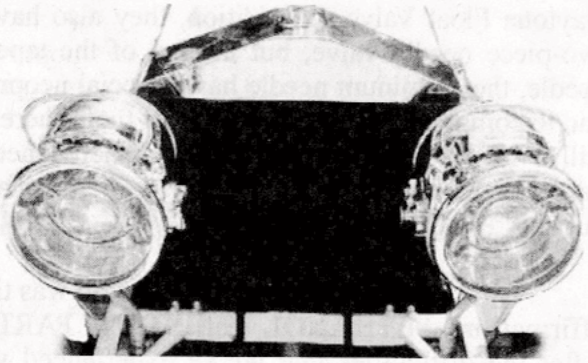


Gas Lights for Motoring

by Bouvard Hosticka

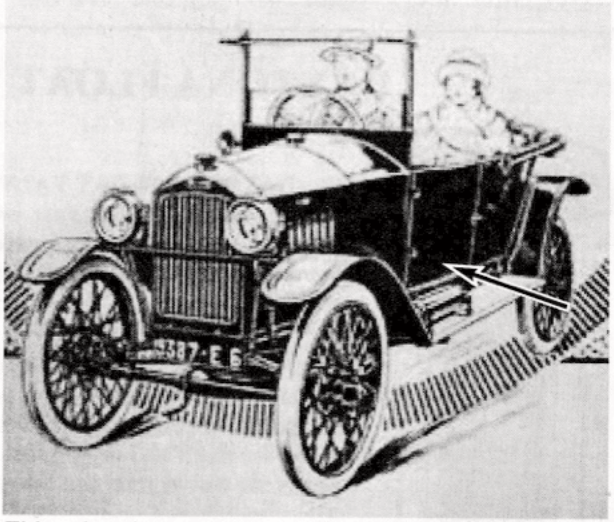
Part III - Fuel Tanks

Prest-O-Lite Tanks:

Prest-O-Lite was the most common supplier of dissolved acetylene for automobile use. The tanks were exchanged at service stations when they became exhausted then returned to a central plant for refilling. The car owner did not receive the same tank as was given to the gas station so there was little incentive to keep them clean and polished. The Prest-O-Lite tanks in circulation in the days when gas light was the norm differ from modern acetylene tanks in many respects.

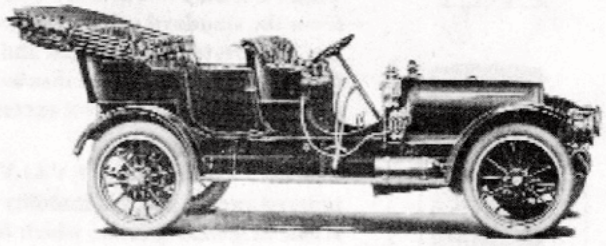
The most important difference is that automotive Prest-O-Lite tanks are designed to be used while lying on their side in one particular orientation marked on the tank ("This Side Up") also indicated by the valve being toward the upper part of the cylinder. The gas accumulation space on modern tanks is at the top so that the tank must be use vertically to avoid severe acetone carryover. If modern tanks are transported or stored horizontally, several hours in the vertical position are needed to clear the gas accumulation space of any acetone.

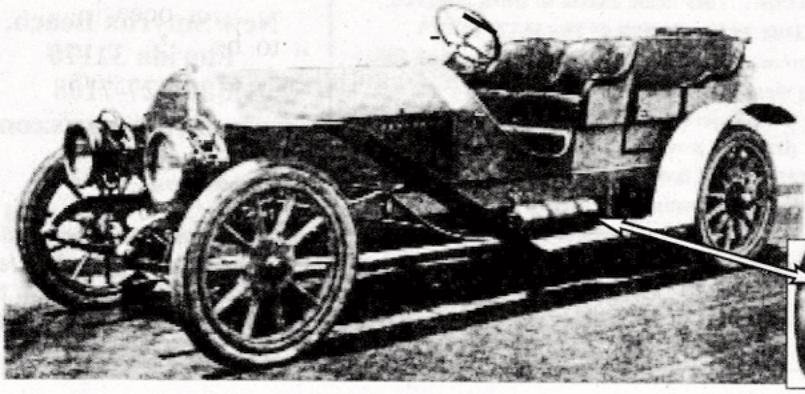
All other differences between modern tanks and Prest-O-Lite tanks are trivial in comparison to this, but are listed nevertheless. Prest-O-Lite tanks for automobiles have a pressure gauge installed in the bottom of the tank to indi-

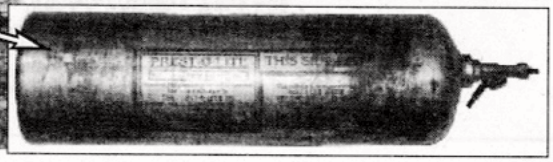


This advertisement (above) for a 1921 Peugeot shows the acetylene tank is mounted horizontally.

An earlier advertisement from 1910 (below) shows the tank mounted on the right-hand side (driver's side) of the car.

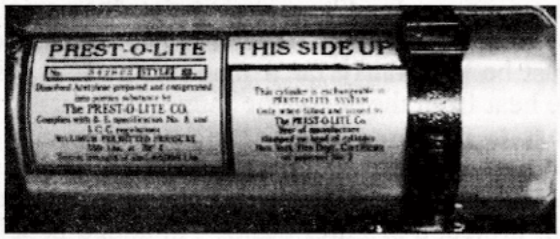






1908 Palmer and Singer 'Six-Sixty' with a horizontal Prest-O-Lite acetylene tank and rather sloppy plumbing to the lamps. The tank (below) is similar to the one mounted on the car.

cate the amount of gas available. Modern tanks do not have integral pressure gauges so the valve must be opened against full backpressure to read the pressure on an external gauge. Although the regulators used in welding outfits have gauges on the bottle side and the flow through the regulator is so low that it is at full backpressure, automobile lighting systems do not have any provision for opening the valve against pressure (the valve is throttled to give just a few inches of pressure needed for the lamps), hence the need for the gauge on the tank itself. Prest-O-Lite tanks have a rupture disk installed in the bottom head that would release the gas, if the pressure were to exceed 500 psig. Modern tanks do not have a rupture disk. Prest-O-Lite tanks as well as modern tanks have a fusible metal plug that melts to release the gas as a jet rather than having the cylinder explode in case the tanks are in a fire (i.e. create a flame thrower rather than a bomb). The Prest-O-Lite fusible plug is located in the gauge housing, but the modern ones are usually part of the valve body. Prest-O-Lite valves are easily throttled, and no regulator is normally installed between the bottle and the lamp. Modern tanks seem to have much steeper valves making throttling with the tank-valve to adjust the brightness of the lamp difficult.



Requirements of acetylene tanks.

All acetylene tanks must be periodically certified to be legally filled, and only licensed facilities may legally fill the tanks. The filling facility will check that the tank is certified and the cost of recertification is often folded into the refill price. The detailed requirements are in DOT Regulations 49CFR180.209(i). There are two certifications. The shell must be inspected and certified every ten years. If there is a gauge on the tank, it cannot be certified. The weld for the bottom of the tank must be visible for inspection since corrosion of this weld is a common source of failure as are dents or deep scratches on the tank. The manufacturer's name must be permanently marked on the shell of the tank. When the tank shell is certified, the tank is stamped with the letter S (Shell), the month and year of certification, as well as the shop-code of the inspector. The porous-mass filler must also be certified in the life of the tank (sometime after 1991 for old tanks) and indicated with the letter F (Filler). These two inspections can be done at the same time and one SF stamp applied.

Tanks with central valves must be used vertically. Tanks with offset valves are to be used horizontally with the valve towards the top. The size of the tank should be considered so that no more than about 7% of the nominal capacity is used per hour. Standard B tanks have a maximum draw rate of 2.5 to 3 cfh so there is no problem supplying two large headlamps or even two moderate size headlamps plus a spot-light all from one tank. The small MC tanks have a maximum draw of only 3/4 cfh so can support only one normal automobile headlamp. MC tanks were introduced for Motor Cycles with a single small headlamp in addition to a very small flame for the tail lamp.

Cost of lighting:

As of this writing, it costs about $25 to exchange a B size tank which contains 40 cubic feet of acetylene. This is the same as using eight pounds of carbide and lasts about 25 or 30 hours of night-time running. The cost of carbide is difficult to separate from the hazardous material packaging and shipping expenses, but the price of ten pounds of carbide delivered anywhere in the contiguous states is about $95. Unless you can buy the carbide over-the-counter to avoid the problems of shipping, the cost-per-hour of lighting is about thrice for carbide generated gas as bottled acetylene in B Tanks. The filling charge for MC tanks is about double on a volume basis as a B tanks and approaches the cost of carbide generated lighting. In any case, the operating expense is trivial for occasional use and it is well worth it to be able to light the lamps for a delightful run under the stars.

To finish off this series on acetylene lighting, a few practical notes on the actual lamps, generators, and tanks are presented.

Lamps can be thought of as the jewelry of an automobile and as such, lamps were often chosen by the owner for their style and decora-

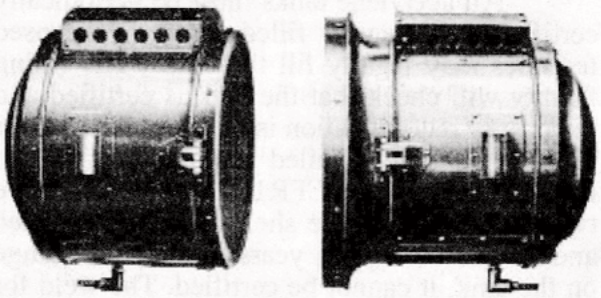
tive properties. Many automobile manufacturers did not supply lamps with their cars leaving the choice entirely to the owner. Even when lamps were standard equipment, owners frequently changed the factory lamps for something that they thought added distinction and beauty to their car. This practice, along with the need to replace broken, lost, or stolen lamps over the past hundred years, means that a wide variety of lamps may now be found on different cars of the same model. The lamp makers catered to the free exchange of lamps by adopting a set of standard fork spacing for the headlamps and a single mounting tang size for the side and tail lamps.

The front windows of most gas headlamps have no optical properties other than the unavoidable and unwanted one of absorbing some of the light. The thicker the glass, the more light is absorbed. The flame heats the front glass unevenly, and a thin window is likely to crack under the thermal stress so solid disk windows can be as thick as ¼ inch. By dividing the front glass into narrow strips, very thin glass which does not absorb much light can be used since the individual strips will expand by different amounts to keep the stresses low. This is the only reason the makers gave for using strips of glass instead of a solid disk. A specialty front window consisting of several strips each ground into a cylindrical lens were sometimes used and are again available. Each cylindrical lens individually projects the light horizontally to cover the field of illumination. Thus the projections from the several lenses overlap, and any movement in the flame is averaged out in the beam thereby reducing the flickering and waving of the light normally seen in a moving car. The lenses absorb more light than plain glass strips or even a thick solid window but add a certain distinction to the car (see note about jewelry above).

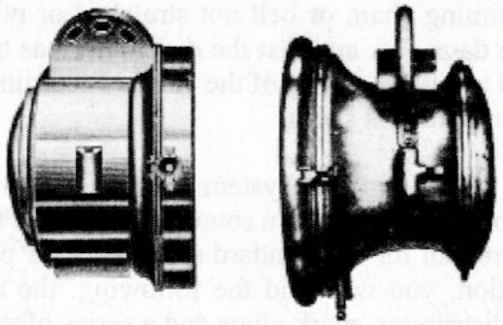
The performance of a lamp is judged by how much stray light leaks out through the housing as well the intensity and focus of the beam. With the exception of the mirrors and reflectors, the entire inside should be flat black to reduce unprojected light out the front. There are air inlets at the bottom of the lamp and a chimney-bonnet at the top. These are carefully baffled to block light and to keep the air flow through the lamp steady while the car is underway. The baffle in the chimney above the flame also acts as a heat shield to keep the external bonnet from overheating. The top baffle is often made of steel and can rust out. It is important to ensure that all baffles are intact for proper performance.

The doors of some simple Mangin mirror lamps were available with or without a noticeable flare. This was purely an aesthetic feature, and the advertisements assure that both styles perform equally well since all of the projecting optics are behind the flame. The flare-front lamps were a bit more expensive than the plain ones and might interfere with fenders or hoods since the diameter of the front extends beyond the width of the forks. The inside of the flared portion should be painted flat black since it is not part of the projecting optics of the lamp. These simple flare-front lamps should not be confused with lamps incorporating an annular reflector ring or condenser-lens lamps which can have a very pronounced ogee flare.

Mangin mirrors used in automotive headlamps were made in just a few standard sizes with outer diameters in integral inches from six to ten. Therefore, when searching for a mirror for your lamp, a ruler rather than a micrometer can be used for measuring the outer diameter of the mirror. For efficient lighting, larger mirrors (and lamps) are better than smaller ones. For thermal reasons, the gas burner must be kept fairly far from the mirror or else the heat from the acetylene flame will cause the glass to crack. A larger mirror will intercept more of the light from a flame at a given distance from the glass than a smaller one and thus will project a brighter beam. An added benefit of a large mirror is that more of the flame is in reasonable focus thereby creating a tighter as



The body and optics of the plain door on the left are identical with the lamp with the flared-front door on the right. These are both simple Mangin mirror lamps; and the flare adds nothing but style. The inside of the flare should not be reflective and should not be confused with lamps that have a separate parabolic reflector ring right on the window.



The Mangin mirror lamp (left) with an annular reflector ring and the condensor-lens lamp (right) both have a more pronounced flare than the flare-front, simple Mangin mirror lamps. These two styles have a separate, highly reflective, parabolic shaped ring right behind the window.

well as brighter beam. Glass mirrors of uniform thickness or metal mirrors used in place of Mangin mirrors might look fine by day but will not project the beam properly and should be avoided if actually using the lamps for driving at night. Telescope mirrors are not appropriate either. Their focal length is much too long, and the delicate reflective coating on the front surface cannot stand up to the abuse of a sooty flame. Lancaster Glass Co. supplied proper mirrors until a few years ago but has stopped making Mangin mirrors and I know of no current supply of new ones. Mangin mirrors can be ground from flat blanks by custom optical houses, but this route is extremely costly. When mounting the mirror, care should be taken that there is some insulating padding behind the mirror so that the metal support ring in the lamp does not scratch the coating when vibrating or scorch it when hot. This padding has historically been a couple of turns of asbestos ribbon but modern substitutes work well.

Carbide generators came in a variety of sizes to support various gas loads. The typical round or square ones about fifteen inches high as seen on the running boards of Model Ts can support the two small headlamps but might not be able to supply an added spotlight. Very attractive but small generators are found on some early cars that can feed only a single small headlight. Lamps with six-inch reflectors (Model T size) originally ran with ½ or 5/8 cu. Ft. per hour burners but are now commonly fitted with ¾ cu. Ft. burners which place a heavy load on the original generators. All but the smallest tower styled generators should be able to provide the needed 1.5 cu. Ft. per hour, but the twelve-inch high Solar model 711 will not.

Original Prest-O-Lite tanks were generally nickel plated over a layer of copper plating. A mask during the nickeling process would cause the lettering to be exposed as copper. The typical wording on a tank in addition to a large "PREST-O-LITE" banner diagonally on one side is:

PREST-O-LITE

No. 987654 Style B.
Dissolved Acetylene prepared and compressed
Into porous substance by
The PREST-O-LITE CO.
Complies with B. E. specification No. 5 and
I. C. C. regulations
MAXIMUM PERMITTED PRESSURE
250 lbs. at 70° F.
Tensile strength of steel-60,000 lbs.

THIS SIDE UP

This cylinder Is exchangeable in
PREST-O-LITE SYSTEM
Only when filled and issued by
The PREST-O-LITE Co.
Year of manufacture
stamped on head of cylinder
New York Fire Dept. certificate
of approval No. 3

. Old automotive Prest-O-Lite tanks have the serial number, year of manufacture, and the words "PREST-O-LITE" stamped in the metal on the head of the tank near the valve. Horizontal tanks with raised lettering near the base saying "PREST-O-LITE" in script were manufactured for general acetylene use after electric lighting was common on automobiles.

S.K.

We are very grateful to Mr. Hosticka for sharing his knowledge and expertise of gas lighting with us. It is an area that, admittedly, we know little about, being more used to 'newer cars' - from the '20s and '30s.

Mr. Hosticka can be contact by letter or e-mail through Skinned Knuckles *magazine at sk.publishing@yahoo.com or mail to* SK, *Box 6983 Huntington Beach, CA 92615*