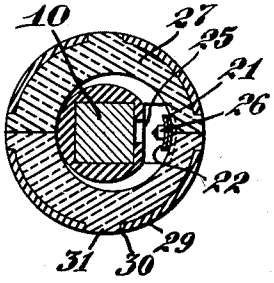


FIG. 6.

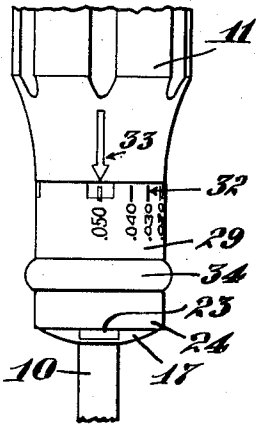


FIG. 4.

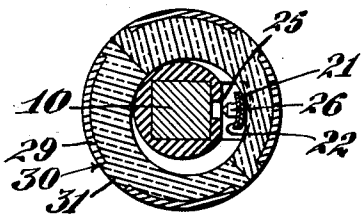


FIG. 7.

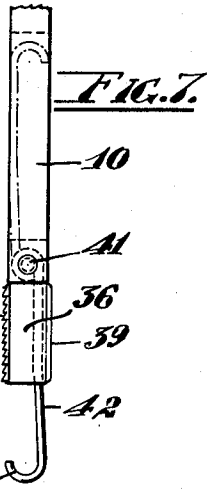


FIG. 8.

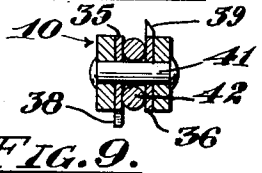
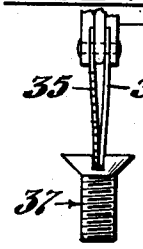


FIG. 9.



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COMBINATION TOOL WITH IGNITION TESTER

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Application January 22, 1940, Serial No. 314,910

10 Claims. (Cl. 175—183)

This invention relates to a combination tool and more particularly pertains to a tool embodying an ignition tester and spark gap indicator.

An object of the invention is to provide a tool of the above character having the characteristics of a screw driver, namely an elongated metallic shank fitted with a barrel type handle, in which the handle is fitted with a contact member electrically connected to a filament lamp in the handle in electrical contact with the metallic shank, whereby on positioning said contact member against the binding post of a spark plug on an internal combustion engine and grounding the metallic shank on the engine head, a circuit from the ignition system of the engine will be directed through the filament lamp if the spark plug is in operating condition and the ignition system is operatively connected thereto.

Another object is to provide a spark plug tester with means for determining the width of the spark gap of a spark plug while the latter is in its assembled position on an engine.

A further object is to provide a spark plug tester which is so formed as to adapt it for equipment with supplemental instrumentalities useful in effecting repairs in ignition systems as in removing insulation from electrical conductors, cleaning the grooves in the generator rotor, setting screws in places difficult of access, and in fishing conductors and other small articles out of small places.

With the foregoing objects in view together with such other objects and advantages as may subsequently appear the invention is carried into effect as illustrated by way of example in the accompanying drawing in which:

Fig. 1 is a view in longitudinal section with parts shown in elevation;

Fig. 2 is a view in cross section taken on the line 2—2 of Fig. 1;

Fig. 3 is a view in cross section taken on the line 3—3 of Fig. 1 showing the parts positioned to indicate a wide spark gap;

Fig. 4 is a section similar to that of Figure 3 showing the parts positioned to indicate a narrow spark gap;

Fig. 5 is a view in section taken on the line 5—5 of Fig. 1;

Fig. 6 is a view in elevation of a fragmentary portion of the tool as seen in the direction indicated by the arrow 6 of Fig. 1;

Fig. 7 is a view in elevation of a fragmentary portion of the tool as seen in the direction of the arrow 7 of Fig. 1 but showing the fishing hook in an extended position;

Fig. 8 is a detail in section taken on the line 8—8 of Figure 1;

Fig. 9 is a view showing the tool as applied in initially setting a screw.

Referring to the drawing more specifically, 10 indicates an elongated electrically conductive metallic shank of rectangular cross section, and 11 designates a portion of a transparent insulated handle into one end of which the shank 10 projects axially thereof. The outer end of the handle 11 is formed with a recess 12 through the bottom of which the inner end of the metallic shank 10 is exposed, and which recess is fitted with a screw threaded lining 13 constituting a lamp socket in which is screwed the threaded end of a filament lamp 14; the lining 13 being insulated from the shank 10 by being spaced therefrom and one terminal of the lamp being seated on the inner end of the shank in electrical contact therewith.

An externally threaded nipple 15 is formed on the outer end of the handle 11 and screwed thereon is a hollow transparent cap 16 which houses the lamp 14. The handle 11 and cap 16 are formed of an insulating material such as phenol-resin or methal-metriculate, or similar composition.

In carrying out the invention the handle 11 is formed with a reduced cylindrical end portion 17 and has a recess 18 leading inwardly from the inner end thereof and spaced relative to the shank 10 by a wall portion 19 which overlies one side of the shank 10.

An electrical conductor 20 is imbedded in the handle 11 in spaced relation to the shank 10 and has one end thereof electrically connected to the threaded socket lining 13. The other end of the conductor 20 projects into the recess 18 and constitutes a spring tongue 21 and which tongue overlies a similar spring tongue 22 in slidable surface contact therewith; the tongue 22 protruding from an insulating plug 23 inserted in and closing the outer end portion of the recess 18. A metallic contact ring 24 is carried by the plug 23 with which the tongue 22 connects; the ring 24 being arranged to encircle the inner end portion of the handle 11 when the plug 23 is set in place.

The inner wall 19 of the recess 18 is formed with an opening 25 through which a portion of the metallic shank 10 is exposed to the recess 18, and mounted on the inner face of the tongue 20 is a spark point 26 protruding toward and terminating in spaced relation to the exposed portion of the shank 10 in the opening 25.

Means are provided for varying the width of the gap between the spark point 26 and the contiguous exposed portion of the shank 10, which means is here shown as comprising an internal cam ring or eccentric 27 arranged in a circumferentially extending channel 28 formed in the base portion of the reduced cylindrical end 17 of the handle 11; the cam ring 27 being divided for assemblage in the channel 28. A turnable sleeve 29 encircles the handle member 17 and is formed with end notches 30 into which extend lugs 31 formed on the outer periphery of the cam ring 27 whereby interconnection between the cam ring and sleeve 29 is effected so that on rotation of the latter relative to the handle the cam ring will be revolved.

The eccentric inner periphery of the cam ring 27 bears against the outer face of the outer spring tongue 21; the tension of the spring tongues 21 and 22 normally maintaining the outer tongue 21 in contact with the inner periphery of the cam ring, which latter is generally positioned with its point of greatest eccentricity opposite the spark point 26, as shown in Fig. 5. A series of graduations 32 are formed of the margin of the sleeve 29 which are calibrated and designated to indicate various widths of the gap between the spark point 26 and the shank 10 effected by rotation of the cam ring 27 to cause advance or retraction of the point relative to the shank; a mark 33 being formed on the handle 11 with which the calibrated graduations 32 are readable. The cam ring 27 and sleeve 29 are formed of an insulating material similar to or like that of the handle 11. The sleeve 29 is held in place against longitudinal movement by a ring 34 interposed between the outer end of the sleeve 29 and the metallic ring 24 on the plug 23, and which ring 34 has a tight fit on the handle portion 17.

In the operation of the invention to test an installed spark plug, the contact ring 24 is positioned against the terminal post of the plug while the shank 10 is brought into contact with the engine head, thus placing the lamp and spark gap of the tester in parallel relation with the spark gap of the spark plug, whereby on electrical current being directed through the spark plug of sufficient intensity to jump the gap of the latter a portion of such current will be shunted through the ring 24, tongue 22 and its overlying tongue 21, through the conductor 21, lamp 14 and shank 10, thereby illuminating the lamp and indicating to the operator the presence of the electrical current. This occurs when the gap between the spark point 26 and shank 10 is greater than the gap between the point of the spark plug. When the sleeve 29 is turned to a position where the cam ring 27 will advance the spark point 26 to a position relative to the shank 10 corresponding to the gap between the spark point of a spark plug the current directed to the tongue 22 will be shunted from the lamp 14 by the resistance offered by the latter and will jump the gap between the point 26 and the shank 10 thus forming a spark in the chamber 18. At this point the lamp 24 will be out, and the spark in the recess 18 will be visible to the operator; the handle 11 being formed of transparent material for this purpose. The reading afforded by the graduation 32 relative to the point 33 will give the spacing between the spark point 26 and shank 10 which will be complementary to the width of the gap between the spark plug points. In this fashion any variance in the gap of the points of the several spark plugs on an engine may be determined without removal of the plug thereby permitting the selection of such plugs as may be out of condition.

In event of non-illumination of the lamp 14 on application of the device as above described, such would indicate a broken circuit in the portion of the ignition system in which the tested plug is connected and this indicating that the tested plug or such portion of the ignition system is defective.

As a means for increasing the utility of the tool the tip of the shank 10 is formed with a pair of parallel spring tongues 35 and 36 tips of which terminate in alignment with each other so that the tongues on being retracted toward each other may be inserted in the kerf of a screw 37 as indicated in Figure 9 in gripping engagement with the screw, whereby the tool may be used in initially setting of the screw.

The tongues 35 and 36 are slightly offset relative to each other and the protruding edge of the tongue 35 is formed with teeth 38 having the characteristics of a saw or file, while the protruding edge of the tongue 36 is formed with a knife edge 39 as shown in Fig. 8; the teeth 38 being serviceable in cleaning the grooves of armatures and the knife edge 39 being useful in effecting removal of insulation from electrical conductors.

The outer end portion of the shank 10 is formed with an open ended longitudinally extending slot 40 and mounted on a pivot pin 41 extending across the outer end portion of the slot 40 is a stem 42 having a hook 43 on the outer end thereof, and which stem is turnable on the pin 41 to a position to house it and the hook portion 33 thereon in the slot 40 as shown in Fig. 1 and as indicated in dotted lines in Fig. 7, but which stem is adapted to be swung to a position to protrude from between the tongues 35 and 36 as indicated in dotted lines in Fig. 1 and in full lines in Fig. 7 in which latter position the hook 43 may be utilized in fishing wires and other small articles from small spaces.

The device is also applicable for use in effecting timing of the ignition of a combustion engine, by substituting a neon bulb for the filament lamp 14 and then connecting the feed wire of one of the engine spark plugs with the shank 10 so that on operation of the engine the neon bulb will be illuminated on electrical current being directed from the distributor through the feed wire to the shank 10. By spotting the light emanating from the bulb on the dead-center markings on the engine fly wheel, the flash of the bulb relative to the position of such markings enables adjustment of the distributor if need be to effect proper timing of the ignition relative to the dead-center position of the fly wheel and its associated crank shaft.

An important feature of the invention resides in the construction whereby the spark point 26 is housed in the recess 18 and its adjusting and indicating means assembled on the handle; and which feature resides in forming the recess 18 to extend inwardly from the inner end of the handle, then closing the open end of the recess by the plug 23 which is inserted endwise into the recess carrying with it the spring tongue 22 and the contact ring 24. In this fashion the spark point 26 is readily positioned opposite the opening 25 and at the same time

the ring 24 is slid into tight encircling engagement with the handle portion 17 to securely retain the plug 23 in place.

This mode of assemblage likewise serves to afford a ready means for effecting electrical connection between the lamp socket 13 and the conductive tongue 22, since by leading the conductor 20 from the socket to an extended position in the recess 18 as shown, the tongue 22 on being advanced to its position in the recess will be brought into overlapped sliding contact with the tongue 21 thereby completing the electrical connection to the lamp.

Another advantageous feature of assemblage resides in the formation of the cam ring 27 in divided form so that the halves thereof may be inserted in the annular channel 28 from opposite sides of the handle, and then surrounding the outer margins of the ring halves with the sleeve 29 to hold the halves in place. By the provision of the notches 30 on the end of the sleeve 29, and the lugs 31 on the ring halves a strong and effective connection between the sleeve and the cam ring parts is easily and quickly effected. The slip ring 34 when fitted on the handle serves to retain the sleeve 29 in place and at the same time affords an abutment for the contact ring 24. However, the ring 34 is employed more to give a finish and to facilitate gripping of the turnable sleeve 29 between the thumb and fingers, since it could be dispensed with by extending the sleeve to meet the contact ring 24.

The slip on arrangement of the parts above pointed out greatly simplifies and facilitates their assemblage, and produces a neat appearing and substantial construction.

While I have shown and described a specific embodiment of my invention I do not limit myself to the exact details of construction and arrangement shown, but may employ such changes and modifications and equivalents of the parts and their formation as come within the purview of the appended claims.

I claim:

1. A spark plug tester comprising an elongated electrically conductive shank, an insulated transparent handle on said shank, an electric lamp in said handle having electrical contact with said shank, a contact member on the exterior of said handle spaced from said shank, an electrical connection between said contact and said lamp, and a spark gap leading between said connection and said shank.

2. The structure called for in claim 1 in which the handle is formed with an internal recess in which said spark gap is located.

3. The structure called for in claim 1 together with adjustable means for varying the width of said spark gap including means for designating the width of the gap.

4. In a spark plug tester, an elongated electrically conductive shank, a transparent insulated handle on said shank having a recess therein, a lamp socket interiorly of said handle, an electric lamp in said socket in electrical contact with said shank, a contact ring on said handle insulated from said shank, a plug inserted in said recess on which said ring is carried, an electrical connection between said ring and said lamp leading through said plug and recess, and a spark point on said connection located in said recess and spaced from said shank, and adjustable means on said handle for varying the spacing of said spark point and said shank.

5. In a spark plug tester, an electrically conductive shank, an insulated handle thereon, a contact member on said handle, a lamp in said handle electrically connected in circuit with said shank and contact member, and means for shunting electrical current from said lamp including a spark gap interposed between said contact member and said shank.

6. The structure called for in claim 5, together with means for varying and designating the width of said spark gap.

7. A combination tool including a screw driver having a metallic electrically conductive shank and an insulated handle, a contact member on said handle, and means in said handle interposed between said shank and contact member for determining the width of the spark gap of an installed spark plug on placing said contact member in electrical contact with the binding post terminal of the spark plug and grounding said shank.

8. In a tool of the character described, the assemblage comprising an electrically conductive shank, a handle on one end of said shank having a recess in its outer end through the bottom of which said shank is exposed, means for supporting an electric lamp in said recess with a terminal thereof contacting said shank, said handle having a recess opening at the inner end thereof, a conductor extending into said recess and leading through said handle and connecting with the other terminal of said lamp, a plug insertable in the outer end of said last named recess, an electrical conductor carried by said plug extending into said recess and arranged to advance into slidable electrical connection with the other conductor on inserting the plug in place, a contact member carried on the exterior of said plug with which the conductor on the plug is connected, a spark point on one of said conductors interiorly of said handle and spaced from a contiguous exposed portion of said shank extending into the handle, and means on said handle for varying the spacing of said spark point relative to said shank.

9. A spark plug tester comprising an electrically conductive shank, an insulated handle on said shank, an electric lamp on said handle, having electrical contact with said shank, a contact member on the exterior of said handle spaced from said shank, an electrical connection between said contact member and said lamp, and a spark gap on the handle leading between said connection and said shank.

10. The structure called for in claim 9, together with adjustable means on the handle for selectively varying the width of the spark gap including means for visually designating the width of the gap.

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