July 7, 1931. D. H. HASTINGS 1,813,289

CARBON CUTTER

Filed April 7, 1928

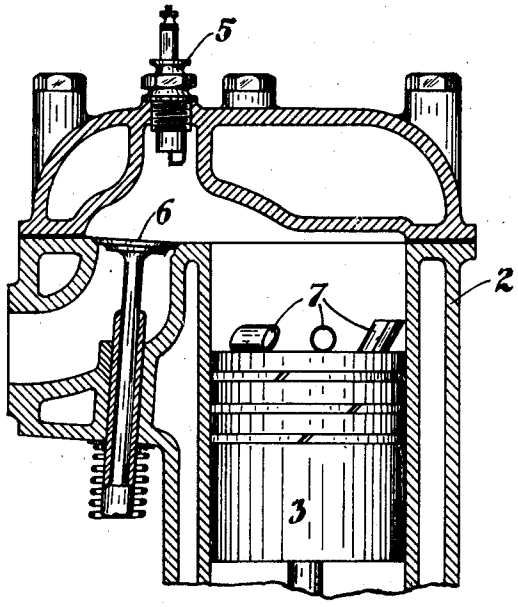


Fig. 1.



Fig. 2.



Fig. 3.

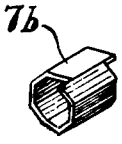


Fig. 4.

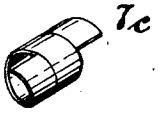


Fig. 5

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UNITED STATES PATENT OFFICE

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CARBON CUTTER

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This invention relates to methods and means for cleaning and scouring the carbon and other residue from the interior surfaces of internal combustion engines.

The object of this invention is to provide improved carbon cutters whereby carbon and other residue which normally collects on the interior surfaces of internal combustion engines, i. e. the piston heads, cylinder heads, valves, valve pockets etc., may be readily and thoroughly loosened from such surfaces mechanically, and be discharged, together with the cutting or loosening means, through the exhaust ports of the engine; and which may be introduced into the cylinders through the usual spark plug openings, thereby making it possible to thoroughly clean all such interior surfaces without the necessity for dismantling and re-assembling of any parts of the engine, other than to remove and replace the spark plugs once each time it may be necessary or desirable that the carbon etc. be removed.

This present invention is an improvement over the carbon cutters disclosed by United States patent to D. D. Getman, No. 1,357,632. It, however differs therefrom in certain important features and in a new method which I have discovered to be absolutely essential for efficiently and satisfactorily cleaning the cylinders.

My improved carbon cutters are illustrated by the accompanying drawings, and my improved process will be understood from the following description.

Fig. 1 is a vertical section through the top part of an L-head type of motor, showing my improved carbon cutters introduced therein.

Fig. 2 is a perspective view, on an enlarged scale, of one of my improved carbon cutters; and

Figs. 3, 4 and 5 illustrate a few of the possible modifications in form.

The same reference characters refer to the same parts throughout the several figures.

Referring to the drawings, 2 represents a part of a cylinder of an L-head type of internal combustion engine, 3 a piston, 5 a spark plug, 6 an exhaust valve, and 7 my improved carbon cutters.

My improved carbon cutters are preferably of tubular form and have a length slightly greater than the diameter thereof; the dimensions are such that they may be easily introduced through the usual spark plug openings, but as long as they retain their normal form will not pass out through the exhaust valves when they open normally. The weight of the cutters is so slight and their hollow form is such that they will be moved and carried about under the urge of the incoming fuel charge, and the outgoing gases, as well as under the urge of the pistons and valves when the motor is running. The cutters may be seamless, or the seams may be brazed, or the adjoining edges of the piece of material from which it is made may be simply butted together, or lapped and left free.

In Figs. 1 and 2, the edges of the cylindrical cutters 7 are shown in contact by abutment and the ends are shown cut in planes at an angle to a plane at right angles to the axis. Fig. 3 shows a cutter 7*a* with the edges in abutment but which are slightly offset at the ends. Fig. 4 shows a cutter 7*b* of a form similar to Fig. 3, except the tube is of hexagonal form instead of circular. Fig. 5 shows a cutter 7*c* of tubular form rolled up in the form of a helix from a comparatively narrow strip of metal and with the successive turns in abutment at their edges.

While I now prefer to make my improved cutters of a copper-zinc alloy (rolled sheet .008 to .018 inches in thickness and containing from 60% to 95% of copper) I may make them of any other suitable composition, metal, or substance which will withstand for a sufficiently long period of time the conditions to which such carbon cutters are necessarily subjected in service, but which will eventually so compact, or disintegrate, or both that they will be carried out through the exhaust ports along with the products of combustion. And while I now believe a tubular form of cutter to be preferable, and that they should be of uniform thickness throughout, numerous other forms might be

employed without departing from the spirit of this invention.

My improved carbon cutters are used and operate in the following manner:

A number of the cutters, usually four or more are introduced through the spark plug openings into each cylinder of the engine, which is then started and run at idling speed for from three to twelve minutes (or longer), at the end of which period it will be found that the cutters which were in the cylinders have disappeared therefrom, and also the carbon and other residue which was present at the time they were introduced.

My improved cutters are of an entirely different character than prior cutters; and the process by which they clean the interior of the cylinders is entirely different. Heretofore the weight and form of the cutters have been such that they are merely bounced or thrown by the pistons and always lodge in the side wall pockets and stay there after a few movements and are also likely to damage the spark plug points and crack and destroy their insulation material, as well as damage the valves and other parts by their heavy impact. The result is that they fail to clean, also damage the parts and do not properly disintegrate or compact so as to be discharged harmlessly through the exhaust ports.

In accordance with my invention, the cutters are of such form and of such weight that the process of cleaning is brought about by their being carried around with the varying flow of the gases. Their movement is also affected by the movement of the pistons. They can never lodge permanently or find any periods of rest in the wall pockets, because the flow of the gases keeps them in constant motion. They clean effectively and rapidly without damage to the parts by reason of their light weight and form. Their inner space and light weight permits the gases to sweep them around in every direction with constant movement, giving them a rapid varied movement which effectively but lightly cuts and chips away the foreign material without damage to any of the exposed surfaces. The heat of the gases and parts causes the cutters to gradually break and disintegrate, so that after an effective cleaning action, they break up into particles that are harmlessly carried out through the exhaust ports.

I claim:

1. A carbon cutter comprising a length of tubing made from a copper-zinc composition having a thickness of from .008 to .018 inches, the length of said tubing being about equal to the diameter thereof, both length and diameter being too great to permit same to pass, without distortion beneath the exhaust valve of an internal combustion engine in which the cutter is designed to be used.

2. A carbon cutter comprising a tubular form made from a composition metal of substantially uniform thickness containing from 60% to 95% of copper, the length of said form being about equal to the diameter thereof, the size thereof being too great to permit it to pass, without distortion the exhaust valve of an engine in which it is designed to be used, when said valve is opened but a normal distance.

3. The method of cleaning the interior surface of an internal combustion engine cylinder which comprises placing a device in the cylinder, and impacting said device against the interior surfaces of said cylinder directly by a flow of gases into and out of said cylinder.

4. The method of cleaning the interior surface of an internal combustion engine cylinder which comprises placing a device in the cylinder, and causing said device to be carried about and impacted against the interior of said cylinder directly by the flow of gases in and out of the ports of said cylinder.

In testimony whereof I have affixed my signature.

DOUGLAS H. HASTINGS.