

# HOW TO DIAGNOSE MOTOR TROUBLES, KNOCKING NOISES

### Novice, by Proper Care, Should Tell the Difference Between Motor and Transmission Troubles, Says Expert.

"The correct novice should have little difficulty in distinguishing between motor troubles and transmission troubles. There is only one possibility of mistake, that being the case of knocking and hammering noises, which sometimes seem to come from almost any part of the 'underbody,' says one of the motor magazines recently in an article headed 'When the Owner Drives the Car.' The article goes on to say:

"Most confusing are the knocking noises which seem to come from under the footboard, and may result from a worn crankshaft bearing or a loose part in the clutch. If the noise stops when the car is stopped with the motor running free, diagnosis would seem to be easy; yet it sometimes happens that a bearing which is perfectly quiet when running free will develop a bad knock when running under load. For one who has no previous acquaintance with the car, the best method of distinguishing between these is to take up the footboard while the car is running and get an ear as close as possible to the source of the noise.

#### Primary Distinction.

"One primary distinction can be made in all cases of transmission trouble: either the car will run, or it will not. The troubles which come in the latter class as usually—contrary, perhaps, to one's first thought—the least serious. Such a trivial thing as a loose screw in the clutch or gear shifting connections may prevent the car from running.

"Having once determined that the combination of motor running gears in mesh and clutch engaged will not move the car, the first thing to do is to find whether the actual position of the clutch and the gears is the same as that indicated by the controlling pedal and lever. In about 99 cases out of 100, a little investigation along this line will soon disclose a loose set-screw or a missing bolt, the cause of all the trouble.

"Gear box troubles which result in putting out of commission only one of the three or four speeds are, of course, easily distinguished. In the case of selective gear changes, however, almost universally, the same applies to troubles which affect two speeds controlled by the backward and forward movement of the lever in the same slot. Such a peculiarity serves to indicate the probable location of the trouble.

#### General Rule Impossible.

"The change gear and clutch connections in use differ so widely, both in principle and detail, that it is impossible to lay down any general rule for locating troubles in them. In the case of the change gear, the first thing to do is to take off the lid of the gear box and note whether the gears move, or attempt to move, in conjunction with the lever. If they do move, the fault lies with them; if not, with the connections.

"Another form of connection linkage trouble is jamming of the lever. This must not be mistaken for the difficulty which is sometimes experienced in forcing the gears themselves into mesh, due to improper shaping of the teeth. On the other hand, looseness of the connections may result in the same exasperating grid. But the definite refusal of the lever to move into the desired slot, with the gear shafts turning at good speed, is usually due to the lodgment of some foreign object in the path of one of the shifting arms.

"Concerning clutches alone, quite a chapter could be written. The clutch has always been one of the weak points of the gasoline automobile, and probably more different principles have been employed for it than for any other single part. The average clutch is capable of making three kinds of trouble: It may refuse to hold at all; it may keep holding when the operator desires it to let go, or drag long enough to interfere with gear changing; or it may become 'fierce,' engaging with a sudden jerk which strains both the gears and the passengers' necks.

#### Certain Grade of Oil.

"Many multiple disc clutches require a certain grade of lubricating oil in order to secure the desired results. If the oil is too thick, it will make the clutch drag; if it is too thin, the discs will take hold with a sudden jerk. Too high tension on the clutch spring will give the same effect. Slippage of the clutch is usually due to insufficient tension of the spring—which, of course, should be provided with some means of adjustment.

"Fierceness in a cone clutch generally results from hardening of the clutch leather; the remedy is either a new leather or the softening of the old one with castor oil, if it is not too much damaged.

"Many cars nowadays have the clutch provided with a brake pad, to prevent the objectionable spinning of the clutch shaft after the pedal has been pressed down. On such cars a sudden attack of noisy gear shifting is generally due to deflection of this brake.

"If the motor is running, the clutch is actually engaged and the gears actually in mesh, and the car does not move, there must be some serious trouble in the drive shaft or the rear axle. A broken drive shaft occurs only rarely, and loses no time in calling attention to itself."

## Performs Great Hill Climbing Event

Steepest Incline Ever Attempted in Oregon Negotiated at Forest Grove by Portland Men.



Auto essaying specially constructed grade at an angle of greater than 45 deg. cen.

Forest Grove, Or., April 20.—A demonstration of the hill climbing ability of the Cartercar was made in this city Saturday afternoon, April 20. Before a large crowd of spectators Earl Smalley, the demonstrator of the Carter car people, of Portland, Andrew Philip, local agent, and Mr. Hull, sales agent, from Pontiac, Mich., ran the car up an incline of 58 2-10 per cent, said to have

been the steepest incline ever before negotiated by an automobile in Oregon, at least one carrying seven passengers. The carpenters putting up the incline intended to have erected it at an angle of 45 degrees, but made a mistake and gave it the pitch before mentioned. It will be lowered to 45 degrees, and the Carter car demonstrator will then essay to run half way up, stop the car and then go on up to the top.

had to be found in the motive back of the use made of the machine. For the purpose of giving road supervisors and other persons interested in good roads practical instruction, Professor R. C. Terrell, head of the civil engineering department of State university at Lexington, Ky., has been giving practical demonstrations of the construction of earth and sand roads, and the reconstruction of macadam roads.

## Why The Paige Has Forged Ahead

This is why. Simply because the automobile buying public has found out that materials, workmanship and design, are the vital considerations in the building of the Paige—and not details of equipment, untried and unproved, and not experimental construction features.

While others have sought greater volume of business by reducing prices, cheapening the product, and attempting to replace essentials with selling arguments, we have sought to hold and conservatively increase the loyal Paige following by maintaining prices, retaining quality and providing in the Paige everything possible that makes for comfort, and long, satisfactory service.

## The PAIGE Car

gives power, more horse power for every hundred pounds of car weight, than is given in ninety per cent. of all other makes. Speed—more than a Paige owner ever needs. Comfort—roomy bodies, perfect balance, deep upholstery, easy riding springs. Style—most advanced body types and excellence of finish. Economy—20 to 25 miles per gallon of gasoline, light weight, over-size tires, absolute interchangeability of parts.



Model Beverly Torpedo Touring Car, Fully Equipped, \$975

Six seat, very stylish bodies—4 and 5-passenger touring cars, roadsters and raceabouts—prices \$975 and \$1000. The beautiful La Marquise Coupe, \$1600. All built on the one Paige chassis and on the one Paige unit power plant.

Regular equipment of Paige cars includes top, windshield, 5 black enamel lamps, generator, horn, tools, jack and tire repair outfit. Quick Demountable Rims (set of 5), on touring car models, including tire irons, \$15. Same equipment on Roadster \$12.50. (Self-starter and Prest-O-Lite tank installed at factory for \$25 if desired.)

Telephone, write or call for demonstration.

STODDARD-DAYTON AUTO COMPANY

Phones—Marshall 1915, A-1917. 690 Washington St.

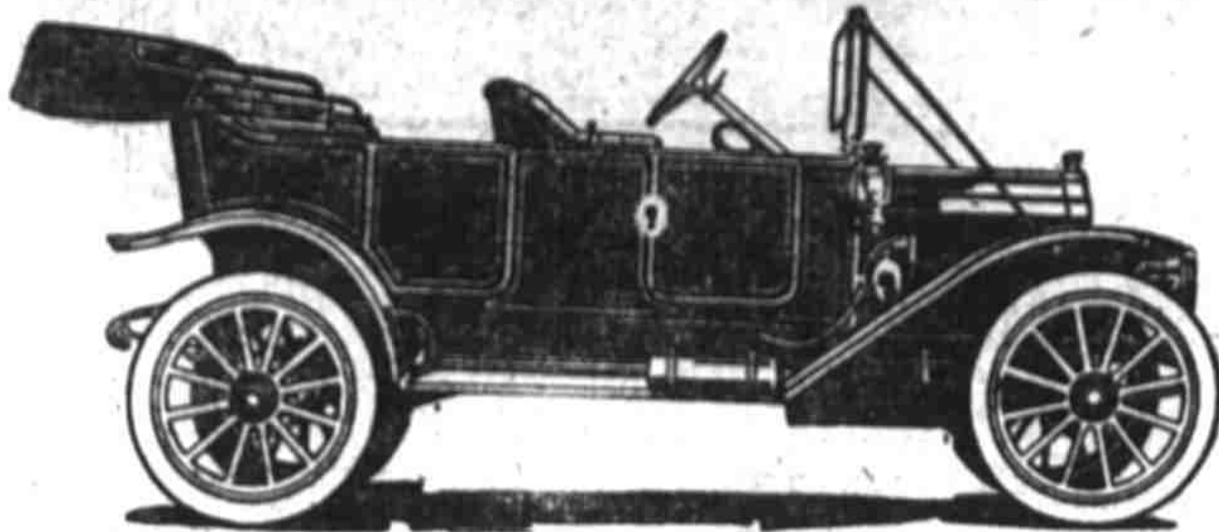
PAIGE-DETROIT MOTOR CAR COMPANY, DETROIT, MICHIGAN



# STUDEBAKER AUTOMOBILES



## A Timely Tip to Tardy Buyers



FLANDERS "20" TOURING CAR, \$925 F. O. B. PORTLAND

WE HAD HOPED that this season the usual spring scramble for automobiles would be averted in the case of Studebaker cars at least—but, alas, for well-laid plans!

NOT THAT WE ARE COMPLAINING—not in the least. So far as we ourselves are concerned. Far from being unpleasant, the condition that confronts the Studebaker Corporation this Spring of 1912 is well nigh ideal.

THAT IS SPEAKING from a manufacturer's point of view.

BUT FROM YOUR STANDPOINT—it is different. That's what we wanted to talk about—and to advise you how best to go about it to meet the conditions that obtain and ward off disappointment.

HERETOFORE, AS YOU KNOW, there has always been a tremendous—one might almost say a hopeless—shortage of Flanders "20" and E-M-F "30" cars in the Spring months—the rush season.

ONE OR TWO OTHER MAKES that were popular with buyers shared with us to an extent this pleasurable-over-demand. Pleasurable, but disheartening at that. For one dislikes to disappoint so many good friends. Then, too, when you know you make the best automobiles for the money you hate to see good friends forced to accept second bests.

THAT HAS ALWAYS BEEN THE CASE. We were powerless to remedy it. The E-M-F Company was young. Had made tremendous progress, but there was a limit to financial resources. And, anyway, factories can be equipped only about so fast. Machine tools can't be wished into form.

BUT THIS YEAR it was different. This big forty-five-million-dollar Corporation felt equal to the task of supplying the full demand for its two models—herculean though it was.

WITH UNLIMITED CAPITAL at its command, with the largest and best equipped plants in the world, with an engineering and manufacturing organization second to none, contracts for material placed and deliveries assured, it seemed as if even our splendid sales force would be unable to keep ahead of the production department.

AND WE HAVE DONE ALL we set out to do. That is to say, we estimated that 50,000 cars (divided into 30,000 Flanders "20"s and 20,000 E-M-F "30"s), would surely supply the demand.

WE FELT SURE WE HAD NOT underestimated the demand. We knew the unparalleled popularity of these famous cars not only throughout the length and breadth of America, but in all other civilized countries, but

WE THOUGHT 50,000 CARS would do. Some of our competitors warned us it was too many—the rest of them didn't believe we would or could make that many.

WELL, WE'RE UP to schedule—a few cars ahead of it on April 1st, and we carried over from March to April orders for 4722 cars. Most of them Flanders "20"s.

LOOK AT THIS RECORD—it's almost unbelievable. In December, when would-be competitors were subsisting on snowballs and waiting for "the season" to open up, the Studebaker plants shipped 3600 cars. In January (inventory month), 4000.

IN FEBRUARY 4200, in March 4601, and the schedule for April is 5000—and, as we have said, we are a little ahead of the schedule.

IN THE WICKEDEST WINTER in fifty years, you'll recall. You'd have thought that would help us by retarding demand—it did leave other makers' cars on their floors. But seems as if the harder the conditions of roads and weather, the more careful people are about selecting their automobiles.

6000 A MONTH IS THE SCHEDULE for April, May, June, July and August, and we'll make them, but as the little boy said, that's our almighty darndest.

WORKING OVERTIME NOW—and men can stand only about so much of that. We don't like overtime at all. But we're doing out utmost to keep up with the demand—and we are still in sight of it, though breathless.

THERE'S THE CONDITION as it stands today. It is up to you. What are you going to do about it?

ANALYZE IT: It means that a lot of people are going to have to wait for deliveries and a lot more will be disappointed—compelled to accept some other car—second best value—for all will not be able to get Flanders "20" or E-M-F "30" cars.

IT ISN'T SO BAD as it looks, in a way. The shortage of Flanders "20"s is more apparent than real—for our capacity is 50 more 20's per day than 30's. But it's bad enough. And it shows we have again fallen short of our ambition, hard as we have tried to realize it.

WE ARE TELLING YOU THIS because we have repeatedly asserted to dealers and the public that we would surely avert the Spring scramble. Now that we know that we have failed, we feel that we owe you a frank statement of the facts.

OF COURSE IN TELLING YOU we cannot help telling our competitors also—and very naturally they will use it against us—try to persuade you to buy their cars on the same grounds as former years, "You can't get Studebaker Cars—either model." And that'll be true—unless you beat some other buyer to it.

WE FELT SURE we would be able to supply every possible customer with a Flanders "20"—but remember

THE ENGINEERS WHO BUILT the levees along the Mississippi were eminent and honest men and they were equally certain they would hold any floods that might ever come. But this has been an exceptional season—and dykes have given way in places.

WE WERE EQUALLY CERTAIN we had gauged demand aright—thought we might be over-sanguine, in fact. But we underestimated the flood of orders that has poured in increasing volume on us through our big branches and dealers and our thousands of smaller, but no less alert representatives. We are swamped, despite our elaborate precautions!

IT'S MOST GRATIFYING to see how Flanders "20" has gained impetus with the years. It is the story of E-M-F "30" over again—and we have ceased to marvel at the way that car grows in demand, selling itself as fast as we can turn them out. And with scarcely any effort on our part.

IT'S THE ENDLESS CHAIN principle at work on marmoth scale. When we make a good car we start it. Every satisfied buyer tells three more—and each of the three tell three others—and it grows at a wonderful rate.

FLANDERS "20" ENJOYS that happy state today to an extent greater than any other car. And because there is more value—more automobile, more quality of performance, and better looks, than in any other 20 or 25-horsepower car in the whole world at the price.

AND IT ISN'T CHEAP at any point. Better steel is not used in any automobile on earth. Get that—any—regardless of price. We use the best of the science of metallurgy and of automobile engineering can specify.

IN APPEARANCE—it is just what you have been looking for, a smaller edition of a high-powered, high-priced car. It looks \$3000—it sells for \$925 in Portland.

WE FIND TWO CLASSES of people, mostly, buy Flanders "20" cars.

FIRST: DISCRIMINATING FOLK who will not have—will not be seen in—a poorly-made, noisy, under-powered and cheap looking car at any price.

THESE HAVE WAITED for years for the arrival of a car the man of pride but moderate means could buy and drive with pleasure. They found it in Flanders "20" as in no other light car. But these people are conservative, too—they don't care to take risks or to experiment with new models.

SO THEY WATCHED Flanders "20" through three seasons. The first, the usual discovery and corrective stage, was like most other new models. Then she struck her gait and for two seasons past, she has been steadily forging ahead till now she leads undisputed.

THERE ARE TWO WAYS to buy an automobile. One is to buy a cheap car because it is cheap in price and then pay in installments the difference between that and the value of a good car—in repairs and replacements of inferior parts—and then find you have nothing.

THE BETTER WAY is to determine just what is the lowest price at which a really first class 20-horsepower car can be made. Decide which car is backed by the best reputation for quality and service—afterward. Then pay that difference in the first place and have not only quality but a car that in appearance as well as performance will be one your family will be proud to ride in.

THAT'S FLANDERS "20"—if you search the world over you will decide that way.

WHY, FRANCE BUYS Flanders "20"s to an extent greater than any other car made outside France. Germany also; Belgium, Italy, England. We exported 4000 Flanders "20"s last year. Of what other American car can this be said?

EVEN THE GREAT E-M-F "30" does not enjoy the demand abroad that Flanders "20" does. The "30" is essentially an American product—made for American roads. The "20" accurately conforms to European ideals and engineering standards—and in competition with their own it sells as fast as we can supply them.

APPEARANCE is worth while—is worth all it costs. Beauty is more than skin deep in a motor car. Has to be made good to look good. A "tin car" cannot but look "tinny."

YOU'LL FIND IT'S CHEAPER by the end of the first year to pay the \$150 to \$200 more and own a Flanders "20" that looks the part as well as performs it—a car in which the repair and maintenance bills are practically nil—than to pay less and get so much less. And have everybody know it, too.

BUT YOU'LL HAVE TO HURRY if you expect to get a Flanders "20" this Spring. There isn't an hour to lose. You may be too late now—your local dealer may be sold up to his full allotment. If so, we can't help him. Only way is to see him at once and get your order in.

AND DON'T EXPECT the dealer, just because you have known him so long, to take a verbal statement as an order. He can't. We won't permit him for one thing. If he hasn't bona fide orders for every car he has been allotted by a certain date, we insist on shipping such cars elsewhere to dealers who are heavily oversold.

FIRST SEE THEM ALL—hear all the salesmen's stories. Else you won't fully appreciate your Flanders "20" after you have gotten it. And you will never know how nearly you came to buying the wrong car! See them all. Then decide, and having decided, delay no longer—else you will surely be disappointed, as more than 10,000 persons were a year ago.

REMEMBER THE STUDEBAKER GUARANTEE and Studebaker reputation and service goes with every car carrying the Studebaker name.

Of course you are coming to Detroit for Cadillac, the great water carnival, the fourth week in July. While here you will visit Detroit's famous automobile factories. We invite you to visit the Studebaker plants, the largest in the world.

# Studebaker Corporation of America

L. H. ROSE, Northwest Manager

Portland Branch—Chapman and Alder Streets

Seattle Branch 2201-3 Second Avenue

Tacoma Branch 1129 Tacoma Avenue

## HOW AUTO IS USED IN PURSUIT OF OUTLAWS

"Now that the motor car is being credited with helping the 'crooks' perform their criminal work, comes a concrete example of how the same instrument of travel also aids justice in carrying out its mission," according to Mel Johnson, manager Howard Auto company, agent for Buick and Nationals. He tells a thrilling story of how a touring car was used by officers in Alabama to run down the men charged with the Lewisburg crime of murders that recently shocked the country. The governor, chief of police, sheriff and others used the car in a mad ride through the hazardous mountain trails. It is said that the alleged outlaws have caused terror in their neighborhood for years and the use of the automobile in rounding them up after their escape marks an epoch in such work.

"It is interesting to note," remarks Johnson, "how people instantly adopt new inventions, such as the automobile, for both good and evil. From Paris,