Why the KNIGHT ENGINE Improves with Use

Retail Sales Manager's Film Service

One in a series of original filmstrips preserved for their historical value and presented to the members of the **Willys Overland Knight Registry**

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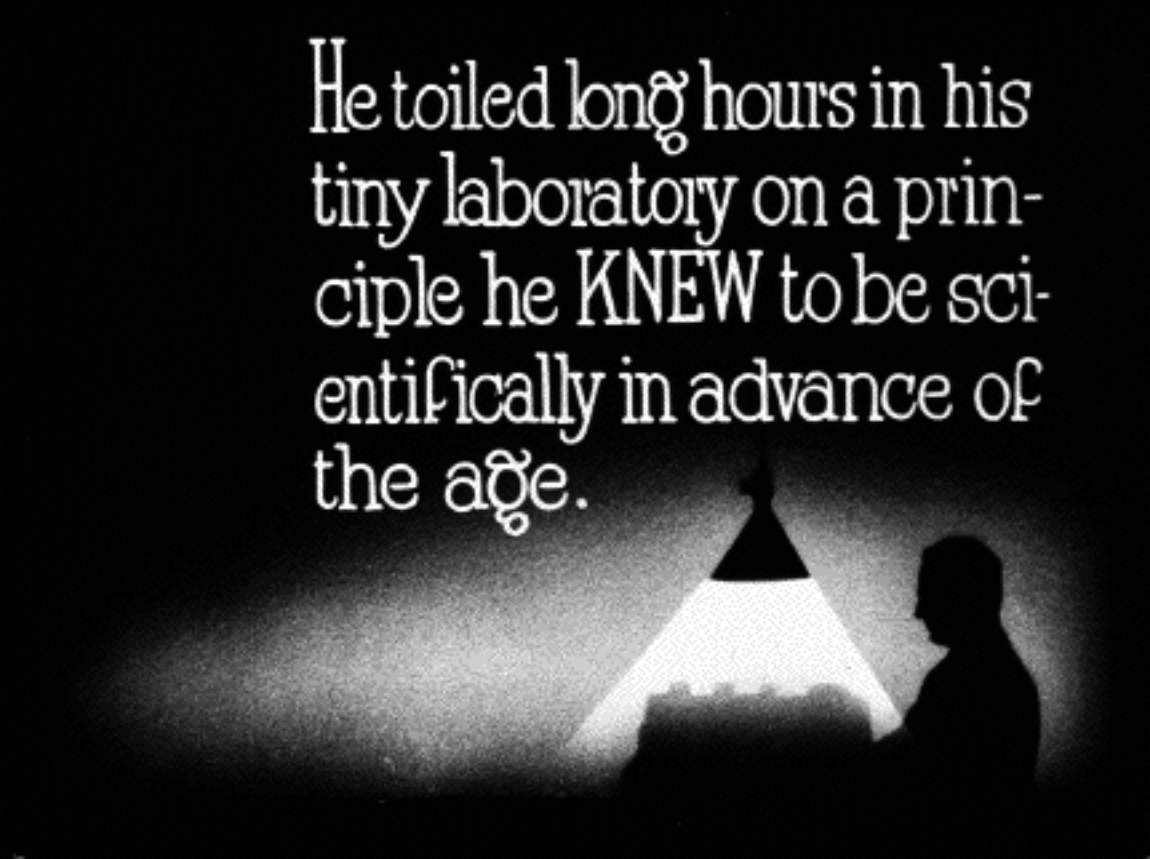
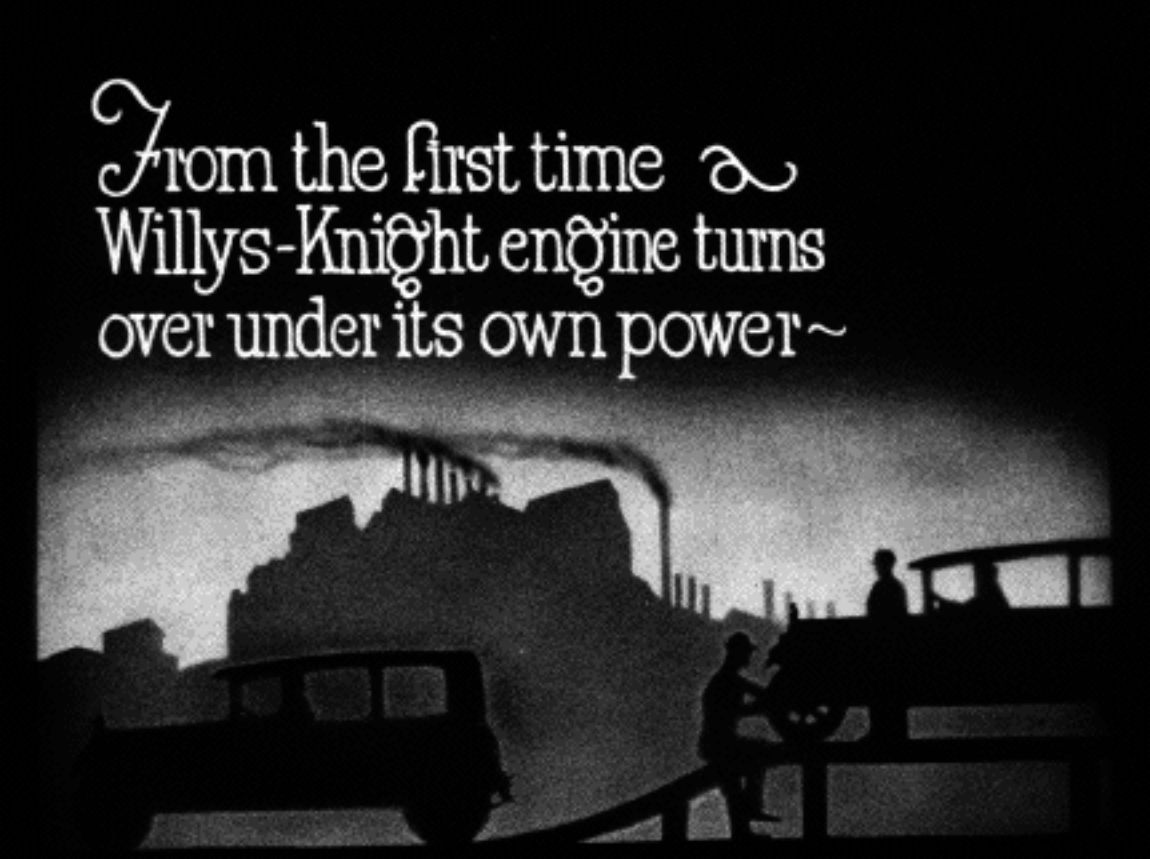
When Charles Y. Knight, far visioned inventor, created the famous Knight sleeve valve engine, he developed an engine that will actually IMPROVE WITH USE.

He toiled long hours in his tiny laboratory on a principle he KNEW to be scientifically in advance of the age.

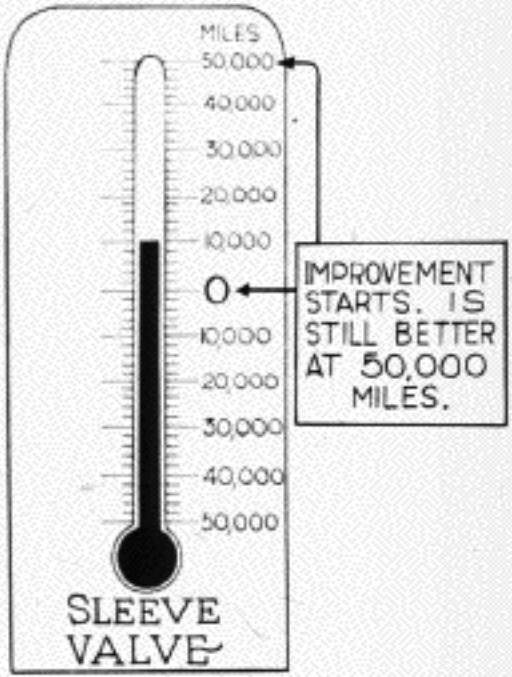


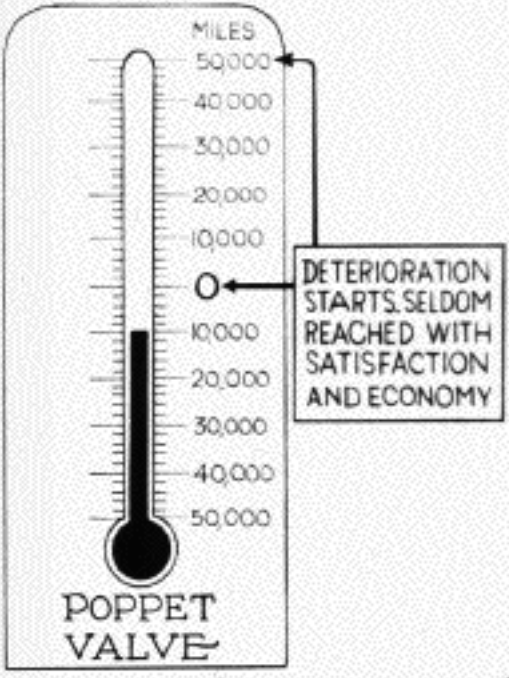
From the first time
Willys-Knight engine turns
over under its own power~



It becomes a little more quiet, a little more flexible, a little more powerful and more economical.

In other internal combustion engine types, operation means deterioration from the very start. They become - -

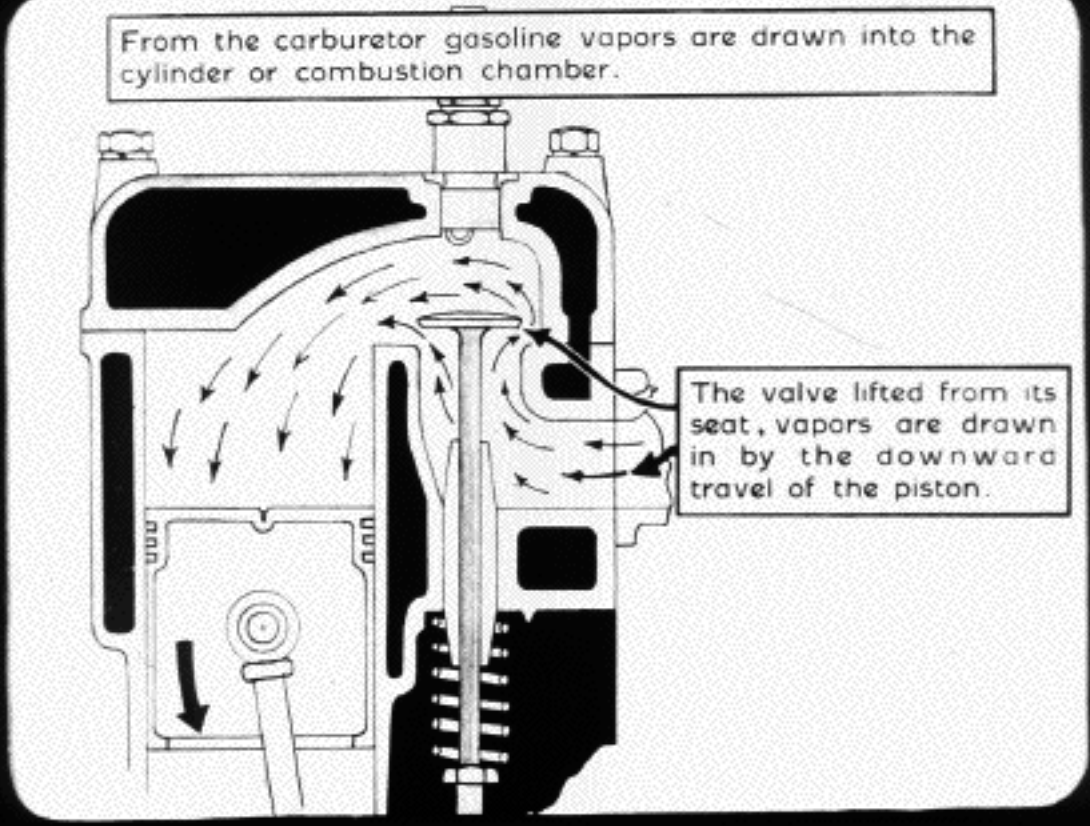




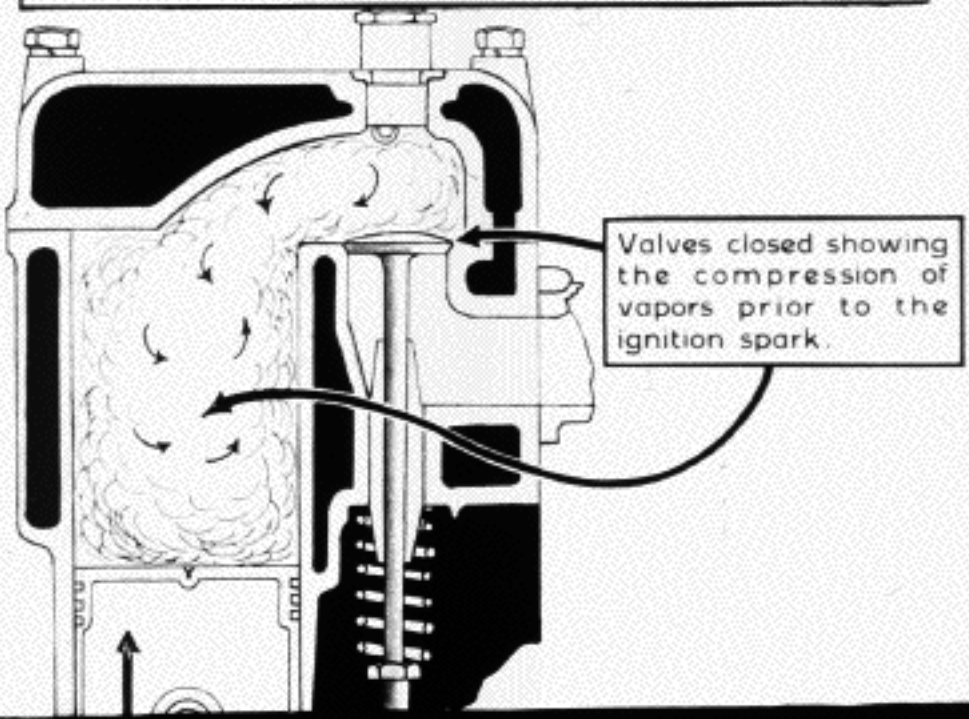
A little less quiet, a little less flexible, a little less powerful and more costly to operate.

This description of the principle of an internal combustion engine will help you appreciate the meaning of, "IMPROVES WITH USE" as it applies to the WILLYS - KNIGHT.

The fundamentals of all such engines are: CARBURETION, COMPRESSION and IGNITION. CARBURETION, the proper mixing of vapors; COMPRESSION, the compressing of gases; and IGNITION, the igniting of compressed vapors.

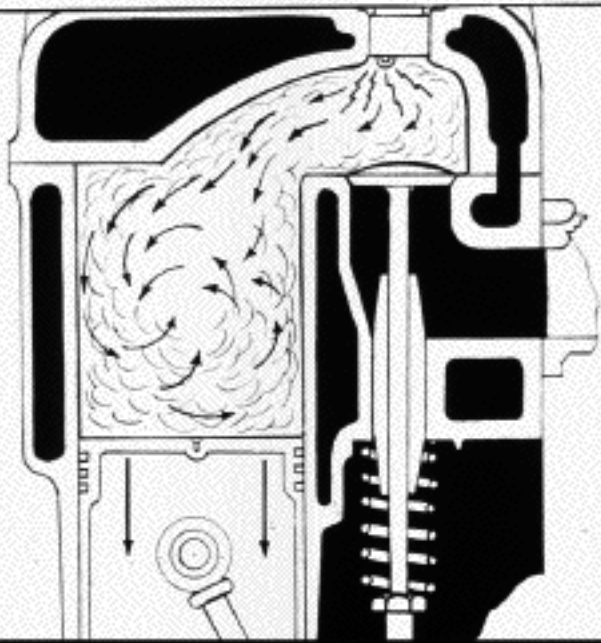

From the carburetor gasoline vapors are drawn into the cylinder or combustion chamber.
The valve lifted from its seat, vapors are drawn in by the downward travel of the piston.

Here the valves close, sealing the combustion chamber as the piston travels upward COMPRESSING the vapors.



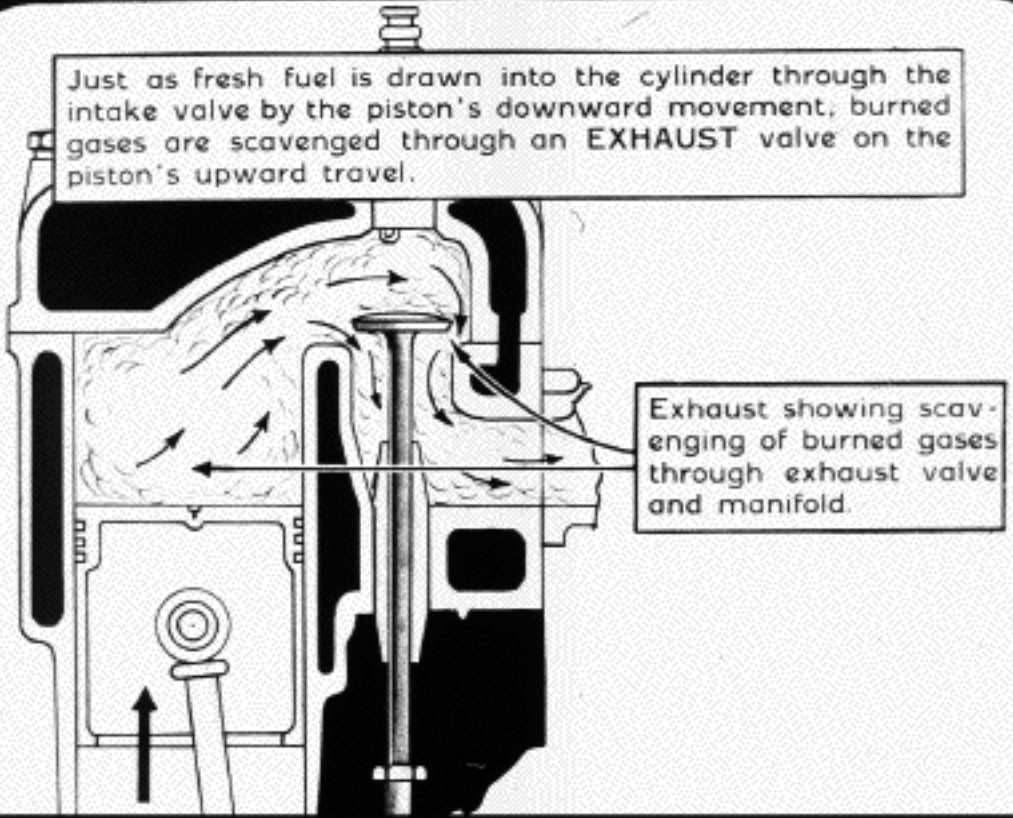
Valves closed showing the compression of vapors prior to the ignition spark.

At the proper instant a SPARK occurs igniting and expanding the gases driving the piston down with tremendous force.



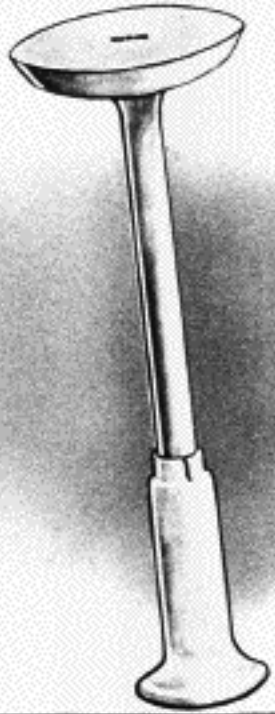
Thus by a succession of explosions the crank shaft is turned, locomotion resulting.

Just as fresh fuel is drawn into the cylinder through the intake valve by the piston's downward movement, burned gases are scavenged through an **EXHAUST** valve on the piston's upward travel.

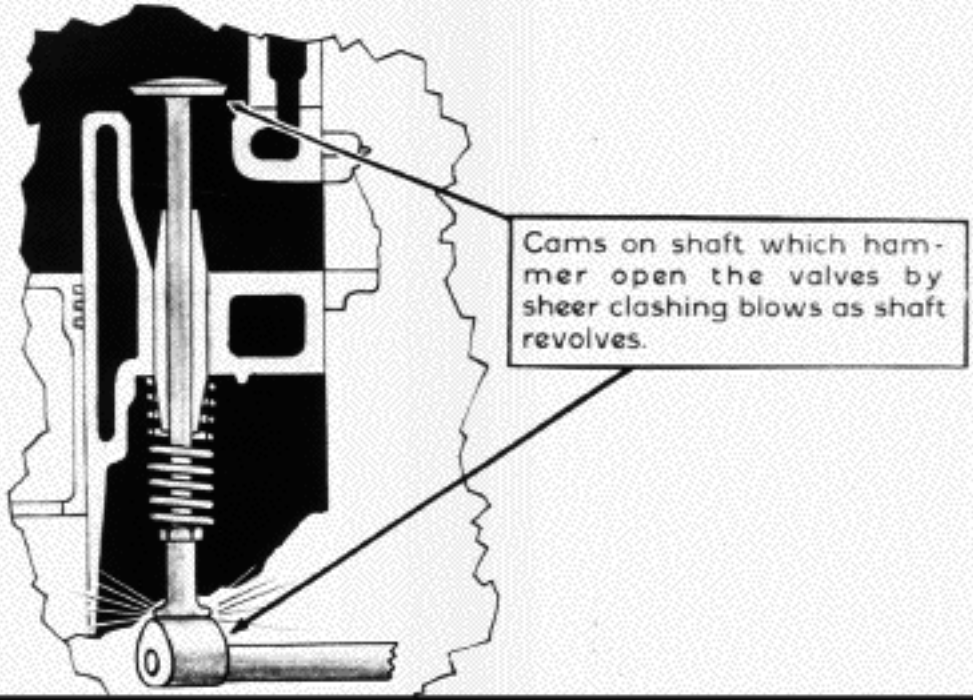


Exhaust showing scavenging of burned gases through exhaust valve and manifold.

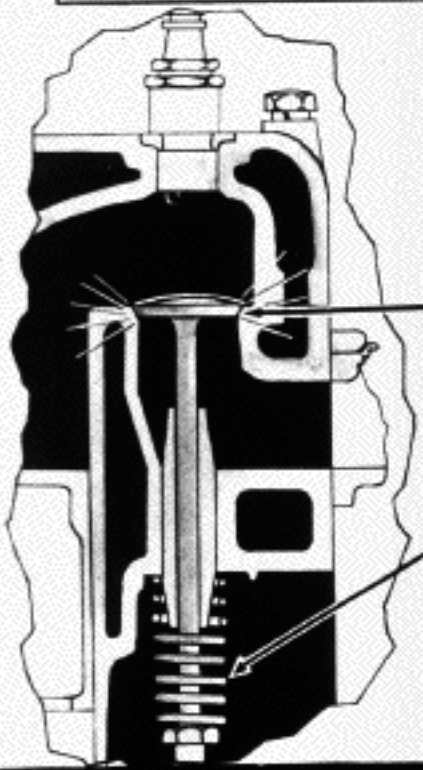
The valve consists of a long, slender stem upon the top of which is a flat, round, beveled surface or plate.



This unit is dependent upon a cam or bump for opening.



It is slammed shut by the strength of a spring.



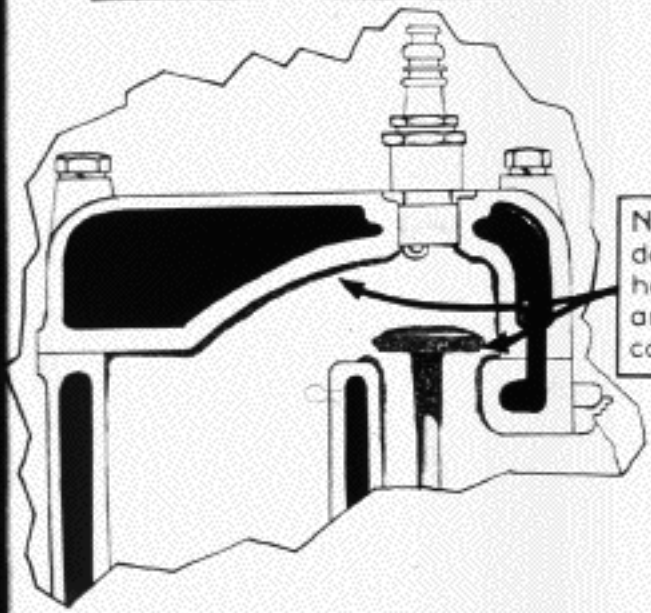
Note the noisy, clashing, blow as the valve reseats. What would happen if the spring broke or grew weak? What happens when carbon lodges on its seat?

Remembering that an engine's efficiency depends upon accurate valve action it is surprisingly interesting to note what takes place within the poppet valve power plant to retard operation.

CARBON, a noncombustible element in gasoline, is the ENEMY of all poppet valve engines and the FRIEND of the WILLYS-KNIGHT sleeve valve engine.

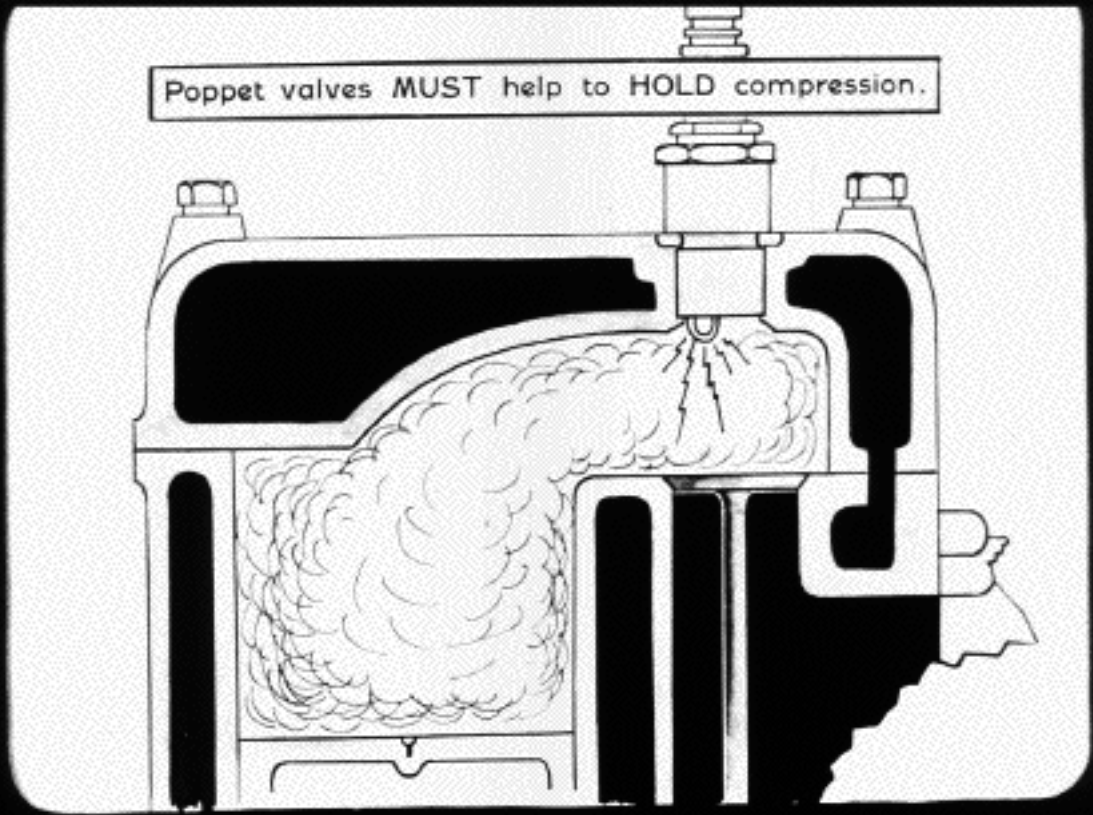
From the initial explosion carbon starts to form. The building up of this hard substance comes with astounding swiftness.

It forms more readily on rough surfaces and around the exhaust valves.

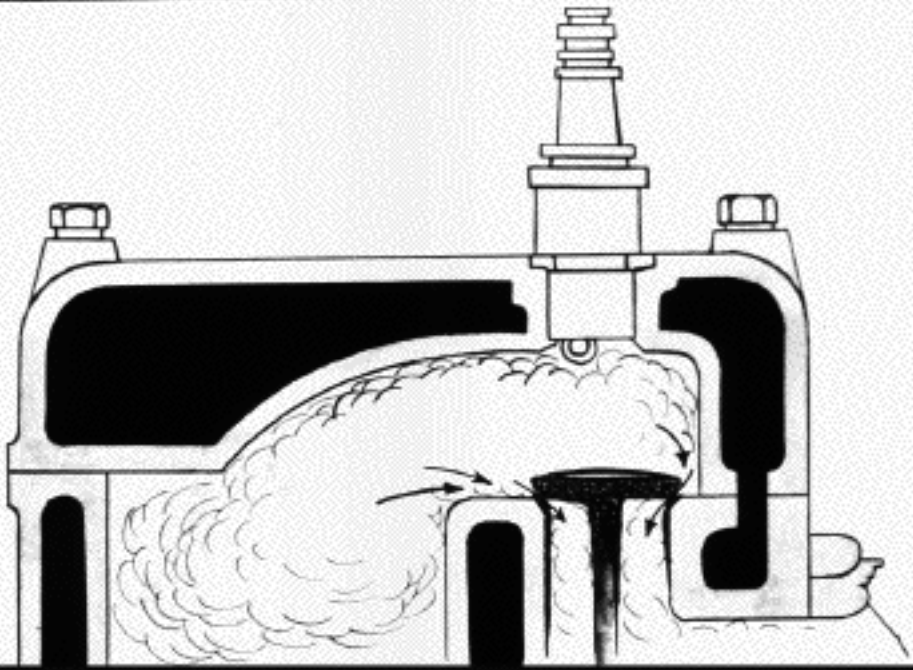


Note how carbon has deposited on the cylinder head and on the valve and valve seat causing compression leaks.

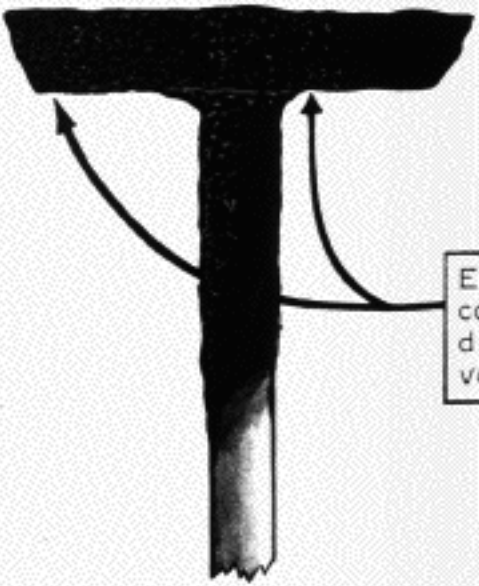
Here we observe the unavoidable weakness in a poppet valve engine.


Poppet valves MUST help to HOLD compression.

You can see what happens when particles of carbon lodge on the valve seat and prevent valve closing tightly. Compression leaks mean loss of power.

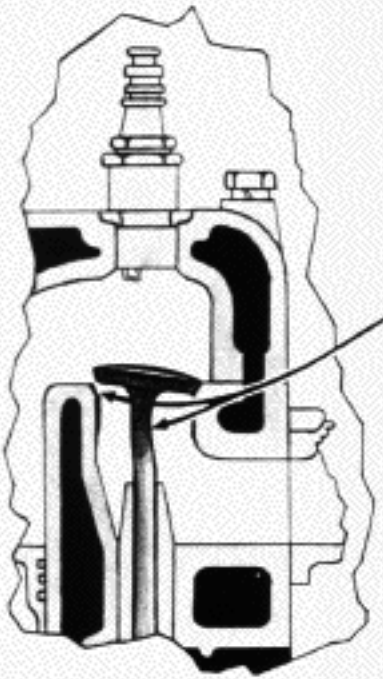


Carbon attacks the valves, building up like so many parasites. It saps the engine's vitality.



Exhaust valve showing carbon deposit. A deadly disease in the poppet valve engine.

It grows red hot from the explosions. Here it has warped the slender valve stem, a common and costly disadvantage.

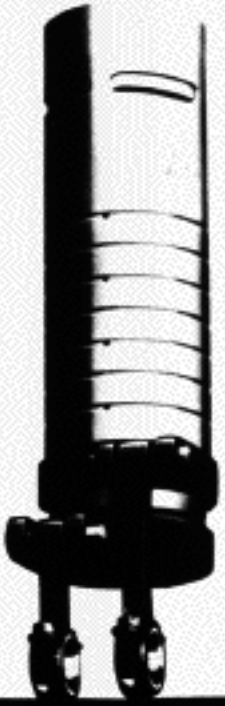


Carbon deposits, red hot, warp stem causing elevation of valve from seat. COMPRESSION leaks follow.

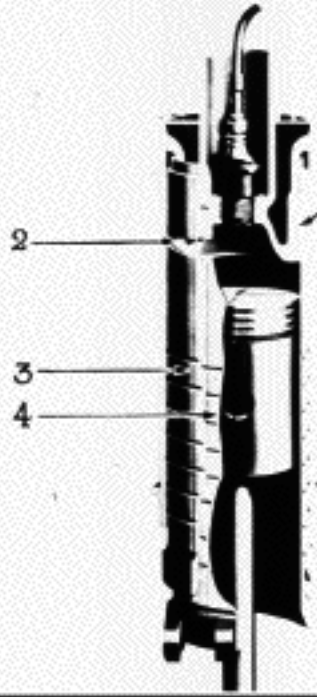
The same carbon deposit is a welcome visitor to the WILLYS-KNIGHT engine.

In place of hammering valves, bumping cams, unreliable springs and "what-not" we find —

Two simple cylinder-shaped sleeves, one snugly and smoothly sliding within the other.

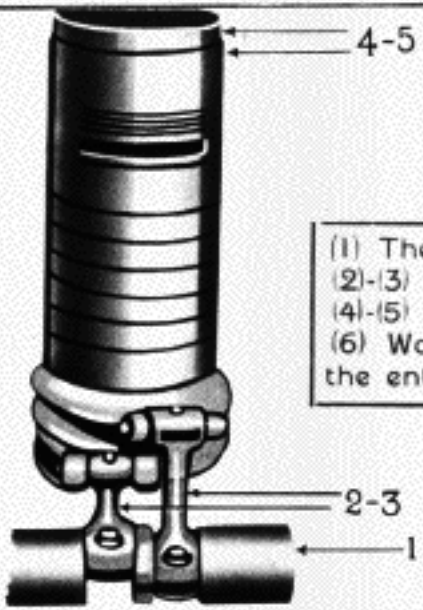


Within the inner sleeve is the piston. In each sleeve is a wide port or slot cut to afford free passage of gas.



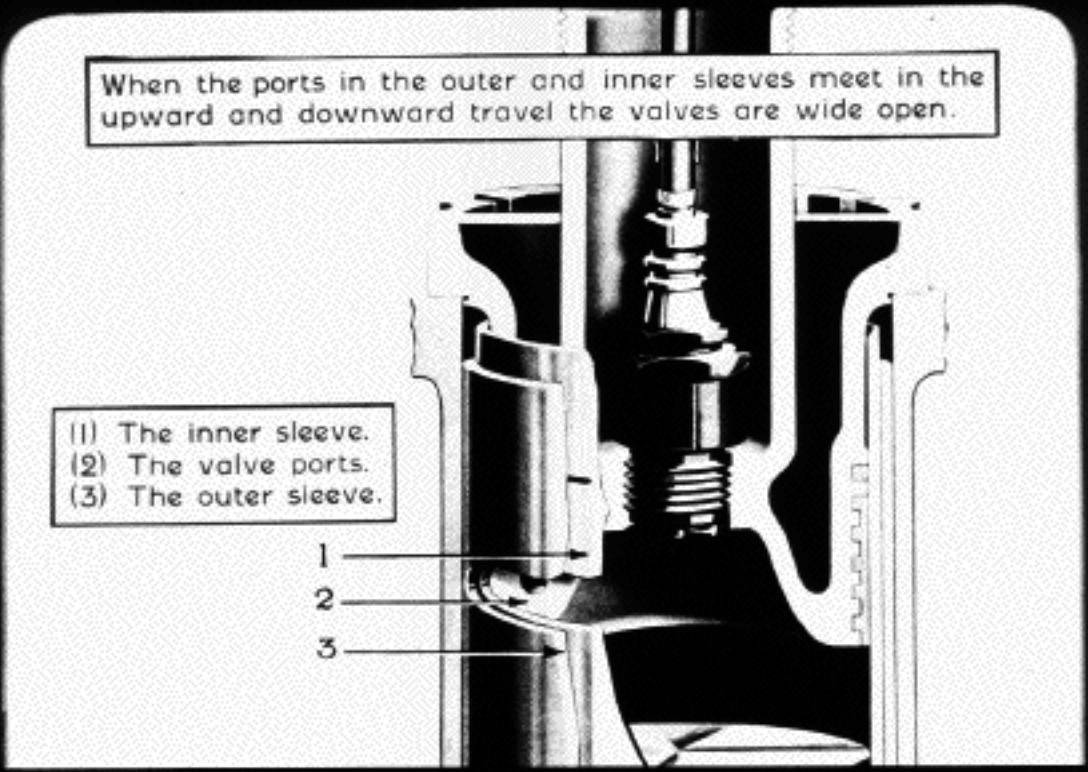
(1) Here is shown the head ring. (2) the valve ports. (3) the outer sleeve. (4) the inner sleeve.

Each sleeve is positively raised and lowered by a rod from an eccentric shaft. NO SPRINGS TO WEAKEN OR BREAK. NO VALVES TO BURN, WARP, STICK OR PIT. Simplicity unapproached.

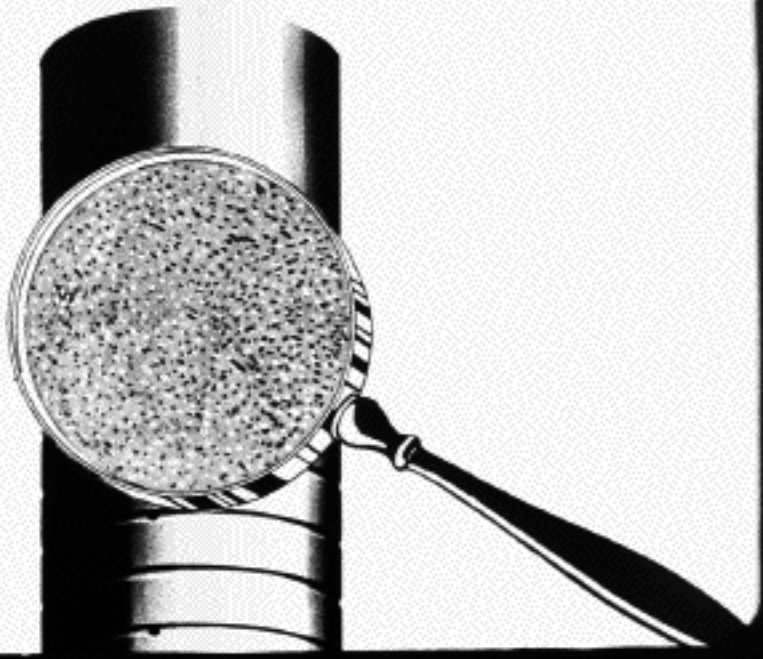


(1) The eccentric shaft.
(2)-(3) The sleeve rods.
(4)-(5) Inner and outer sleeves.
(6) Water jacket cooling the the entire surface.

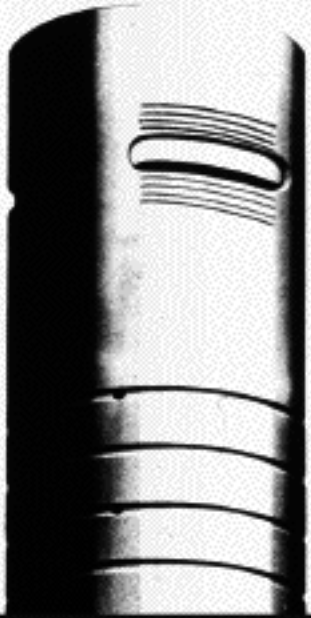
When the ports in the outer and inner sleeves meet in the upward and downward travel the valves are wide open.



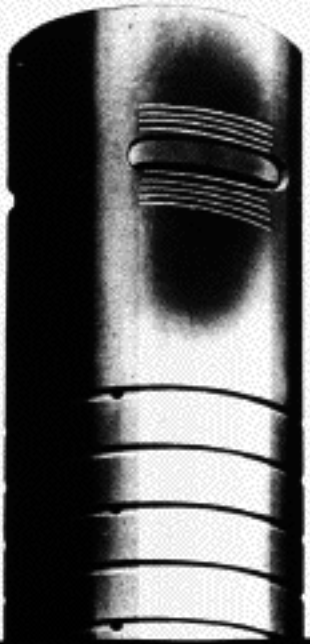
These sleeves, carefully ground to a glossy surface, are of the highest quality gray iron. A microscopic view shows all metal to be porous like the human skin.



Grooves are cut in the sleeves above and below the exhaust ports TO COLLECT CARBON.



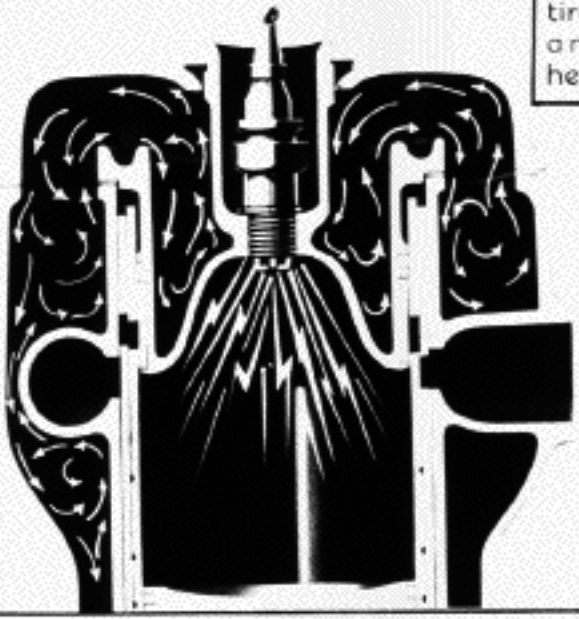
A carbon substance forms on the sleeves sealing the pores, building up a glass-like surface.



Carbon formed around the ports building up a flint-like surface prevents any excess oil getting into the combustion chambers.

As this carbon substance collects, the metal is protected from wear and a smooth sliding surface is attained.

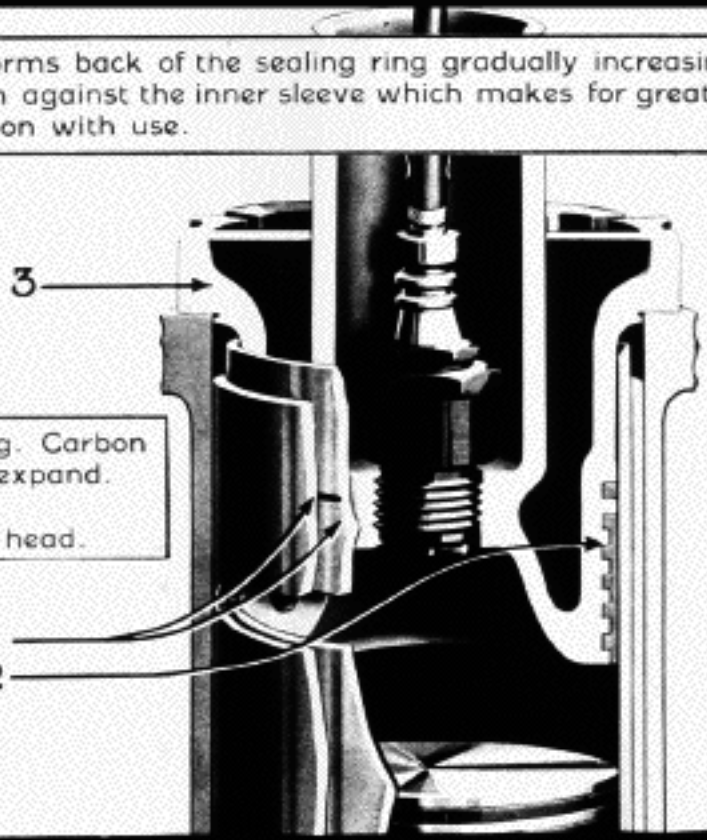
(1) The valve ports entirely housed in water and away from the heat of explosion.



Poppet valves are exposed to fire but in the WILLYS-KNIGHT the valve ports escape the heat by sliding within the water cooled head when the explosion occurs.

By this exclusive and scientific advantage WILLYS-KNIGHT valves cannot become burned or pitted from carbon.

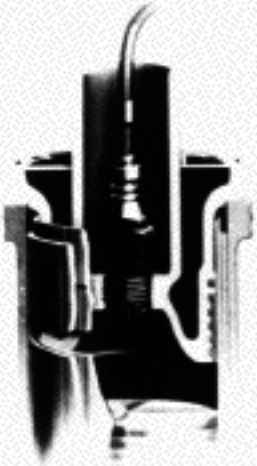
Carbon forms back of the sealing ring gradually increasing its tension against the inner sleeve which makes for greater compression with use.



(1) Head ring. Carbon forcing it to expand.
(2) Sleeves.
(3) Cylinder head.

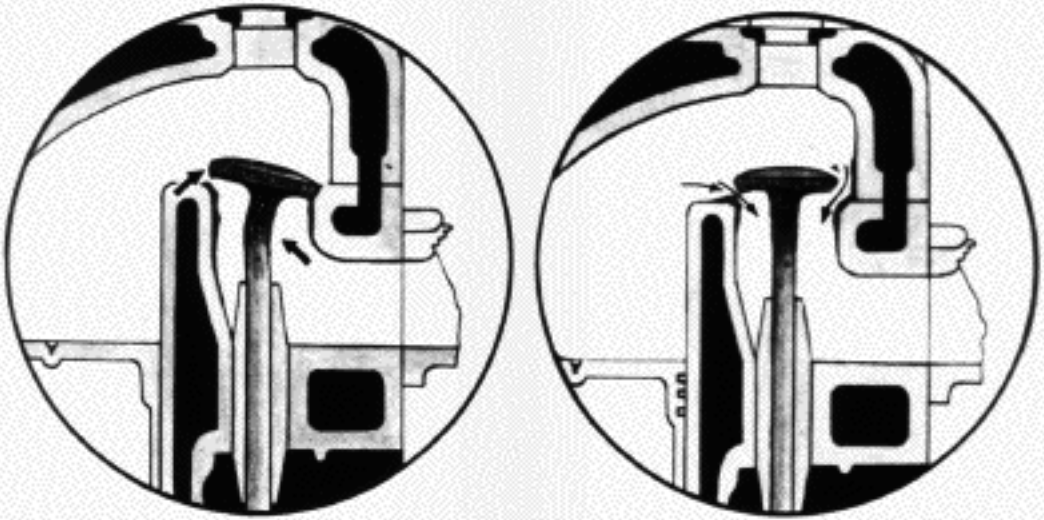
With every mile of operation carbon is busy, sealing, packing, smoothing and compressing into every tiny pore and crevice. THE WILLYS-KNIGHT DOES IMPROVE WITH USE.

After 100,000 miles of satisfying service a dismantled WILLYS-KNIGHT engine shows:



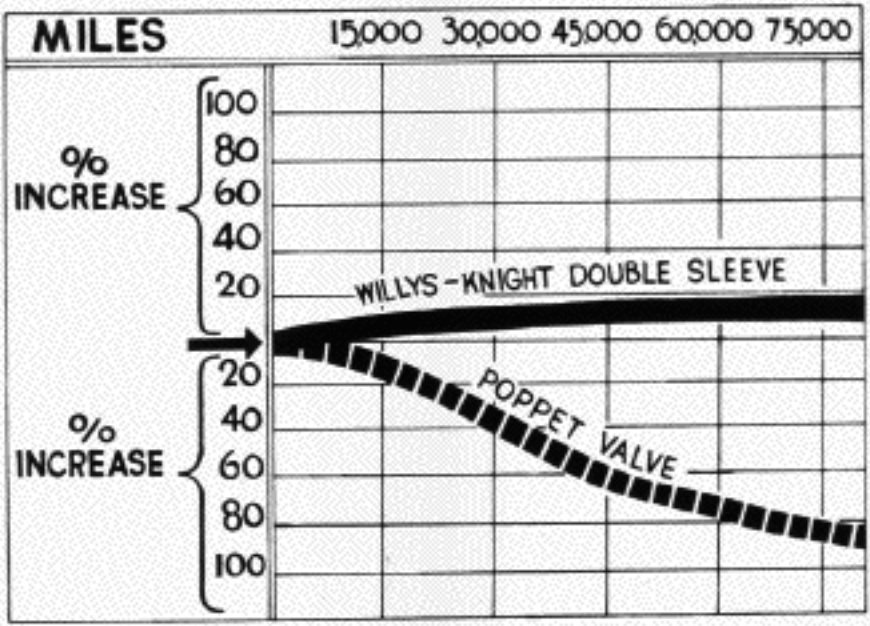
A glass-like sleeve surface built up by carbon and constant oil rubbing. No wear can be detected due to the flint-like armor of carbon. Note the perfect seal formed by the head ring.

But a poppet valve engine having traveled only one-fiftieth that distance by constant nursing, costly repairs and replacements often shows:



Warped valve stems, pitted valves, pitted valve seats causing leaks in compression and lost power.

Observe this chart composed by engineers revealing the life, endurance and efficiency of internal combustion engines.



Thus in eliminating clicking cams, hammering valve tappets, uncertain valve springs, warping and leaky valves, together with such parts as valve spring cups, retainers, adjusting screws, Mr. Knight achieved SIMPLICITY.

And by reason of the simplicity, plus the fact that every motion in a Knight engine is either sliding, eccentric, or rotary, plus the fact that every bearing is an "oil bearing", Mr. Knight achieved QUIETNESS.

Since, too, carbon deposits around the head rings cause the combustion chamber to become more tightly sealed, the COMPRESSION, IGNITION and CARBURETION of the engine are bettered — AND THE ENGINE IMPROVES WITH USE.


The
End