July 10, 1923. 1,461,320

J. MARKS

SPARK PLUG

Filed July 24, 1920

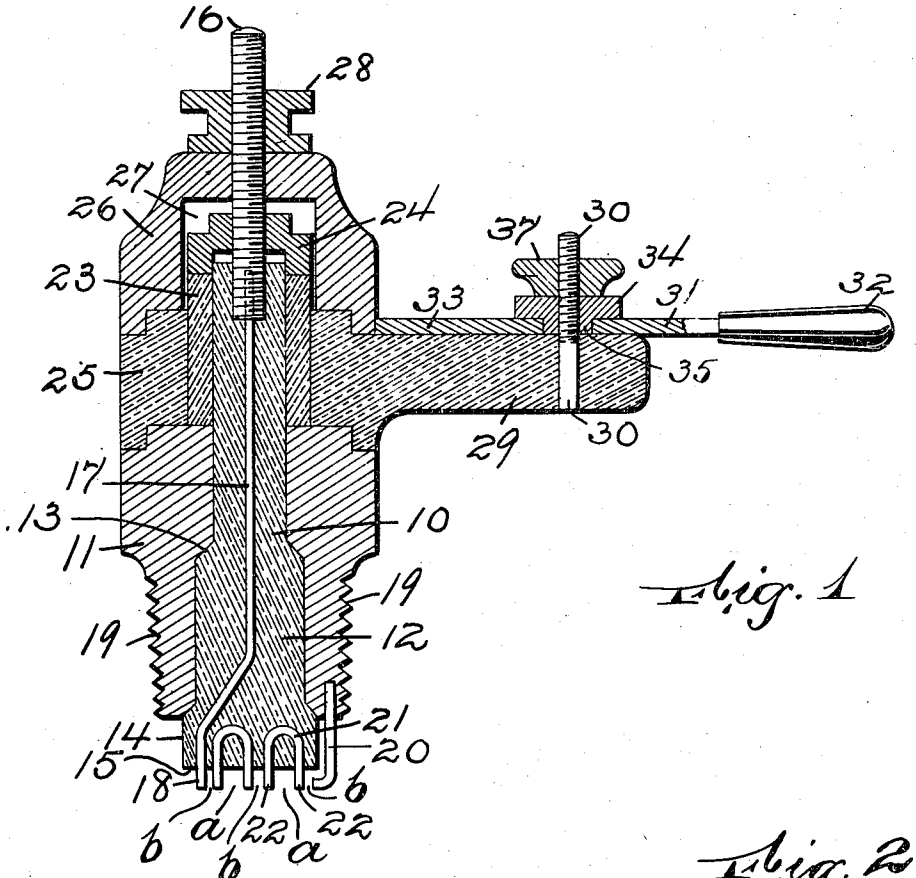
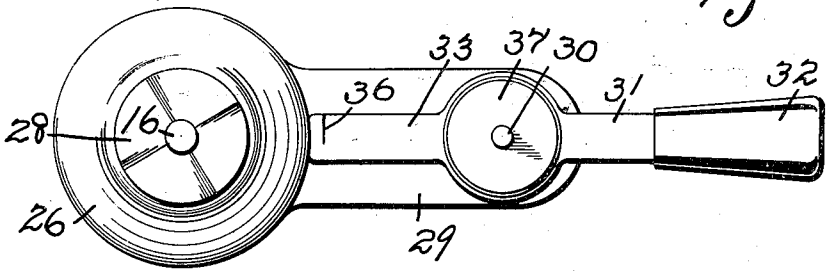


Fig. 1

Fig. 2



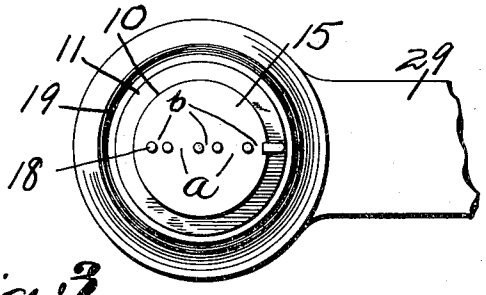


Fig. 3

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Patented July 10, 1923. 1,461,320

UNITED STATES PATENT OFFICE.

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SPARK PLUG.

Application filed July 24, 1920. Serial No. 398,744.

To all whom it may concern:

Be it known that I, JOHN MARKS, a citizen of the United States, and a resident of Pearl River, county of Rockland and State of New York, have invented certain new and useful Improvements in Spark Plugs, of which the following is a specification.

This invention relates to an improved spark plug that is stable, is easily assembled and is easily kept clean, in that the bottom part of the plug is preferably made without a recessed portion for the lodgement of carbon.

The invention relates to a plug of this kind in which the points from which the sparks jump one to another are arranged with two main points and also intermediate points, the intermediate points being electrically connected in bearings and so arranged that a series of alternate sparks and gaps is provided when electric current is passed through said points.

Another object of the invention is to provide a spark plug in which a spark testing device is mounted to one side thereof and is adjustable radially so that its position, after the spark plug is fixed in position, can be altered in case any parts of the mechanism adjacent thereto necessitate a shifting of such testing device.

The invention is illustrated in the accompanying drawings, in which Figure 1 is a vertical section through a spark plug made according to my invention. Figure 2 is a top view of the spark plug shown in Figure 1, and Figure 3 is a bottom view of said spark plug with the extension broken away.

The spark plug comprises a core 10 which is surrounded by a sleeve 11, the downward movement of the sleeve on the core being limited usually by enlarging the bottom part of the core, as at 12, such enlarged portion being connected to the upper and reduced portion by inclined shoulders 13, the sleeve, of course, having similar shoulders so that the parts fit tightly together, the core projecting upward beyond the sleeve and also projecting below the sleeve, as at 14, and has a substantially flat bottom face 15 so as to provide no recessed part for the accumulation of carbon and other dirt.

On the top of the core is a binding post 16 which is screw-threaded and is inserted part way into said core and has connected thereto, usually by brazing, a strand 17 which passes down through the core and projects a short way from the bottom thereof, as at 18, to form a point, which is one of the sparking points of the plug.

The core is made of material that will not conduct electricity, it being the practice to make such spark plugs of porcelain. The sleeve 11, however, is made of metal, usually iron, and is provided with a screw-threaded part 19 by means of which it is screwed in an opening in the top of the cylinder and is provided with a point 20 which projects from the bottom face of the core and is usually bent over at the end to face toward the point 18.

I prefer to place intermediate points between the points 18 and 20, these intermediate points in the form shown comprising U-shaped pieces 21 which are embedded in the material of the core and have their ends projecting to form points 22, but the points 22 of any one member are separated by a space *a* which is greater than the space *b* between the points of adjacent members, so that the spaces *b* are sparking points, whereas the spaces *a* are gaps.

In the drawing Figure 1 illustrates a construction where there would be three sparks and two gaps, so that if one sparking point becomes clogged there are still other sparking points functioning, so that the positive operation of a spark, even under difficult conditions, is prolonged.

When all the sparking points are clogged of course the plug must be cleaned, and this cleaning is facilitated by reason of the bottom face of the core being substantially flat and not being recessed. A bushing 23 is arranged outside the core and rests on the sleeve, and a locking nut 24 screws onto the binding post or screw 16 and bears on top of the bushing, thus locking the core and the sleeve together.

A collar 25 surrounds the bushing and rests on the core 11, and a thimble 26 has a recess 27 to enclose the top part of the bushing 23 and the locking nut 24, the thimble resting on the collar and screwing on the binding post so that when the thimble is screwed down the collar is locked against the sleeve. The usual nut 28 screws on the binding post above the thimble to form a means for attaching an electric wire to the binding post.

When a spark testing device is to be used in conjunction with the plug, the extension 29 of the collar, which extension is prefer-

ably radial, is provided with a binding post which I will designate as the second binding post 30 so as to differentiate it from the primary binding post 16. The second binding post 30 acts as a standard on which a movable element, such as the lever 31, swings, the lever 31 having a handle 32 and having its inner end 33 arranged so as to contact with the periphery of the thimble 26. If it is desired, a bearing collar 34 is screwed on the binding post 30 and the lever 31 swings on such bearing collar, the bearing collar having an extension 35 which can be made slightly eccentric, if desired, so as to adjust the fulcrum of the lever toward and from the thimble.

Another form of insuring a tight joint between these parts is to provide a small sawcut or opening 36 (Figure 2) to give the end of the lever a slight amount of spring. A nut 37 is screwed on the binding post 30 to insure the affixing of an electric wire thereto.

It will be readily seen that if the terminal of an electric circuit, in the form of a wire, is fastened to the binding post 30, instead of the binding post 16, when the handle 32 is swung to cause a small gap between the thimble and the end of the lever 33, the presence or absence of a spark will indicate whether or not there is anything the matter with the ignition system.

The extension 29 can be adjusted rotatably on the spark plug to meet different situations where obstructions might be present, it being readily seen that by a loosening of the thimble 26 the collar 25 can be turned on the bushing 23 and the sleeve 11, and when it is in the proper position it can be held there by screwing down on the thimble 26 to lock it in such position.

It will also be evident that the nut 28, the thimble 26 and the collar 25 can all be removed from the plug when the plug is in position, while the other parts of the plug will be still held in proper operative relation.

It will be understood that minor changes can be made in the details of construction and in the form of the parts without departing from the scope of the invention.

I claim:

1. A spark plug comprising a core made of non-conducting material, a sleeve surrounding the bottom part of the core, the sleeve and the core having co-acting parts to limit the downward movement of the sleeve on the core, a terminal on the core terminating in a point at the bottom of the core, a thimble screwing on the terminal, a nut on the terminal so as to form a binding post, and a collar with an extension insulated from the said sleeve having means for connecting an electric circuit thereto and having a movable element to be placed in and out of contact with the thimble, the thimble resting on the collar.

2. A spark plug comprising a core larger in diameter at the bottom than at the top, a sleeve fitting on said core and limited in its downward movement by reason of said enlargement, a binding post secured in the top of said core, a bushing surrounding the core and resting on the sleeve, a locking nut screwing on the binding post and bearing on the bushing, whereby the sleeve is secured on the core, a collar surrounding the bushing and bearing on the top of the sleeve, a thimble screwing on the binding post and enclosing the locking nut, said thimble acting to lock the collar in position and permitting the rotative adustment of said collar, and elements on the collar co-acting with the thimble to form a spark testing device.

3. A spark plug comprising a core larger in diameter at the bottom than at the top, a sleeve fitting on said core and limited in its downward movement by reason of said enlargement, a binding post secured in the top of said core, a bushing surrounding the core and resting on the sleeve, a locking nut screwing on the binding post and bearing on the bushing, whereby the sleeve is secured on the core, a collar surrounding the bushing and bearing on the top of the sleeve, a thimble screwing on the binding post and enclosing the locking nut, said thimble acting to lock the collar in position and permitting the rotative adjustment of said collar, an extension on the collar, a second binding post on the extension, and a lever swinging on said binding post and having its inner end adapted to cooperate with the thimble to form a spark testing device.

4. A spark plug comprising a core being larger at the bottom than at the top, a sleeve to fit said core and having its movement downward limited by said enlargement, a bushing around the core and resting on the sleeve, a collar resting on the sleeve and surrounding the bushing, a binding post projecting from the top of said core, a locking nut screwing on the binding post and bearing on said bushing to hold the bushing, the core and the sleeve in their assembled positions, a thimble screwing on the binding post and being recessed so as to enclose the locking nut in the top of the bushing, the thimble bearing on the collar, a nut on the binding post above the thimble, a strand extending through the core from the binding post and projecting from the bottom face thereof to form a sparking point, and a point projecting from the bottom of the core.

In testimony that I claim the foregoing, I have hereto set my hand, this 23rd day of July, 1920.

JOHN MARKS.