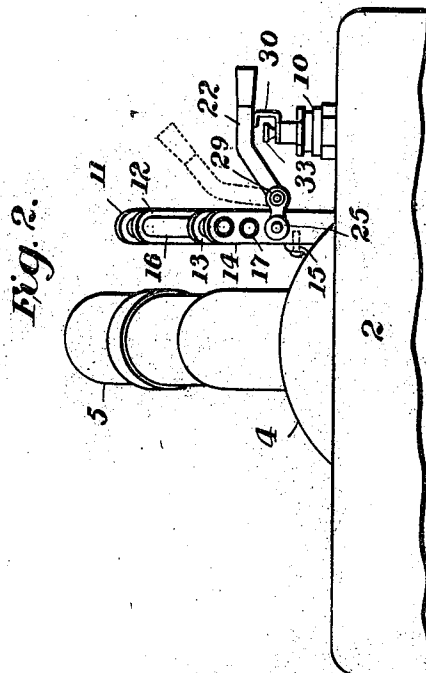
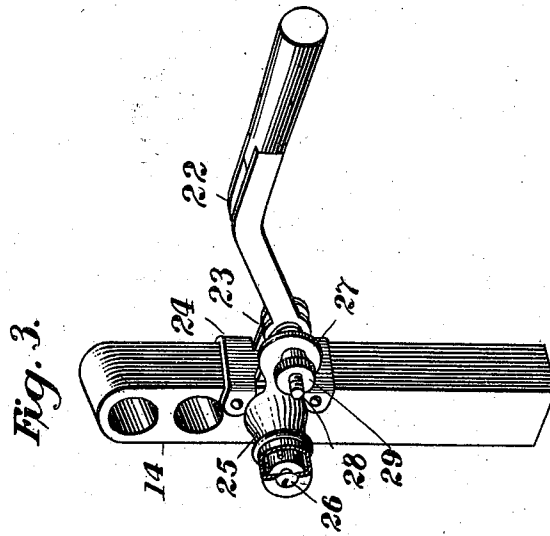
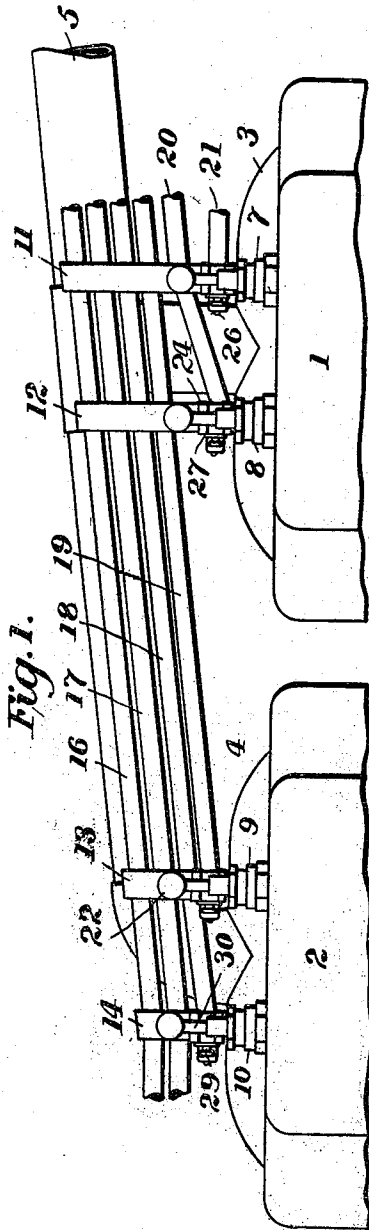


M. TIBBETTS.
IGNITION APPARATUS FOR HYDROCARBON ENGINES.
APPLICATION FILED APR. 17, 1908.

1,023,180.

Patented Apr. 16, 1912.

2 SHEETS—SHEET 1.



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2 SHEETS-SHEET 2.

Fig. 4.

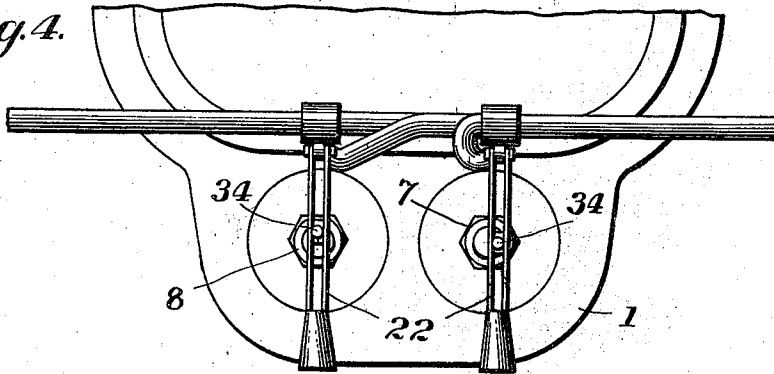


Fig. 5.

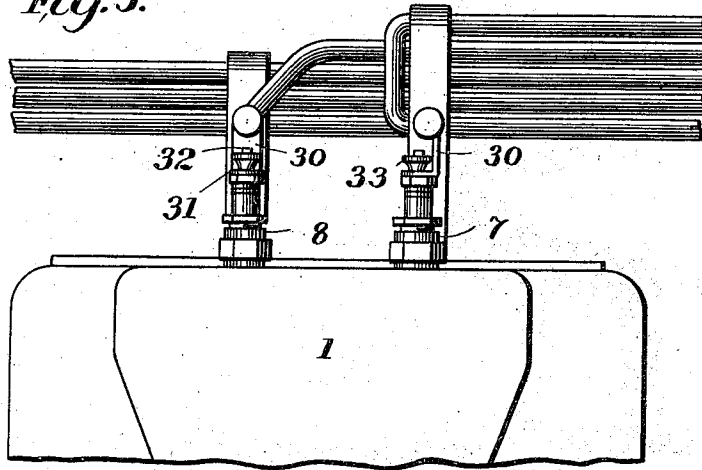


Fig. 6.

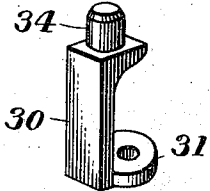


Fig. 7.

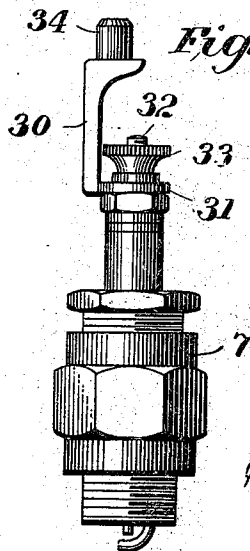
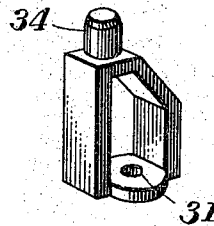


Fig. 8.



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UNITED STATES PATENT OFFICE.

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PACKARD MOTOR CAR COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF
MICHIGAN.

IGNITION APPARATUS FOR HYDROCARBON-ENGINES.

1,023,180.

Specification of Letters Patent.

Patented Apr. 16, 1912.

Application filed April 17, 1908. Serial No. 427,634.

To all whom it may concern:

Be it known that I, MILTON TIBBETTS, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Ignition Apparatus for Hydrocarbon-Engines, of which the following is a specification.

This invention relates to ignition apparatus for hydrocarbon engines, and has particular reference to means for mounting high tension wires and knife switches on insulating posts on the engine cylinders, means for making connection between the wires and switches for the spark plugs and adjustable means for alining the knife switches and spark plugs. Its objects are to simplify the construction and improve the appearance and operation of the ignition device, thereby producing an ignition system in which the parts may be quickly and easily assembled and adjusted to proper operative position.

In the accompanying drawings, Figure 1 is a side elevation of a portion of two adjacent engines having the preferred form of my invention applied thereto; Fig. 2 is an elevation taken at right angles to that of Fig. 1; Fig. 3 is a perspective view of one of the insulating posts carrying a wire terminal and a knife switch; Fig. 4 is a plan view of a modified form of the invention; Fig. 5 is a side elevation of what is shown in Fig. 4; Fig. 6 is a perspective view of an adjustable contact piece for the spark plug; Fig. 7 is a side view of the spark plug having the contact piece secured in position thereon; and Fig. 8 is a perspective view of a modified form of contact piece.

In Fig. 1, I have shown my system applied to two two-cylinder engines mounted side-by-side. Each engine is made of a single casting, the cylinders 1 and 2 being surrounded by the water jackets 3 and 4. Each water jacket has an outlet connecting with the outlet pipe 5 which may be made flexible, and which is mounted at an inclination above the tops of the engine cylinders, as is usual in motor cars.

Each engine cylinder is provided with an opening in the inlet in which is mounted a spark plug, the casings of these plugs being lettered in the drawings as 7, 8, 9 and 10. Adjacent the plugs are the insulating posts 11, 12, 13 and 14 which carry the high ten-

sion wires which supply current to the spark plugs, and also carry the two wires leading to the transformer. These insulating posts are secured in place on top of the cylinder by means of bolts passing through the lug 15 on the top of the cylinder casing (see Fig. 3). As shown in Fig. 1 there are six wires leading to the posts 11, one of the top wires 16, 17 being intended to carry the low tension current to the transformer coil, and the other being intended to carry the high tension current from the distributor of the magneto to the secondary wire of the transformer coil. Therefore these two wires pass entirely across the top of the engine cylinders and to the transformer. The four lower wires 18, 19, 20 and 21 carry the high tension current for the four spark plugs, one wire terminating at each insulating post. It will be noted that the wires are arranged at an inclination substantially the same as that of the water outlet pipe 5, and that the lowest wire is the one which terminates at any post and makes connection with the knife switch of the spark plug. This inclined arrangement of the wires and the connection of the lowest wire with the switch makes a construction having distinct advantages over those in common use where the top wire is the one connected with the spark plug. It improves the appearance of the device and enables the connection with the knife switch to be made at a lower point.

It will be understood that the high tension wires are insulated and are made up of small wires in the form of a cable and it has been customary to bend the wire which is to terminate at a particular post so as to make connection with the knife switch mounted on that post. In order to avoid this and to make a simpler and more effective terminal connection with the knife switch I have devised the structure shown clearly in Fig. 3. As here shown, the knife switch 22 is pivotally secured in the ears 23 on the bracket 24 which is bolted to the insulating posts adjacent one of the openings in that post which receives one of the high tension wires. A thimble 25 of conducting material is in alignment with the hole in the post so that when the wire is passed through the hole it will enter this thimble. The thimble has at its outer end an opening for the reception of the screw 26, and it will be understood that

to make electrical contact between the wire cable and this terminal thimble the wires in the cable are bent back over the insulation before the end is inserted in the thimble, and the screw 26 makes contact with the wires at the center of the cable, thus making good electrical contact between the high tension wire and the thimble. The thimble is provided with the conducting arm 27 which has an opening through which the pivot pin 28 of the knife switch passes. A thumb nut 29 secures this arm against one of the ears on bracket 24 and thus electrical connection is made between the high tension wire and the switch arm 22. It will be noted that the switch arm 22 may be bent upwardly as shown in Fig. 3 when this is necessary to properly reach the spark plug.

The knife switches being mounted as above described opposite the spark plugs are intended to be brought down against the contact points of the spark plug, but it has been found in practice that the parts are not always properly aligned so that the knife switches will fit easily upon the contact point without bending. To bend the switch not only disfigures it, but impairs its efficiency. In order to avoid these defects and to insure the proper alinement of the switch and contact piece I have devised the adjustable contact piece which is most clearly shown in Figs. 6, 7 and 8. This contact piece embodies a main upright portion 30 having a base 31 in the shape of a washer which fits over the upper end of the screw threaded part 32 which in turn makes contact with the electrode of the spark plug. The thumb nut 33 on the part 32 binds the base 31 to the upper part of the spark plug-casing, and thus makes electrical connection between the contact piece and the electrode of the spark plug. On the upper end of the contact piece is the cylindrical head 34 which is adapted to fit between the two blades of the knife switch, and it will be observed that this cylindrical head is mounted on the contact piece not in line with the point of pivotal support on the part 32, but eccentrically. It is thus apparent that the head 34 may be moved from one side to the other by simply rotating the contact piece on its washer 31, and that thereby the head may be brought into proper position to be engaged by the knife switch without bending. In the form shown in Fig. 8 the contact piece has been strengthened by upwardly extending portions on both sides of the lower washer. The adjustable contact piece for bringing about an alinement with the knife switch can be applied to wires mounted in the way heretofore in common use as shown in Figs. 4 and 5.

Having thus described the invention, what is claimed is:

1. In an ignition system for hydrocarbon

engines, the combination with the engine cylinders, of spark plugs thereon, high tension conducting wires supported above one another in an upwardly extending plane adjacent said plugs, each wire being inclined downwardly, switches for making contact with the spark plugs; and means for connecting the lowest wire adjacent each plug with the switch for that plug.

2. In an ignition system for hydrocarbon engines, the combination with the engine cylinders, of spark plugs thereon, posts on said cylinders adjacent said plugs, means on said posts for supporting high tension wires above one another and at an inclination to the horizontal, switches for making contact with the spark plugs, and means at each post for connecting the lowest wire with the corresponding switch.

3. In an ignition system for hydrocarbon engines, the combination with the engine cylinders, of spark plugs thereon having contact points, insulating posts on said cylinders adjacent said plugs, knife switches mounted on said posts in a position to make contact with the spark plugs, high tension wires carried by said posts and extending diagonally downward above one another, and means for connecting the terminal of the lowest wire at each post with the knife switch of that post.

4. In an ignition system for hydrocarbon engines, the combination with the engine cylinders, of spark plugs thereon, insulating posts on said cylinders adjacent said plugs provided with means for supporting wires one above the other, knife switches pivotally secured to said posts adjacent the lowest wire supporting means, and adapted to make contact with the corresponding spark plugs, and a wire terminal on each post for the lowest wire electrically connected to the knife switch on that post.

5. In an ignition system for hydrocarbon engines, the combination with the engine cylinders, of spark plugs thereon, insulating posts on said cylinders adjacent said plugs provided with means for supporting wires one above the other, knife switches pivotally secured to said posts adjacent the lowest wire supporting means and adapted to make contact with the corresponding spark plugs, a thimble-shaped conducting terminal for the end of the lowest wire on each post, and a conducting arm connecting said terminal with the switch on that post.

6. In an ignition system for hydrocarbon engines, the combination with the engine cylinders, of spark plugs thereon, insulating posts on said cylinders adjacent said plugs provided with means for supporting wires one above the other, knife switches pivotally secured to said posts adjacent the lowest wire supporting means and adapted to make contact with the corresponding spark plugs,

a thimble-shaped conducting terminal for the end of the lowest wire on each post, a conducting arm rigidly secured to said terminal having an eye adapted to fit over the pivot pin of the knife switch, and a thumb nut, for clamping said arm in place on the pivot pin.

7. In an ignition system for hydrocarbon engines, the combination with the engine cylinders, of spark plugs thereon having contact points, insulating posts on said cylinders adjacent said plugs, knife switches mounted in said posts in a position to make contact with the spark plugs, high tension wires carried by said posts and extending diagonally downward, means for connecting the terminal of the lowest wire at each post with the knife switch of that post, and means for adjusting the contact point of the spark plug into proper alinement with the knife switch.

8. In a device of the class described, the combination with a post having a hole there-through for supporting a conducting cable, of a thimble-shaped conducting terminal adapted to fit over the end of said hole, a bracket secured to said post adjacent said hole having projecting ears, a knife switch secured to said bracket by a pivot pin passing through said ears, a conducting arm rigidly secured to said terminal having an opening fitting over the end of the pivot pin, and a thumb nut for securing said arm on the pin.

9. In a device of the class described, the combination with a pivoted knife switch, of a spark plug adjacent thereto having a contact point adapted to be engaged by the switch, and means for adjusting said contact

point laterally on said plug into alinement with the switch.

10. In a device of the class described, the combination with a knife switch, of a pivotal support therefor permitting it to move in a single plane, a fixed spark plug adjacent thereto having a contact point adapted to be engaged by the switch, and means for adjusting said contact point laterally on said plug into alinement with the switch.

11. In a device of the class described, the combination with a pivoted knife switch, of a spark plug adjacent thereto, a contact member pivotally mounted on said plug substantially in line with the knife switch, and a contact point on said member eccentric to the pivotal point of support and adapted to be brought into alinement with said switch, for engagement therewith, by rotation of said member on its pivotal support.

12. In a device of the class described, the combination with a pivoted knife switch, of a spark plug adjacent thereto, a screw threaded extension of the electrode of said plug, a contact member having an opening fitting said extension, and pivotally supported thereon, a thumb nut on said extension for clamping the member in position, and a contact point on said member eccentric to the pivotal support and adapted to be brought into alinement with said switch, for engagement therewith, by rotation of said member on its pivotal support.

In testimony whereof I affix my signature in presence of two witnesses.

MILTON TIBBETTS.

Witnesses:

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L. C. TENNEY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."