TEACHING THE OWNER TO KNOW HIS AUTOMOBILE

Being the Fourth of a Series of Practical Articles by an Expert on the Subject of the Car and Its Operation.

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There are two ways of cooling the gasolene type motor. One is by air; the other is by water. Each employs different methods. For instance, the air cooled motor may use the forced air system whereby the air is drawn through jackets about the cyclinder, or the ordinary system as employed on the motor cycle, whereby the cooling effect depends upon the forward momentum of the vehicle. In water cooled motors there are two methods also, namely, the thermo-siphon system and the force feed system. Each is used extensively to advantage.

Before discussing in detail the methods used it seems best to give some explanation as to why cooling is necessary. The efficiency of a gas engine depends upon the number of heat units converted into useful work. When a charge of gas is drawn into the cylinder and compressed by the upward stroke of piston it is ready for the spark. When ignition takes place the charge burns very rapidly and the resulting expansion forces the piston outward, effecting the power stroke. Considering that several hundred or more of these explosions must take place within the cylinder each minute, one may readily appreciate the necessity for the cooling system. If some method of cooling were not employed lubrication of the parts would be impossible. The piston and rings would seize within the cylinder and score the walls. Likewise, bearings would burn out. Even though the best grade of lubricating oil were employed this seizure of the metals could not be prevented.

It is true that a gas engine develops its greatest efficiency when hot, therefore the necessity arises for a well designed cooling system which will not permit the motor to become overheated nor absorb too much heat, thereby detracting power.

A well designed cooling system maintains the water at a point just below that of boiling. If the water were permitted to boil much would be lost by evaporation and trouble result. Likewise in the air cooled type motor efficient cooling must be maintained to prevent the destruction of the lubricant and warpage of the valves, due to excessive heat, &c.

While the air cooled type has many good features, nevertheless it has not been universally adopted. Simplicity of construction and less weight are advantages. Also in zero weather there is no possibility of freezing. The latest method of air cooling is to force the air by means of a fan or fly wheel through an air jacket about the cylinder. This system has proved very efficient, especially where the motor has the auxiliary exhaust valves.

In water cooled types of engines there are two methods used to obtain the cooling effect of the water, namely, the thermo-siphon system and the force pump system. In the thermo-siphon system the circulation depends upon the heated water about the cylinders rising and the cold water coming in to take its place. With this the radiator and all connection pipes are of liberal size, decreasing as much as possible any resistance to the flow of water.

In the force pump system the water is circulated in and about the cylinders mechanically. This pump is driven by the engine and its speed varies with the engine. Thus the circulation of the water in controlled in a way by the motor, and the troubles resulting from its use are purely mechanical. Quite often dirt or other foreign matter will lodge in the pump, causing a broken blade or tooth, or perhaps wedging the pump and causing a broken shaft. In such an instance everything appears in good order, but the circulation of the water is practically blocked and a hot engine results. However, it is not difficult to locate such trouble.

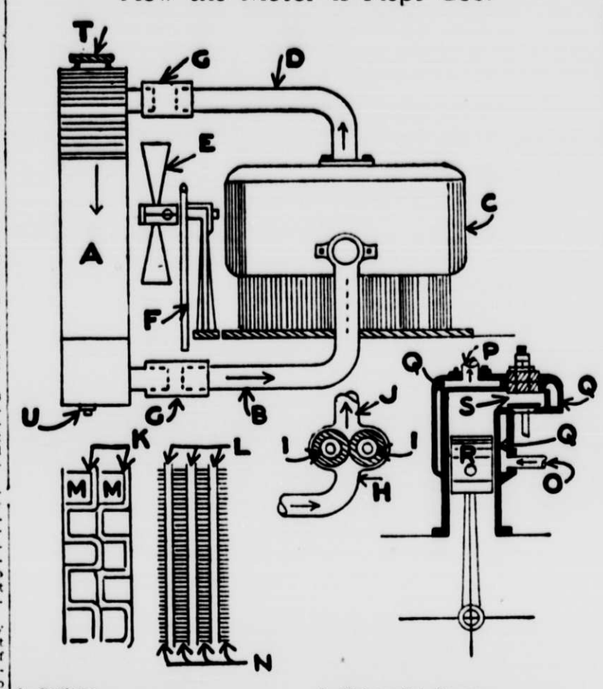
As the water enters the pump from the base of the radiator and is from there forced into the cylinders, one can easily remove the connection just beyond the pump and observe the flow of water. Of course, when the engine is started additional water must be fed to the radiator. This test will plainly show the efficiency of the pump. Should it work properly and should all the hose be in order, then the obstruction will undoubtedly be found in the radiator.

Let us revert to the drawing for a brief explanation of how the cooling system works.

The water must circulate from radiator A through manifold B and cylinder casting C. As the water becomes heated, due to the successive explosions within the cylinder, it becomes lighter and rises, passing through manifold D back to the top of the radiator. As soon as the heated water enters the radiator it is spread out into thin sheets and cooled. In this manner a natural circulation takes place, namely, as the heated water rises cool water comes in to take its place. This is called the thermo-siphon or gravity system.

The air fan E is installed just back

How the Motor Is Kept Cool



A—Radiator.
B and D—Water manifolds.
C—Water jacketed cylinder.
E—Fan.
F—Fan belt.
G—Water manifold hose connections.
H, I and J—Water pump.
K—Water inlet of pump.
L—Water pump gears.
J—Water outlet of pump.
B and L—Water passage of radiator.
M and N—Air passage of radiator.
O—Water inlet to water jacket.
P—Water outlet of water jacket.
Q—Water jacket about cylinder.
R—Piston.
S—Combustion chamber.
T—Radiator filler cap.
U—Radiator drain.

of the radiator and is driven by the belt F. The object of this fan is to create a rush of air through the radiator, thereby cooling the water very quickly. Likewise a constant circulation of air is maintained over the cylinder block.

Two sections of the radiator are shown to illustrate how the water passes through. At K will be noted very small water passages which practically spread the water into sheets. At points M will be noted the air passages. Likewise at L is shown a section of the tubular type radiator wherein the water passes through small tubes. There are numerous radiating fins described at N which carry off the heat from the tubes. The rush of air passes these fins and between the tubes, effecting the cooling.

At this point it is well to note how readily the water of the radiator may freeze, since it is spread out into thin sheets in order to obtain a quick cooling effect. With this great exposed area the water is very soon frozen at low temperatures. In freezing water expands, thereby causing leaks in the radiator. If the temperature is low enough to freeze the water in the cylinder jacket the same will expand and crack the casting.

At H, I and J is shown a water pump which is incorporated in the forced feed circulating system. This pump is attached in circuit with manifold B and is mechanically driven by the motor. One of the gears, I, is positively driven, which in turn draws the water through the water inlet H and forces it out through J into the cylinder casting.

Both systems are universally used, it being a question of opinion among engineers as to which is the better method of cooling.

The thermo syphon system undoubtedly has many excellent features and is being used to a very great extent at present. As stated previously, the gas engine to be most efficient must be maintained at as normal a temperature as possible under all working conditions. In the thermo-siphon system the water circulates more or less rapidly as conditions require. That is to say, if the motor is forced to work hard, under a full throttle, and perhaps retarded spark, such as in climbing hills, &c., the water will circulate in a manner to meet this condition of running. Where the water pump is employed the circulation of water depends entirely upon the speed of the pump, which, in turn, depends upon the speed of the motor.

Referring to the sketch showing a cross section of the cylinder one may note how the water enters at point O and passes around through water jacket Q and out again at point P.

In this manner the cylinder is maintained at a normal temperature.

A few points should be observed relative to maintaining the cooling system in proper working order. Occasionally the hose connections need replacing. While these may appear intact from the outside, nevertheless disintegration takes place on the inside and quite often these hose connections close up and prevent proper circulation. Likewise an obstruction may get into the pump and cause the impelling gear to shear on the driving shaft. In such a case the pump would apparently be working, but the gears would not be rotating. This would result in blocking the circulation.

Then, again, the radiator occasionally needs attention. The water passages K and L are very small and when sediment or other foreign matter closes these passages considerable radiating area may be lost, which would induce overheating. Likewise, these water passages become coated with scale, which reduces radiation. In such an event, it is necessary to thoroughly clean the radiator with an alkali solution in order to remove it. The radiator should always be kept full at filler cap T, using clean, soft water. Water containing minerals will set up a scale deposit within the radiator and water jackets. In a short time this mineral deposit will become great enough to induce serious overheating.

OVERLAND HORSES ARE THE LATEST

They Are Knowing Critters Who Help the Big Plant.

KNOWN AS 'NIGHT RIDERS'

Among the curiosities of the automobile industry are the three horses used in patrolling the grounds of the Willys Overland automobile plant at night. These are the only horses ever seen about the great plant.

The 16,000 employees of the Willys Overland Company who travel to and from the automobile factory every day utilize about every known means of transportation that the city affords. Trolley cars, automobiles, bicycles, motorcycles and jitney buses all carry their quota of passengers to the plant, but even in this maze of power driven vehicles the horse is seldom if ever seen.

But after the whistle blows at night and the army of day workers have departed for home the three horses make their appearance, entering the grounds along a footpath in the rear of the factory. They are the mounts of the Overland night watchmen, who keep in touch with forty-five other men stationed around the freight yards and factory buildings. Throughout the night they police the great Overland property, and it is said to be next to impossible to get through their sentry lines without being challenged.

This system of protection is imperative owing to the huge quantities of material that come into the plant at all hours of the night. The dockage facilities for taking care of inbound freight extend over a distance of 4,900 feet.

Some idea of the volume and value of freight received at the Overland can be gained from the fact that during the year 1915 the company paid out over $800,000 for freight charges on inbound shipments alone. There are seven and three-quarter miles of railroad tracks on the Overland property and over three miles of storage tracks built outside of the plant proper. As the automobiles are made ready for shipment they are run out onto any one of a number of loading platforms, housed in the freight cars that are waiting for them and started on their way toward the main lines that carry them to all parts of the world. The loading platforms for outgoing shipments, if joined together in a straight line, would make a runway 6,000 feet long.

Looming up in the centre of the railroad yards is a watch tower that overlooks the entire system of tracks. From this point of vantage one night watchman can detect any suspicious characters who may be lurking around and by signalling to his mounted assistants have a guard on the spot almost immediately. Before the day workers start operations in the morning these watchmen disappear and the last seen of the three "night riders" is when they leave the factory grounds through the little gateway at the rear.

KESSER IS BATAVIA MANAGER.

One of the Deans in the Tire Trade.

Franklin Kesser, well known to the automobile industry and especially in the tire trade, has become Eastern district manager of the Batavia Rubber Company, with headquarters at 1906 Broadway.

Mr. Kesser's experience covers a period of ten years as manager of the Hartford Rubber Works branch in Philadelphia, five years in an executive capacity at the Hartford factory, three years in executive positions with Akron tire companies, and for the past year jobbing representative of the Batavia Rubber Company for the Philadelphia market. This experience entitles him to be called one of the deans in the tire world.

Big Business for Roskam.

J. Edward Roskam, manager of the Roskam-Scott Company of 1805 Broadway, reports a tremendous increase in business over the previous year. He says the coming year is very promising, especially for high grade used cars and the people have come to recognize the efficiency and reliability of rebuilt cars.

The Striking Daniels Sedan

This car is being shown at the headquarters of the A. Elliott Ranney Company, Broadway at 52d street, and is attracting much attention.

SILVER SERVICE SATISFIES.

Big Dealer Appreciates Importance of This Department.

To keep the owner satisfied is the aim as well as the problem of the wide-awake automobile merchant to-day. Service is a word which enters into every sale, and enterprising dealers have at last discovered that many buyers are particularly influenced by it.

The average prospect has now reached the point where he asks pointed questions as to service, how it is interpreted, the facilities for giving it and the willingness to do it. Lack of full co-operation on the part of the dealer only too often detracts from the pleasure of ownership and the purchaser nowhere near reaches full enjoyment in the use of his machine if left too much to his own resources.

Service to customers has been practised for several years by the C. T. Silver Motor Company and it has been of such a high and satisfactory order that this concern has built up a great automobile business, thus demonstrating the wisdom of its policy.

Another step forward in the direction of even better service has been taken by the progressive president of the company, C. T. Silver. He has established branch service stations in Brooklyn, The Bronx and Yonkers, N. Y., and Newark, N. J., each furnishing service identical with that rendered at the New York headquarters.

This plan is of great advantage to the thousands of customers of the C. T. Silver Motor Company. It means that no matter at which place they buy their cars they are entitled to service at the home office or any branch, whichever happens to be most convenient in time of necessity. It means a united organization bent on the one object of giving service of the most satisfactory sort.

DROVE WINTON 18 YEARS.

Not the Same Car, but Always Same Make.

The automobile industry had a birthday on Friday. Eighteen years ago on that date occurred the first recorded bona fide sale of an American made motor car; that is, not an experimental vehicle but one of a regularly manufactured output. The purchaser was Robert Allison, a mechanical and mining engineer of Port Carbon, Pa. The purchase price was $1,000 and the car a single cylinder Winton phaeton. Mr. Allison was by no means a college sophomore looking for a lark when he invested in a horseless carriage, for he had already passed his seventieth birthday. At an age when most men are occupied chiefly with memories Mr. Allison looked forward with keen enthusiasm to the perfection of the motor car, and when he died on February 3 last in his eighty-ninth year he had enjoyed a full realization of his expectations.

At various times he purchased two cylinder, four cylinder and six cylinder Wintons, and was a Winton Six owner at his death. Indeed he was one of the first and strongest advocates of the six cylinder motor.

The Winton Company made single cylinders from 1898 to 1902 inclusive, five years, at $1,000 to $1,200. The two cylinder Winton was first marketed in 1902 and was continued to 1904 inclusive, three years. Prices ranged from $2,400 to $2,500. Four cylinders were marketed from 1904 to 1907 inclusive, four years, at from $1,800 to $3,500. Winton sixes were introduced in June, 1907, and are now in their ninth consecutive year. Six cylinder prices have ranged from $2,285 to $4,500.

GET A BOOK FROM GOODRICH.

Every Truck Owner and Operator Should Have One.

Not every truck owner realizes how much more efficient trucks can be made by the adaptation of the proper devices for handling the load. These mechanical aids are now so numerous that there is practically no class of merchandise which cannot be handled better by their assistance. Whether it be coal or lumber, dry goods or building material, there is an efficient way to load, carry and deliver.

Such devices have been described from time to time in various magazines, newspapers and trade publications. All of the most important of these have now been collected and are set forth in one article, appropriately illustrated, under the title "Devices That Make for Motor Truck Efficiency," and appearing as an introduction to volume IV. of "Motor Trucks of America," published by the B. F. Goodrich Company of Akron, Ohio. This 144 page volume, an edition of which is published annually, is now ready for distribution, and a copy can be secured on application to the Goodrich branch at 1780 Broadway.

"Motor Trucks of America" has become an institution. Because it contains the detailed specifications of all the important motor trucks made in the United States, furnished by the manufacturers themselves, it has come to be regarded as the most authoritative compendium of information regarding present day motor trucks that is published. While truck agents and truck salesmen keep this book with them as a matter of course, it is also intended for truck owners and those who are interested in or contemplating the purchase of motor trucks.

Every man in this city interested in motor trucking in all its interesting phases should make it a point to get in touch with the local Goodrich branch and make application for this authoritative reference work. A copy is free.

MITCHELL'S NOVEL LIGHTS.

They Are Adjustable and of Unusual Utility.

"It would seem that John W. Bate, when designing the Mitchell Six of Sixteen, must have had a prophetic vision of future legislative attitude toward headlights, as he provided for them to be focussed in compliance with new laws," says J. A. Clark of the Carl H. Page Motors Company. "He planned to do away with the blinding glare that makes night driving dangerous at times to both motorists and other highway users.

"While it looks like others, the Mitchell headlight has distinctive features of its own. The lamps may be set so that the headlight's rays are sent in any direction desired, either up or down or to either or both sides of the road. We know of an owner caught in a heavy fog who focussed his lights so they illuminated each side of the highway and thus reached his home in safety.

"Some new laws provide that dazzling rays must not be thrown above a certain height fifty feet ahead, the Massachusetts limit being 3½ feet. In New Jersey 4½ feet high is the maximum for glaring lights. Owners of Mitchells can adjust their lights to comply with rules varying from 5 to 150 feet.

"Another advantage of Mr. Bate's patented headlight is that the lamp front carrying the electric globe is hinged. If it is necessary to examine the engine or six feet or more from the back of the car can be performed readily on the darkest nights by swinging the headlight back on the side of the car where the work must be done."

GREAT FUTURE FOR WELL MADE TRUCKS

War Has Furnished Lessons and Opened Up Markets in Astonishing Manner.

An effect of the war upon the motor truck industry promising an influence far more permanent than those generally discussed concerns the organization by truck makers of their plants for large scale production.

The obvious influence of the war in this regard has been of course the stimulation of domestic and foreign markets through the demonstration of efficiency made by American trucks in military service, the rising cost of horses and the general revival of domestic business. These factors have compelled numerous manufacturers to produce in heavy volume, and the increased production has held vehicle prices steady despite the exceptionally high material markets.

This stability in price has in turn extended the market for the trucks themselves. If this market continues to grow at its present rate it may be expected to establish the business definitely on a large scale basis. The probable result will be that the cost of truck operation will be cut so far below that of horse hauling on most jobs that horse equipment will be regarded everywhere as obsolete.

T. P. Myers, manager of the truck division of the Packard Motor Car Company of New York, cites the progress of the truck department of the Packard company as an indication of the rapidity with which the industry is going forward. In seven years, according to Mr. Myers, the annual production of Packard trucks have soared from 25 to 4,411, an increase of more than 17,500 per cent.

"In 1908 one corner of one room, comprising about 1,000 square feet of floor space, was used," he said. "In 1915 there were seven buildings, with a combined floor space of 315,099 square feet. Seven years ago we had seventy-five employees in the truck department; now we have nearly 2,000.

"Naturally in such a growth manufacturing facilities kept pace and the improvement in methods has been of the greatest importance to the truck buyer. For every advance accomplished in manufacturing there is a corresponding increase in the quality that is built into the truck. By putting profits into research, equipment and advanced factory practice we compel the increased output to pay back into the hands of the public increased value in the goods delivered.

Joins Briscoe

ROBERT T. WALSH.

The Briscoe Motor Corporation at Jackson, Mich., has just announced the appointment of Robert T. Walsh as head of the advertising department.

Mr. Walsh recently occupied a similar position with the Maxwell company at Detroit, and at one time was assistant advertising manager of the Ford Motor Company. He is familiar with all phases of advertising, which has been his work and study for the last eleven years.

Mr. Walsh's appointment is in line with Benjamin Briscoe's policy of building up an organization of specialists at the head of the various departments.

Stearns Co. Advances Prices.

The F. B. Stearns Company, (Sons and builders of Sterns-Knight motor cars, announce an advance of $50 per car on all models, which began March 20.

The cost of raw materials has advanced so rapidly, and stated Frank B. Stearns, president of the company, "that in order to meet the prevailing high prices of materials necessary to the quality and standard of our Knight construction, we are compelled to increase the selling price."

Stearns production since the first of the year has already passed the mark of the entire output of the previous year. And while the increase in production lowered the price of the Stearns-Knight in the beginning of the present season, the increase in the cost of materials has gradually passed the point which made possible this lowered price and forces the advance in the selling price.