MOTOR CAR ENGINE TYPES AND HOW THEY OPERATE

The Forty-fourth of a Series of Articles by an Expert for the Automobile Owner.

By WALTER SHIELDS.

The motorist in America is familiar with perhaps two or three distinct types of engines and is unaware that there are probably more than sixty types which have been developed and some of which are in use. In American passenger cars there are but three types in use, namely, the poppet valve, which is the common variety, the Knight sliding sleeve valve and the steam power plant. If we wish to add the air cooled engine there are four. In addition to these at one time or other automobiles were fitted wth rotary valve engines, piston valve engines, revolving cylinder engines, oscillating sleeve engines, &c. Much has been heard about the Diesel engine, but its application to passenger cars is yet an uncertainty, though its use for trucks and tractors is being considered seriously and it would not be far wrong to say that a few such engines will be brought out for this work.

The reason for the supremacy of the poppet engine is its low cost, simplicity, reliability and performance. While other types of engines may give slightly better results under certain conditions, the experimental work in the past has shown that for money expended the poppet does the work better than any existing design. In previous articles the numerous varieties of poppet engines were taken up such as the L-head, T-head, overhead valve, &c.

Since the Knight engine is in actual use on three well known makes—the Moline-Knight, the Stearns-Knight and the Willys-Knight, this becomes an engine of more interest than many of the others. Invented by Charles Y. Knight, a native of Chicago, and first used by the Daimler Company of England, the Knight engine differs from the poppet in that it uses sliding sleeves inside the cylinders instead of ordinary poppet valves. These sleeves have ports cut in them, and as the sleeves slide up and down the ports register with the manifolds and the cylinder. The sliding sleeves are operated by rods from a so-called eccentric shaft which corresponds to the conventional camshaft. The great advantage of this engine, which is not so pronounced now, however, is its quietness of operation, because the sleeves sliding up and down a short distance make comparatively no noise, while the camshaft and the poppet valve gear is likely to emit numerous clicks and rattles.

The early disadvantages of the Knight centring around sleeve lubricating and power output have been entirely eliminated and the Knight engine of to-day is considered as reliable a piece of mechanism as any poppet. However, it costs more to build than a poppet, and if any trouble should happen to come up with the interior parts the engine must be partially dismantled. A strong advantage which is claimed for the Knight aside from the others is that carbon does not affect it in any way as it does a poppet. Whereas in the poppet carbon interferes with valve seating, this substance is said to make for greater efficiency in the Knight by glazing the sleeve surfaces.

In passenger car work the air-cooled engine has but one user in America, namely, the Franklin. There are obvious advantages in using the air-cooled engine, some of the important ones being the enormous weight saving due to the discarding of the radiator, heavy cylinders, pump, &c., and the freedom from troubles in winter. The air-cooled car as now made is much more economical than the gasolene water-cooled of the same size, which is due partly to the reduced weight of the chassis. However, the power output of the air-cooled does not compare with that of a water-cooled the same size, and in other respects the performance of an air-cooled automobile engine is below that of a water-cooled. For ordinary work, however, the air cooled as now made is perfectly satisfactory, giving a minimum of trouble regardless of ill-handling. It is stated upon good authority that many prominent engineers are working out some air-cooled engines for high speed, high power output work.

The rotary valve engine, which at one time was considered a very appropriate type for automobiles, and even now is thought to be a future contender for first honors, failed in this country. Only one maker—Speedwell—marketed a car fitted with a rotary valve engine and soon after the company failed. In rotary engines, instead of using poppet valves or sliding sleeves, there are long bars of steel or iron which revolve in the cylinder head. The bar or bars have ports out in them and proper registration is made with the manifolds and the cylinders. In some designs only one valve, that is one bar, was used for both inlet and exhaust, but in the later types one value had exhaust ports cut in it, the other the inlets. There were any number of departures from the basic design, some using revolving disks in the cylinder head. The main trouble met with in these designs is due to the valve sticking or slapping or otherwise not running free and easy in its guide. Leakage between the valve bar and the housing also was troublesome. Lubrication of the valve was not easy, and though direct oiling was used in connection with oil in the gasolene trouble still existed. Inventors have endeavored to overcome the primary objections to this type, but so far seem to have been unsuccessful. There are a number of engineers who believe that the real merits of the rotary valve such as quietness of operation, simplicity, cheapness, &c., will bring it back at some future time.

Dozens of designs of piston valve engines have sprung up in this country, none of which, however, have been used in commercial production in passenger cars. In this type of engine ordinary pistons, small in size, control the inlet and exhaust ports. These pistons move up and down in their own small cylinders just as the regular pistons do. Intended to simplify design, this type does just the opposite, making the engine bulky in appearance and with greater internal resistance. Though the valves do not move as fast as the regular piston there is nevertheless the chance for wear and trouble with the valve gear, which is difficult to get at and not simple to repair. Lubrication of the valves also must be taken care of.

The revolving cylinder engine, which many readers know about because of its use in certain types of airplanes, was once used in an American passenger car, the Adams-Farwell, but its life was not long. Not only does it interfere with body design, but it is noisy and so far as performance is concerned it has no advantages over the ordinary type of engine. In airplane work the fuel and oil consumption has been found to be out of all proportion to its weight and power, indeed one early type consumed almost as much gas as oil and the oil and gas together which had to be carried weighed much more than the engine itself. The fuel consumption has been reduced in the later designs, but still the type has application only in planes which make short flights. As a type for vehicles on land it is passed, though one maker insisted upon attempting to offer a revolving cylinder engine in a car as late as last year.

The steam power plant is used to-day in two cars, the Stanley and the Doble, and for flexibility, quietness, power, and speed there are few which can equal the steamer. Economy also might be added to the list of advantages. The disadvantages as regards complicated mechanism, trouble, the necessity for replenishing the water at frequent intervals and the fact that the fuel consumption was equal to that of a gas car, has been overcome to a large extent. So well has this power plant been developed that it is looked upon to make a "return engagement," having had a strong hold in the early days of the industry when the gasolene engine was in its period of development. However well the steamer may be developed, it hardly is possible that any great number of buyers will discard the conventional car for it, not because the average buyer is able to judge design, but because he simply is prejudiced against something which departs from the ordinary. Steam will, however, return to greater popularity, if not for passenger cars, for trucks and tractors, though there is the menace of the oil burner, the Diesel and the semi-Diesel. In the Diesel and semi-Diesel almost any sort of fuel can be used; no spark plugs are required because the charge is injected into the cylinder, the fuel and air separately, and the heat of compression depended upon to ignite the mixture. For economy and power this type leads all others, but it cannot be made small enough and develop sufficient power for vehicle work. It is a slow moving engine, while the high speed idea is preferred in vehicle engines. Though used to-day in motor ships and has numerous applications for factory work, its field of usefulness for vehicles will undobutedly be confined to trucks and tractors.

LINKS MOVIES AND AUTOS.

Film Star Makes Comparisons in Talk to Chalmers Men.

Miss Myrtle Steadman, the movie actress, has just spent ten days studying the great automobile factories of Detroit preparatory to staging an immense film spectacle founded on the motor car industry.

Until recently Miss Steadman was a Paramount star and occupied a distinctive position among movie celebrities around Los Angeles. She calls herself "an outdoors crank" and knows automobile like a female Barney Oldfield. At the Chalmers factory she put on jumpers and actually manipulated a lathe on one of the famous hot spot engines. Later she addressed some of the Chalmers employees, and the following are a few of her timely comparisons of the moving picture and automobile industries:

"The reason the automobile and the moving picture industry are so typically American and immensely popular is because they are essentially constructive industries. Both are building useful practical products. The world needs both and the movies need the automobile. I have always insisted that the word 'pleasure car' is a misnomer without a cause. A trolley ride is oftentimes a pleasure, but who would call a trolley car a pleasure car?

"The automobile and the moving picture camera are indispensable in war or peace. The former is winning the great war and the latter is recording it for posterity. The automobile is winning the battle of transportation, and do you know that every army in Europe has its own completely equipped moving picture department? And in man power both industries have given of their best."

MOON IN NEW HOME.

New in Spacious Quarters on Broadway.

Having outgrown their old headuarters at 237 West Fifty-eighth street, where they have been located for the past seven years, the Moon Motor Car Company of New York have moved to their new and more spacious showrooms at 1875 Broadway, near Sixty-second street.

William J. Coghlan, president of the Moon Motor Car Company, is responsible for the great popularity of Moon cars in the East, having handled the sales and distribution of the Moon product since 1907. The growth of this business has made larger quarters imperative.

The new showrooms as well as the executive and sales offices are decorated in the most tasteful and modern manner. On another floor in the same building is a complete parts and service department, and also a showroom for the display of used cars. This brings the entire organization under one roof, and, according to Mr. Coghlan, greatly facilitates the handling of customers' wants.

Milburn Business Increasing.

One of the latest announcements of bigger and better business comes from R. S. Woodhull, sales manager of the Milburn Wagon Company of Toledo, Ohio, manufacturers of the Milburn Electric.

"Despite the advance in price due to increased costs of material and labor our electric car business is getting better and better," says Woodhull. "Unquestionably the growth in certain business is largely due to the merits of the product manufactured; nevertheless the most meritorious article in the world could not be marketed successfully unless the public were in a financial position to buy it. And, to us, that is the most important feature of the whole situation. The public is in a financial position to buy electrics, and when the public has money general business will not suffer.

Liberty Shopping Limousine.

This little limousine, made for J. D. H. Bergen of Brooklyn, is the ideal type in which to do your Christmas shopping. John F. Plummer, president of the Colonial Motors, states that the Liberty limousine is going to be a big help to Santa.

CLOSED CAR SALON OF WILLYS-KNIGHT

Custom Built Bodies Feature Unusual Display at Willys-Overland Showrooms.

Decorators have been busily engaged for the last week in transforming the spacious building occupied by the Willys-Overland Company at Fiftieth street and Broadway into suitable quarters for the "Closed Car Salon" of Willys-Knight models, which is to be held there throughout the coming week.

Seldom has there been such a representative showing of closed models brought together at one time before in this city. The styles which are to be featured are the custom built closed models, designed and executed for the Willys-Knight chassis by such builders as Hale & Kilbourne of Philadelphia, the Blue Ribbon Carriage Company of Bridgeport, Locke & Co. of this city, and the Walton Body Company.

These models consist of limousines, both five and seven passenger, on the Willys-Knight Eight and the Willys Six chassis; a delightful brougham type which has been executed by Hale & Kilbourne, and is mounted on the Willys Six chassis, the Willys-Knight Four and the Willys-Knight Eight. This car offers some entirely new departures in body construction, is very distinctive in appearance without being extreme, and is sure to be a favorite during the salon. Two styles of landauletes are offered, and these bodies are to be shown mounted on all three of the Willys type chassis, the four, six and the eight.

In all there will be shown more than fifteen distinctive models from which the prospective buyer can make his selection.

A special feature of the exhibit will be the imported fabrics with which the custom built cars are trimmed. Many of these patterns are exclusive designs nad cannot be duplicated.

The Closed Car Salon surely gives the prospective buyer an opportunity to see a wide variety of body styles, together with a choice of color combinations and interior trimmings which has never before been offered by any company. There will be a total of more than fifteen cars displayed throughout the week, and no two will be identical.

The timeliness of this exhibit of the Willys-Knight cars is enhanced by the recent British victory at Cambrai, in which the Knight motored tanks took such a brilliant part.

The Salon will remain open every evening until midnight in order to accommodate those who desire to visit the exhibit after theatre.

TAYLOR TRUCK HEADQUARTERS

In the Frank Work Establishment, Famous in Horse Lore.

The Taylor Motor Truck Company of New York, Inc., has secured the celebrated Frank Work establishment at 157 and 159 West Fifty-sixth street, which it is having readjusted to fit the requirements of the modern horse—the motor truck. Old New Yorkers will remember the bachelor headquarters of Frank Work, the lover of horses. He had his place fitted up in solid mahogany, with stained glass windows and all the refinements for which he was famous. Here in the old days foregathered the lovers of horses and here were solved some of the great questions of the day about races and track meets. That this quaint and celebrated place should be at last given over to the motor truck is a dramatic indication of the modern spirit.

There is a large and fine show room, where the Burford motor truck in all models will be displayed and later models of the new Taylor trucks. Commodious offices for the president, E. F. Twyman, and other officers are now being fitted up in the mahogany rooms of Frank Work.

Atkinson Instructors Join Colors.

Albert N. Atkinson of the Atkinson Automobile School, 232 West Fiftieth street, reports that four instructors of his school have joined the colors and are doing splendid work in the motor transportation section. They are not only directing the mechanical repairs to motor vehicles but are also training men from the ranks.

WE ARE INDUSTRIALLY FIT.

Hupp General Manager Tells What Auto Makers Are Doing.

"Considering the nation's industrial situation, it would seem that at no time were we better equipped than now for the conduct of our part in a world war," according to the view expressed by C. D. Hastings, general manager of the Hupp Motor Car Corporation.

"For the purpose of contrast visualize the factory and transportation facilities of the United States ten years ago and compare them with our present manufacturing capacity and railroad facilities. The steel industry has advanced by leaps and bounds in the last ten years. The railroads have invested millions of dollars in new mileage and new equipment. The automobile industry has sprung into full flower, and is now the third largest industry in the United States.

"Consider, for example, the work of the motor car industry in the conduct of the war. It would be difficult perhaps to name a motor car factory that is not engaged to-day in war work. Some are building airplane engines; some are building gun parts; some are building passenger automobiles; some trucks. Almost overnight factories have been made over in part or in whole to give the Government the benefit of the best that is in them.

"I do not for a minute mean that the automobile industry has done or is doing more than its share. I do want to make plain the fact that the average manufacturer of motor cars has willingly turned his plant upside down if necessary to produce war materials for his nation's need.

"Meanwhile the industry is carrying on the production of passenger automobiles. Dealers who have invested their capital and their business experience are solid behind the manufacturers, and the public is able to buy the automobiles for which it has real need in its daily life."

KEEP CAR LOOKING NEW.

Harry S. Houpt Gives Interesting Advice on Washing a Car.

Many cars show the effect of winter driving through the snow and slush and in the spring must have at least a coat of varnish to bring the lustre. "If the owner would use care in washing his car this revarnishing would not always be necessary," says Harry S. Houpt, the Hudson distributer.

"The paint on a car," continued Mr. Houpt, "has three principal parts. First, there are the foundation or priming coats; second, the color, and third, the protective coat. The protective coat is a heavy, hard coat of transparent varnish, which protects the softer coloring base from the weather. If this coat is kept firm the color coats will hold their brilliancy.

"Do not try to wash the car in the cold. Take it inside and use only clear, cold water. Cold water will harden the varnish, preventing abrasion. Use little soap, for free acid or alkali softens the finish. Soak mud off with water.

"In an overheated garage the body of the car expands somewhat and if the machine is suddenly taken out in the cold the sudden contraction causes the paint to crack."

1,624 Goodrich Men Join Colors.

Enlistments have followed so rapidly in the ranks of the B. F. Goodrich Rubber Company that the corporation has had difficulty in filling vacancies in some departments. The latest tabulation shows that 1,624 men have gone to the colors. Each day witnesses the departure of more. Ten days ago the company hoisted before 20,000 people a huge service flag—the largest in the State of Ohio—with 1,414 stars on it. The ceremony must have been an inspiration to others, for the following day over 100 men were missing. One hundred and ten others have since enlisted.

NEW YORK SHOW TO BE BIGGEST EVER

Over 300 Cars, Representing 86 Makes and 260 Accessory Displays, at Palace.

With the opening of the eighteenth annual National Automobile Show at Grand Central Palace January 5, but three weeks off, the eyes of the country's third largest industry are already focussed upon New York in anticipation of a week of big business. There will be a larger number of individual exhibits of cars, accessories and parts on the four floors of the big building than ever before and many products will be shown for the first time. In all there will be eighty-six different makes of cars and 260 accessory displays at the Palace show, and a like number will exhibit at the Chicago exhibition January 26 to February 2.

S. A. Miles, who manages both the New York and Chicago shows which are held under the auspices of the National Automobile Chamber of Commerce, has been compelled to turn down applications for space from late comers, despite the fact that under the present space arrangements in the Palace a little more room is available than last year.

An array of more than 300 new car models ranging all the way from tiny runabouts selling for a few hundred dollars to the largest, roomiest limousines costing more than $6,500 will be shown. Among the exhibitors are several makes of electrics and steam cars.

The exhibits will include cars meeting every purse, but of necessity due to the increased cost of material and labor the percentage of low priced cars will be markedly lower than in 1917. Last year about 10 per cent. of the models (not production) sold for under $750. This year just slightly under 6 per cent. of the models on the market will sell under this mark. An indication of the price changes is provided by recently compiled statistics which show that 21.6 per cent. of the 1918 models will list for under $1,000. Last year this price class represented 27.7 per cent. of the models.

A man desiring to spend between $1,000 and $2,000 for a car this year will have 49 per cent. of the models on the market to select from, while last year he had 53.6 per cent. Carrying the classification still further to the cars selling for over $2,000 one finds that the 1917 and 1918 percentages are 18.7 and 29.4, respectively.

Each year the scope of the accessory exhibits expands. Thousands of little attachments that are designed to add to the economy and comfort of automobile maintenance will be displayed on the upper floors of the Palace, and this year especially the show visitor will be impressed by the extent to which the manufacturers of accessories have gone in producing devices that tend to make the operation of a motor vehicle a more economical proposition.

As the most important barometer of automobile design and construction the show will demonstrate that the 1918 car shows very little change mechanically over that of 1917. What changes have been made, as was the case last year, will be chiefly in the nature of minor refinements. Perhaps the most interesting feature of the show to the person giving attention to design tendencies will be found in coach work. Present indications are that there will be a number of new body designs introduced at the show, with special attention having been given to details in connection with the fitting of auxiliary seats, interior panels, lockers, &c.

There are now 4,500,000 automobiles registered in the United States as compared with about 3,225,000 this time last year. The increase in importance of the forthcoming exhibition over its predecessors is in relative proportion to the increase in the number of motor vehicles in service. The display at the Palace will be the greatest ever held in the world. While this is now a monotonous statement, each show greatly surpassing its predecessor in parallel with the growth of the industry, it nevertheless again holds true this year.

British Tank at Ford Plant.

After having been on display at "Hero Land," where thousands viewed for the first time a British tank of the same construction as those which have been doing such effective work on the western front for the Entente Allies, it is now being housed in the Ford Motor Company's spacious Long Island City factory. It seems fitting that the tank should be sheltered by the Ford Motor Company, in view of the activities of Mr. Ford in his effort to cooperate with the Government by assisting in the formulation of plans that will aid considerably in facilitating the manufacture of materials and munitions of warfare for our Government. The Ford factory has been chosen as the halting place for the tank on its trip to Yaphank.

Horse Power and Le· Power in China.

During the past two years American made automobiles have been making inroads in certain sections of China, Japan, the Dutch East Indies and the Philippine Islands. Here is a photograph of one of the latest seven passenger eight cylinder King touring cars in operation in Shanghai. Road conditions in the Orient are fair, road improvement is reported on the increase. In some of the Chinese cities, however, due to narrow streets, it will be a long time before motor cars come into general use.

SHIP FRANKLINS UNDER OWN POWER

Close to 16 Per Cent. of Cars Driven From Factory to Aid Conservation.

Conservation of freight car shipments through the medium of factory drive aways to points throughout the Eastern and Central States wherever and whenever possible is the war time policy adopted by the Franklin Automobile Company. This concern, in fact, is refusing to ship cars by freight unless delivery cannot be made in any other way.

By this over highway method of automobile movement, whereby the dealer or the new owner calls for his car at the factory and drives it away under its own power, 530 automobiles have been sent away from the Franklin factory in the past four months without demanding the services of freight cars.

Figures compiled by the Franklin Company show that as many as 15.7 per cent. of the total shipments of Franklin cars during the four months period just passed were factory drive aways. During August the best percentage was shown, when 21.8 per cent. of the total automobile shipments were made by the over road method. The September figure was 14.2 per cent.; October, 12.1 per cent.; while the month just passed registered 10 per cent.

The new policy, if carried on for a year, estimated on the basis of the four months just passed, a fair average because it contains three fall months and one of summer, would mean the annual saving for more necessary service of 525 freight cars. That means that the Franklin company in one year is saving on the use of freight cars to the extent of a train of cars four miles long. This is a conservation of 10.1 cars per week and 177 cars for the quarter year period.

Dealers are now driving Franklin cars to places throughout the Eastern and central States. Such cities as Baltimore, Washington, New York, Philadelphia, Boston, Cleveland, Detroit and Cincinnati are taking a big majority of their cars by this method. In fact, most cities in New York, Ohio and Pennsylvania will follow out this policy throughout the winter so long as the roads are open and passable.

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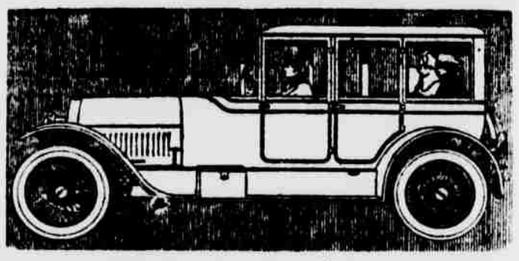

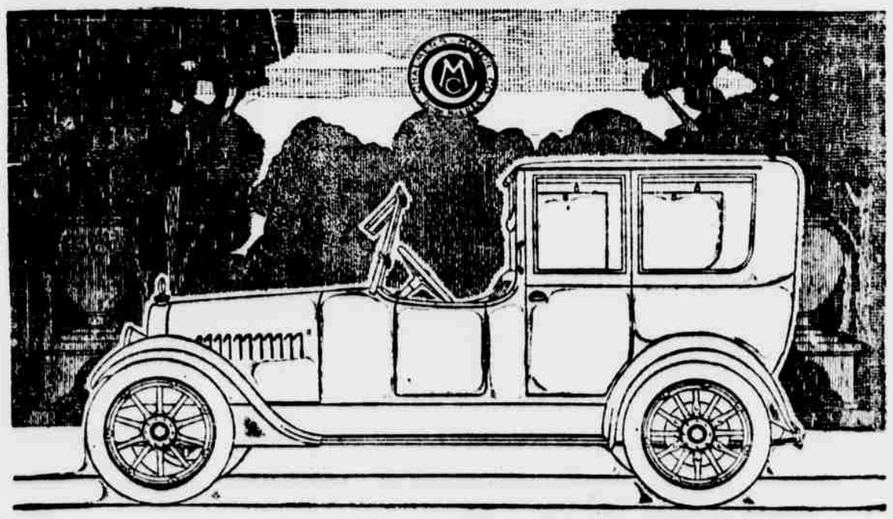

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