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Evolution Of Headlights

Academic Skills (ACHA4005)

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11/2024

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1. Introduction

Headlights have always been an integral part of commercial automobiles, and like the cars they reside on, they themselves have evolved over time to be more efficient. The types of headlights that will be covered in this report will be Acetylene, Electric, Xenon and LED's. This report aims to cover that evolution and the mechanics of the types of lights involved.

2. Contextual\Background

Acetylene Lamp

With the advent of Motor Cars in 1886 it did not take long until the need for lighting on such vehicles arose. The lighting of choice was the Acetylene Lamp, this lamp was composed of two main chambers and a reflector. The way it worked was in the bottom chamber there lay Calcium Carbide, and in the top, there was water. Over time the water would be dripped into the lower chamber turning the Calcium Carbide into Acetylene Gas. This gas would then leave the lower chamber through a tube and be ignited next to the reflector.

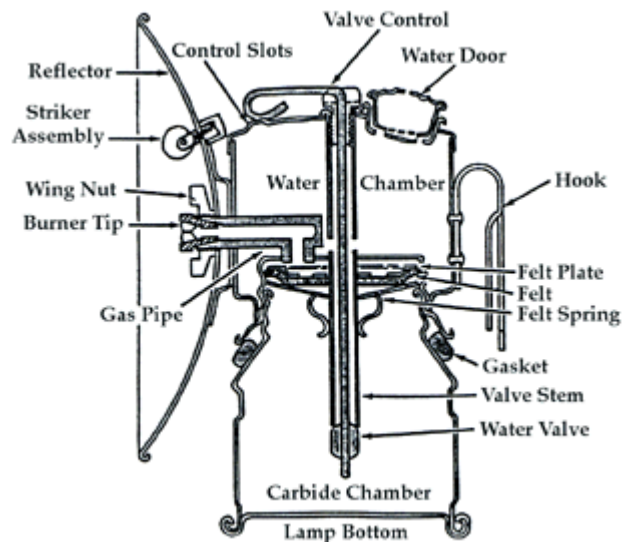


Figure 1, Diagram from <https://www.firodaschool.ie/cmsfiles/coalminingincastlecomer/carbide/carbide.htm>

These lamps were chosen at a time where the main way of illumination was candles due to their wind and rain resistance, imperative for a motor vehicle. These lamps could be run for around 8-10 hours, providing a low level of illumination making them a suitable light for slower vehicles. As cars became faster the need for a brighter light that would also last longer became greater.

Electric Lights

As cars evolved to be faster and to run for longer the simple Acetylene Lamps were no longer serviceable as the main illumination. Electric lamps were not a new concept at this time, but it took until 1904 for the American manufacturer Peerless to introduce

Electric Headlights onto their production cars for the first time. By 1911 Electric Headlights had become a standard in the American Auto manufacturing Industry. These new lights provided an ample amount of light that could provide a clear view of the road at night. These headlights work by using a small piece of filament which burnt next to a reflector pointing towards the road and usually a piece of glass to protect from wind and rain.

Sealed Beam Headlights

Headlights with filament were starting to show their vulnerabilities which were their lack of full protection from the elements, and their inaccuracy with projecting the light. Due to these issues the Sealed Beam Headlight was designed and first put into a production car in 1939 and were mandatory in the USA by 1940. These headlights worked by having a piece of filament burning behind a lense and utilized a parabolic reflector to project the light as a beam onto the road, avoiding dazzling drivers. These headlights did not come without faults however as the light emitted was weak and only grew weaker as the filament would stain the glass it resided behind. Due to these issues in 1962 a French, German and Italian consortium of bulb - and headlamp – makers produced the first car mounted Halogen headlight. These lights did not affect the lens as drastically as filament did. They also burned much brighter and were much more reliable due to the tungsten used.

LED,s

With the advent of the modern age a new light technology was beginning to show its head and that was the LED (light emitting diode). This new light technology did not use wire like the halogen bulbs before it did, therefore giving it a longer life as there was no wire that could be burnt out. Instead it uses a semiconductor that releases photons of light when it is provided with an electric charge. These LED's also provide a much better quality of light. Due to these reasons in 2008 the Audi R8 became the first car to use LED headlights. In their use they are very much like halogen lights using reflectors and a lens with the only difference being the way the light is provided.

3. Discussion

The possible future of headlights

With the constant development and evolution of the automotive industry every component of a car must be made to be better and more efficient, this involves headlights. Like every other car component, it has undergone many changes over its lifetime from the Acetylene Lamps to LED's. And as the rest of the car's parts are still evolving, so are lights. The manufacturer BMW has created what they call believe to be the future of headlight design, this is the Laser Light Headlights. These lights are unbelievably powerful and can illuminate the road for almost half of a mile. This is achieved "When semiconductor laser diodes in the blue area, i.e. those with the greatest energy, meet a yellow phosphorous reflector, they turn into white light." – (Dr. Abdelmalek Hanafi. BMW Website). They also achieve this when using less space than LED's and 30% less energy. This technology has already been implemented in models such as the X6, X7 and 7 Series, showing that it can be a viable alternative to the current standard of using LED's. Despite this fact Laser Lights are being phased out of BMW's production due to USA regulations not allowing anything over 150,000 candela.

4. Conclusion

In conclusion the evolution of headlights has been a long and varied with many changes to the designs which has dramatically increased the potency and durability. Most cars on the road either use halogen sealed beam lights or LED's, some even use a combination but in the future, it can be predicted that new technology will continue to be developed, whether that is improvements on current systems such as LED's or Laser lights, or a brand new form of projecting light onto the road.

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