

EXPLAINING VARIOUS SPEEDOMETER UNITS

The Thirty-ninth of a Series of Articles by an Expert for the Automobile Owner.

By WALTER SHIELDS.

The speedometer and the shaft and gears which drive it comprise a system which rarely gives trouble of a serious nature, but which at times may cause irritating remarks from the driver because of inaccuracies in registrations. When any serious trouble arises the instrument usually is blamed and the local service station called upon to make repairs, but very often a great deal of trouble may be traced to some slight derangement which may be repaired by the owner. Without knowing the principles involved in the design of the instrument or the method of driving the same cannot logically trace the units of the system in order to discover any fault.

There are in use today four types of speedometers using the following principles: Magnetic, centrifugal, air-circuit and hydraulic. The magnetic is used in a greater variety of cars and probably exceeds the others in the total use, although the large number of centrifugal types may bring the total of the latter on top. The air speedometer, of which there are two distinct types, has a high class following, hence in point of number it is the most popularly used. The hydraulic has a very limited field, though its accuracy and simplicity call for greater popularity. All speedometers are mounted on the dash or other part near the driver and connected by a flexible shaft (that is a hinged rotating shaft which is flexible so as to move freely) to the front wheel or the propeller shaft. A gear is attached to the front wheel or propeller shaft and in mesh with this gear is another gear mounted on the shaft. As the shaft revolves it turns the mechanism of the instrument by means of a joint of some kind. For each wheel speedometer there is a type there is a definite gear ratio which varies as the location of the drive. At the present time the front wheel drive shafts are the most common, and the propeller shaft drive and many makers are going a step further than this and are enclosing the gears in the instrument housing. This makes a quiet drive and one which is protected from dust and is always lubricated.

Stewart speedometers operate on the principle of a circular magnet, but one moving part—a circular magnet—rotates over this magnet, but not touching it, is an inverted aluminum cup, on the rim of which are figures indicating the miles in both directions. The magnet, which the magnet is revolved, and as it does so the field around it acts on the cup. The greater the speed of the magnet the more the cup is repelled and consequently the dial is moved around further, thus indicating more speed. The dial is mounted on the shaft of the magnet and is free to revolve in the upper end. The hairspring resists the pull of the magnet on the cup and also returns the cup to zero when the magnet's pull drops to zero, in order to make the speedometer register accurately at all temperatures a temperature compensator is used. This compensator counteracts the expansion of the hairspring due to change in temperature.

In one of the air speedometers air pressure is constant, the pressure on the speed of the car, but the volume of air entering and leaving varies. A flexible shaft drives an air circulator, which consists of two elongated aluminum shafts, located in the head of the instrument and communicating with the air chamber. This chamber has two openings, one at the top and the other at the bottom. The chamber has attached to its bottom a piston which is attached to the chamber which strikes the same and turns the dial, the numbers on which are visible through the window. As the speed increases the volume of air increases, but the pressure remains constant because of the greater escape of air at high speed. The air escapes between the plate and the dial, and the chamber to the outlet hole. In other words, for every position of the dial there is a definite amount of air escape, which keeps the pressure constant. The only action that can change the position of the dial is a change in the speed of the air circulator, which is controlled by the speed of the car. When the current stops because the car stops the dial is returned to zero by a spring. The speedometer is, of course, positively driven.

In the centrifugal types the operation is on the principle of the flyball governor. By means of levers or cranks weights are mounted on the rotating shaft in such a way that movement of the weights because of centrifugal force is communicated to the dial. As the speed increases the weights fly outward and by means of connections to the dial cause the latter to move further to the right.

A new record device indicates not only car speed, trip mileage and season mileage, but also gives the mileage obtained from each liter used on the car, the total gasoline consumption and oil consumption, and finally a warning indication of necessary attention to the car at the end of the first 1,000 and first 2,000 miles of running. A single flexible shaft, connected centrally to the propeller shaft of the car but equally as well to the front wheel, actuates all the gears of this instrument. The method by which the instrument is driven is as follows: A dial ring, marked in separate places for miles, Nos. 1, 2, 3, 4, 5 and 6, for total mileage, trip mileage, gasoline consumption, oil consumption at 1,000 miles, attention at 2,000 miles. When the reading on the No. 3 is desired the ring is moved around until the words "The No. 3" cut out in the dial ring face are opposite the adjustment screw on the face of the instrument. The screw is then turned until the mile-ometer dial has returned to the No. 3. This is done by the dial of the instrument. This applies to all the other individual readings in the same way.

The speed measuring part of another air speedometer consists of two essential parts, one inverted and telescoping the other, with an air gap between them. The driving cup is driven by a flexible shaft, as is customary. The driven cup, known as the indicating, is mounted outside the driving cup. It is the air friction generated in the annular space between the cups which causes the speed measuring medium of the instrument.

When the speedometer instrument itself is at fault it is useless for the owner to know it, hence the most popular method, somewhat like a watch, is to have it inspected and requires expert hands. However, often there will be no registration of the instrument due to the fact that the coupling at the bottom of the instrument has worked loose. In this case the shaft will revolve, but the dial being out of contact with the shaft in the instrument there will be no indications. This means simply the loosening of the end of the shaft from the head, if the instrument is called, pulling the shaft and up to the place and tightening it again. If the shaft should bind in its housing due to looping the instrument will not register properly, and the odometer or distance unit may also be affected. The shaft should have a few sharp bends as possible. Sweeping bends give trouble.

Whenever tires are changed from one size to another, account must be taken of the change in speedometer readings. In such cases, apply only when the

speedometer driving wheel receives the change of tire. Even a change from regular to oversize tires will cause a false reading for a while. A car with a 4 by 4 tire, using a sixty-eight tooth sprocket, will require a seventy tooth sprocket if the tires are changed to 35 by 4 1/2. This is for Stewart instruments, and it may not apply to all makes; nevertheless it shows the importance of making a gear change when the tires are changed in size. If the driving gears are of steel and there is noise due to looseness, some strong laundry soap may be used to swell the gear and obtain a better mesh. Oil may be used as a lubricant occasionally, but the gears being exposed lubrication is ineffective. Often the speedometer dial will fluctuate. In some this becomes an interference only after some time is brought about by vibration; in others it may be caused by lack of solidity to the fastening of the instrument, loose connections at the driving gear or a binding flexible shaft. If the instrument does not register either mileage or speed the first thing to look for is the shaft. Disconnect the flexible shaft at the end of the shaft and while the front wheel is revolved notice if the shaft turns without jerking. If it does then the fault is in the instrument. Often a broken end of the shaft is broken and when the shaft is disconnected for this test the broken end might catch at intervals. Also when the shaft is disconnected twist the shaft in the head with the fingers and notice if there is an indication.

MICHELIN TIRE CO. IN PATRIOTIC DRIVE

Make Large Contributions to Liberty Loan as Their Business Booms.

On checking up results of the big drive in New Jersey for the second time the officials of the Michelin Tire Company, at Milltown, that 91 per cent of their employees subscribed, the following subscriptions ranging from a single \$50 note up to several very large subscriptions.

Needless to say, these remarkable results were obtained only after all the details of the drive campaign had been systematically arranged. A conference was called by J. Hauvette-Michelin, head of the American Michelin organization, which was held in the headquarters of the company. At this conference all the details of the campaign were planned, which included large bulletins, booklets placed at the factory entrances and "roll of honor" boards placed in the various departments.

The large bulletin boards at the factory entrances gave the percentage of subscriptions received from each department, the figures being based on the number of employees in each department. The "roll of honor" bulletins placed in each division of the plant, gave the names of all subscribers in each division. Prior to the launch of these bulletins a special appeal written by Mr. Michelin was given to each employee. Although the campaign was a big success, as is clearly indicated by the high percentage of subscriptions received.

In line with the general policy of the Michelin company to take good care of its employees and in recognition of the increased cost of living, the president of the company recently declared an unprecedent advance in wages throughout the plant. This was the fourth time since the beginning of the war that the employees have received a raise.

MARMON HAS BIG PLANS. Moves Into New Quarters and Increases Staff.

To checkmate the wave of pessimism so apparent in certain circles of the automobile industry the Marmon Automobile Company of New York, Inc. has just taken possession of its new show rooms and headquarters at 1880 Broadway, which occupy several thousand square feet of space.

The new building will be entirely divorced from the old headquarters, and their former six-story building at 43 West Sixty-second street will be devoted to service station work. The Marmon company has more than doubled its allotment of cars for this district during the next twelve months and announces several additions to their selling force. The new men are C. G. Taylor, who entered the automobile industry in the early Buick days and later became one of the executives of the Elliott Runney Company, which at different times acted as distributors for the Hudson, King and Tuxedo cars in this section; George H. Lovell, who served his apprenticeship with Robert Fulton in the days when Mercedes automobiles were among the most popular of foreign makes and in later years was associated with the Carl H. Page forces in the sale of Mitchell and Jordan automobiles; Harry Dyke, who was one of the pioneer salesmen in the automobile industry, having started when the business was located below Forty-second street and later associating himself with the Harry & Houpt interests and later with Carl H. Page Company, who handled the Chalmers lines. In 1912 Mr. Dyke went to Houston as manager of the Chalmers branch for a number of years and later returned to New York, selling both Mitchell and Chalmers cars. J. D. Ford, another addition, is one of the best known and most successful salesmen in the United States and probably numbers more actual New Yorkers on his sales list than any one man in the automobile industry.

These Men Head Militor Company.



N. H. SINCLAIR, President.



GEORGE W. DUNHAM, Vice-President.

BIG MEN HEAD THE MILITOR CO.

Will Manufacture Auto Motorcycle on a Very Large Scale.

A draft of significant interest and importance is indicated by the announcement of N. H. Sinclair, president, that George W. Dunham, president of the Society of Automobile Engineers, has become vice-president of the Militor Company of New York.

The fact that Mr. Dunham has been chief engineer of the Olds, Hudson and Chalmers automobile companies lends decided interest to his new connection with a company producing a two-wheeled vehicle.

In speaking of his new connection Mr. Dunham said: "I am convinced that transportation efficiency in the future lies in the development of a motorized, wheeled power driven vehicle. World conditions indicate that the most rigid economy must be practiced. We can no longer waste expensive metals of labor when the great war is over the world will not go back to conditions as they existed. At the same time the world absolutely needs more motorized, efficient methods of transportation. These methods must be developed along lines of economy."

In developing the "Militor" type of auto motorcycle we have worked with a fixed resolution to produce a swift, durable, silent and dignified means of traveling, to be built and operated at the lowest possible cost.

Up to this time all two-wheeled vehicles have been built upon the general principle of the bicycle, that is, a diamond frame of tubular steel. This method of construction has not been a great success where a power plant was used, as in developing the "Militor" we have discarded the diamond frame idea and instead have followed automobile engineering practice. As a result we have a machine whose construction will be entirely familiar to automobilists. In fact, any man who drives an automobile can drive a "Militor" without previous practice or instruction. For instance, it has a channel steel chassis and unit power plant, a four-cylinder air-cooled engine, a direct drive shaft, a selective sliding gear mechanism, which has three speeds forward, and a reverse.

A very unique feature of the "Militor" construction consists of the two eight-inch tires, one on each side of the rear wheels, which can be raised or lowered instantly by the driver by a slight pressure of the hand upon a conveniently placed lever. These wheels are stabilizers and make it possible to mount and dismount, to stop or start the car without requiring the acrobatic agility of most cycle riders. These stabilizer wheels enable the rider of a "Militor" to slow down on high topography or to slow down on high topography or to slow down on high topography or to slow down on high topography.

The ROAMER
America's Smartest Car

THE ROAMER is one car of many. You cannot count a ROAMER in every city block. But whenever you do see a ROAMER lithely wending its way through the turbulent city streets you see too, from all sides, a host of admiring glances cast toward this car of dominating beauty. Its striking charm and grace lift it head and shoulders above the rabble of ordinary traffic and mark it truly as the one of many.

There is unbounded satisfaction in the ownership of a car whose surpassing mechanical perfection and courtly grace stamp the mark of supremacy—and it is extremely gratifying to have your friends recognize your good judgment in the selection of a motor car.

No additional charge for your choice of body color, upholstery, etc. Enclosed models from \$3200 upward, f. o. b. N. Y.

Demonstration by appointment.

236 W. 59th St. Tel. Col. 9620.

First Aid Kit.

1. Wrench for adjusting ignition interrupter points.
2. Pile for cleaning above points.
3. One set of ignition brushes. (In box, labelled.)
4. Several extra spark plugs, cleaned and adjusted ready to use.
5. Tire rope.
6. Half dozen valve plungers for inner tubes.
7. Three in one tire valve tool.
8. Tire pressure gauge.
9. Jack and handle. (Be sure about the handle.)
10. Siphon can full of oil.
11. Voltmeter or hydrometer for testing battery.
12. Box of assorted nuts.
13. Box of assorted cotter pins.
14. Box of assorted cap screws.
15. Box of assorted washers.
16. Spool of copper wire and one of soft iron wire.
17. Full set of electric light bulbs.
18. Bag of clean waste or rags.
19. Two blocks of wood 6 inches by 12 inches by 1 inch.
20. Full set of fuses—if fuses are used.
21. Folding pall.
22. Chain tool and several cross links.

HUDSON PRICE SOON GOES UP.

Only a Few Cars Left at the Old Figure.

The announcement made by President Harry S. Houpt of the Hudson Motor Car Company of New York, that the price of Hudson Super Six cars will be advanced from \$200 to \$250 on December 31, brought many baritone hunters to the Hudson showroom last week.

In the Hudson advertisement it was stated that there were only thirty-eight more of the phaeton models left, and as seventeen of these cars were snapped up last week, only twenty-one of this particular model are left, and Mr. Houpt expects to clear these out within the next few days and then the supply will be exhausted. The car which was last wanted a Hudson Super Six will be compelled to pay nearly \$2,000 instead of \$1,400, which is the present price.

HUMPHREY PRICE ADVANCE.

\$100 Increase on Series X This Week.

Charles E. Price announces an increase in price of \$100 on the Series "X" Humphrey.

This applies to the touring models as well as the full line of specially designed limousines, broughams, sedans, etc.

Mr. Price reports that business has been very good. The special closed bodies mounted on the sturdy Humphrey chassis are being bought more than ever these days by car owners who are accustomed to driving much higher priced cars.

Overland Ambulance Doing Its Bit.



One of the most attractive and unusual displays in the recent Liberty Loan parade was the camouflaged ambulance exhibited by Willis-Overland, Inc.

This car was driven in the parade practically as received by the Overland branch with the exception of one or two new tires, which were necessary owing to the original tires having been entirely worn out. The mud guards, or rather what is left of them, are very much the worse for wear and abuse, and the car has every appearance of having undergone a very strenuous campaign. The camouflage is probably the most attractive part of this interesting exhibit. The body is painted every color of the rainbow, in fact one can imagine that a futurist was given carte blanche to do the work. Broad, irregular stripes of green, blue, brown and yellow, the running gear and wheels are painted in earth colors, greens and browns predominating. Above the top have been attached bougies, though the leaves are now giving way to the chill winds of winter. Across the back where the door once was before it was broken away is now a large tarpaulin, which upon close investigation proves to have been at one time a portion of a shop awning. Through the coating of mud the shop keeper's name is still distinguishable, and one can readily imagine that it was appropriated hastily from some French shop—maybe it was in Louvain or Verdun.

The tarpaulin is also camouflaged in the same colors as the main body of the car. In the center has been hastily sewn a piece of celluloid large enough to enable the driver to see out of the back of the ambulance. Of course the original structure is no longer a part of the equipment, for it was explained by the driver that each time a load of wounded is taken to the hospital the stretcher is removed, the car is carried and being forced to depend entirely upon the information passed back by the observer at the front of the car for guidance.

The Overland ambulance is at the present time making a tour of the larger cities in the East, and it is probable that it will return to New York in time to take a prominent part in the Liberty Loan parade which is to be held at Grand Central Palace, beginning November 26.

Backs Uncle Sam.



JESE FROELICH.

"Traitors who see distant and dispensation among the various racial groups that make up our population at a time when all should be united as brothers should be deprived of the freedom of this country," says Jesse Froehlich, vice-president of the Times Square Auto Company of New York and Chicago, known the world over as an authority on automobile matters.

"The people of America should be solidly behind President Wilson because they believe in his wholehearted purpose to wage this war to a successful end. They have consecrated themselves in patriotic devotion to a glorious cause. The times are critical and we cannot afford to partake with cheap demagogues and traitorous utterances from disloyal people and papers."

"The one certain way to win the war quickly and with the least expenditure in the loss of our soldiers is to Americanize our population at a time when all should be united as brothers should be deprived of the freedom of this country," says Jesse Froehlich, vice-president of the Times Square Auto Company of New York and Chicago, known the world over as an authority on automobile matters.

CHANDLER SIX

Choose the Chandler Because It Offers So Much More

BY people who are familiar with motor car values the Chandler is most commonly compared with high-priced cars, because, in so many essential features of design, construction and equipment, it checks so closely with the high-priced cars. And because so few, if any, of these distinctively high-grade features are found in other cars selling for less than \$2000.

Yet the Chandler price is only \$1595.

The intelligent automobile purchaser is not misled by further threatened price advances of cars striving to maintain some degree of a leadership that has passed.

There have been some necessary price advances within the year. And some unnecessary ones.

If you choose carefully from among well-known medium-priced cars you will choose the Chandler, because of its extraordinary value.

Seven-Passenger Touring Car, \$1595
Four-Passenger Roadster, \$1595
Seven-Passenger Convertible Sedan, \$2295
Four-Passenger Convertible Coupe, \$2195 Limousine, \$2845
All prices f. o. b. Cleveland, Ohio

Let Us Show You How the Chandler Checks with High-Priced Cars

BRADY-MURRAY MOTORS CORPORATION
New York's Most Complete Motor Car Institution
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