

POPULAR SCIENCE

SEPTEMBER

15 CENTS

20 CENTS IN CANADA

MONTHLY

15¢



AN UNUSUAL ARTICLE:

Queer Vehicles Inventors Produce . . . PAGE 26

NEW INVENTIONS • MECHANICS • MONEY MAKING IDEAS
HOME WORKSHOP PLANS AND HINTS • 350 PICTURES

New Gears Shift Themselves

GUS tells How Automatic Systems Take All the Hard Work Out of Driving and Make It Safer

BY
MARTIN
BUNN

GUS WILSON chuckled to himself as he climbed the steps to Jack Sheridan's diminutive front porch.

Frenzied early morning calls from Sheridan were a standing joke at the Model Garage and Gus wondered what it would be this time. "Probably an empty gas tank, a loose wire, or something else a baby could fix," he thought as he reached for the doorbell button.

But Gus never rang the bell. An ear-splitting crash of gears, punctuated with sputtered oaths, told him that Sheridan was airing his temper in the small garage adjoining the house.

Through a blue haze of smoke, the gray-haired mechanic could see Sheridan's car. The engine racing, it coughed and sneezed each time the gears clashed and groaned.

"Hey! What are you trying to do, wreck that chariot?" Gus shouted over the din. "Sounds like you're mixing up a load of concrete."

"I can't get the blamed car in gear," grumbled Sheridan as he tugged at the gear-shift lever. "The harder I pull, the louder it howls."

Gus motioned to Sheridan to slide over and climbed into the driver's seat beside him. With the motor shut off, Gus maneuvered the shift lever. "Shifts O. K. when the motor's not running," he said as he pushed in the clutch pedal, slipped the gears into low, and started the motor.

"There it's in first with the engine running. Now let's see what happens when I let out the clutch."

The car moved forward as the clutch grabbed but when he tried to shift to second it was like pouring a load of pebbles into a coffee grinder. He slow shifted, he shifted fast, and he tried double clutching. Nothing seemed to make any difference. Finally, with a significant "grunt" he shut off the motor.

"Acts like the clutch bearing is either badly worn or broken," the veteran me-

chanic reported after a hurried look under the car. "I don't know for sure but I'll take it back to the shop and give it the once over."

Driving at a snail's pace, in low gear, Gus managed to coax the ailing car a few short blocks to the Model Garage.

Sheridan grinned happily as the car coasted to a stop in front of the garage driveway. "All the racket I've been making shifting gears hasn't been my fault after all," he said.

"Not all of it," Gus agreed. "When a bearing starts to wear, the clutch drags and the gears in the transmission never stop turning. To force them in gear, is like trying to jump on an express train from the platform of a local station. You can't do it gracefully."

"I've never been one for a lot of fancy

through a valve connected to the accelerator pedal.

"When the gas pedal is released all the way, the valve is open, but as soon as any pressure is applied it closes. Naturally, when you take your foot off the gas, the intake manifold sets up a vacuum in the cylinder and the piston is drawn in. That pulls the clutch pedal down. When you step on the gas, the valve closes, shuts off the vacuum, and the piston and clutch return to their original positions.

"Simple enough," Sheridan agreed. "But how do you use it to shift gears?"

"It's just as natural as steering," Gus assured him. "To work the clutch you lift your foot off the gas, shift, and then step on the gas again. You see, it works right in with the usual way of gear shifting. The motor slows (Continued on page 89)



"Acts like the clutch bearing is badly worn or broken," Gus reported. Driving at a snail's pace, in low gear, he managed to coax the ailing car a few short blocks to the Model Garage for a more thorough inspection of the parts that seemed out of order

business on a car but it certainly would help if they'd do something to make gear shifting easier," said Sheridan.

"How about an automatic clutch?"

"That's something like free wheeling, isn't it?" Sheridan asked as he found a comfortable position on the running board.

"Yes and no," replied Gus. "But one thing it does do is eliminate a lot of the tiresome movements in gear shifting. All you do is lift your foot off the accelerator and move the shift lever. The automatic clutch does the rest."

"Sounds good, but I bet it adds a lot of complicated parts that are always getting out of order," put in Sheridan.

"Nope, you're wrong there. It's fairly simple," Gus told him as he opened the car door and pointed down at the floor boards. "All it amounts to is a fat cylinder and a piston mounted under the floor boards. The outer end of the piston

is attached to the clutch pedal and a pipe line leading from the intake manifold of the engine enters the other end of the cylinder

NEW GEARS THAT SHIFT THEMSELVES

(Continued from page 58)

down when the shift is made and speeds up as the clutch begins to take hold."

"By the way, Gus, that reminds me. A fellow said something the other day about a new automatic gear shift that's just come out on a new car. Is there anything in it?"

"Sure, if you don't like to shift gears," Gus replied. "The general idea is not so new. In my younger and palmier days, I had an automatic gear shift on my car. You had to push buttons to change gears."

"Do you have to push buttons on the new one?" Sheridan asked.

"NO, THE new one is really automatic. It does most of the work of gear shifting for you and does it better than you could do it yourself. All you do is step on the gas and centrifugal force does the rest."

"Centrifugal force?" Sheridan repeated in a puzzled tone. "What's centrifugal force to do with it?"

"Plenty," Gus said. "The whole idea is based on it. A set of governor weights fly out and work a clutch that throws the car into high gear when it reaches a certain speed. Once you start the car, the governor weights do the rest. When you slow down, the weights drop back into place and the car runs in low. When you speed up, it shifts back into high automatically. It selects the gear that's best for the speed and power needed."

"Only two speeds ahead?" Sheridan interrupted.

"Only two in the regular driving range," Gus explained, but by turning a small gear-selector handle on the dash, you can obtain an auxiliary low range having two automatically selected gear ratios. Actually that's four speeds ahead, but only two are used for regular driving. The two others are for tough pulling."

"How about the clutch? Do you have to use it at all?"

"Only when you start. When you get in the car you start the motor in the usual way, push in the clutch pedal, and move the selector handle from neutral into the running position by pushing it in. Then you let out the clutch, step on the gas and forget about the gears. To stop, you push in the clutch and step on the brake. Simple, isn't it?"

"I'll say," replied Sheridan enthusiastically. "How about reverse?"

"Simply move the selector handle after pushing in the clutch," said Gus.

"Can you 'free wheel' with an automatic transmission?"

"NOT with that type, but an automatic gear-shift arrangement just developed in Detroit has the free-wheeling feature. Like that clutch I was telling you about a few minutes ago, it's operated by a vacuum.

"It has a master vacuum clutch and three separate vacuum gear clutches that are controlled by a centrifugal governor attached to the main drive shaft. As the driver presses down on the accelerator in starting, the intake manifold vacuum decreases. This engages the first transmission clutch and then the main clutch. The car is then in low. When the car speeds up, the governor shifts to the second gear position. Then the driver just takes his foot off the gas and steps on it again slowly. That engages the second gear clutch. To shift to high, he just does the same thing all over again."

"Gosh, in a few years an ordinary car like mine will be an antique," grinned Sheridan.

"Just the same as your car makes a 1925 model look like an antique," Gus agreed. "It's been that way in the automobile game as long as I remember—and driving has been getting easier and safer all the time."

I WISH I HAD SOME SPENDING MONEY



HERE'S MY CHANCE. I'LL MAIL THE COUPON!



BRING A COMPANION EVERY MONTH



NOW I HAVE MONEY AND A BICYCLE BESIDES!

WIN THIS BICYCLE!

It's easy! Earn your own SPENDING MONEY! Get this speedy motorbike—and your choice of 300 other prizes—without a cent of cost. Bike comes to you fully equipped with coaster brake, headlight, and other big features. Built for easy riding, long wear, and speed.

MONEY and PRIZES can be yours for delivering 3 well-known magazines to customers in your neighborhood. Will not interfere with school or play. Mail the coupon—and we'll start you.

MAIL THIS COUPON AT ONCE!



Mr. Jim Thayer, Dept. 321
The Crowell Publishing Co.
Springfield, Ohio

Dear Jim: I want to win MONEY and PRIZES. Start me as a salesman.

Name _____

Address _____

City _____ State _____

BIG PAY DIESEL JOBS

The New Hemphill Home Study Course includes Practical Shop work operating Diesels in a Hemphill School. Prepares you for Big Pay Diesel Jobs. We supply trained engineers to Diesel companies everywhere. Many successful graduates. Send for Free Booklet F.

PRACTICAL SCHOOL COURSE
Our full time course in a Hemphill school will shorten your training period. You learn by operating all types of Diesels. Write for Free Booklet G.

HEMPHILL DIESEL ENGINEERING SCHOOLS
2121 San Fernando Rd., Los Angeles, Calif.
563 Westlake North, Seattle, Wash.
1842 Pender Street, Vancouver, B. C.

- MEN NEEDED To operate DIESEL—**
- Trucks
 - Buses
 - Power Plants
 - Marine
 - Engines
 - Locomotives
 - Airplanes
 - Power Shovels
 - Tractors
 - Ice Plants
 - Mining
 - Plants
 - Pumping
 - Plants
- Many Other Opportunities

ENGINEERING and ARCHITECTURE

Intensive, Practical, Technical Courses, in Electrical, Mechanical, Structural, Architectural Engineering, Design in 2 yrs. Diploma in 1 yr. Short courses in Electricity, Power Plant, Operating, Inspection, Radio, Telephone, Drafting, Nonmetallics simulated, Time and Money Saved. Low tuition. Extensive modern equipment. Part-time work during training. 30 yrs. experience producing successful men. Write for catalog.

FINLAY ENGINEERING COLLEGE
1003 Indiana Ave. Kansas City, Mo.

Learn Radio in 10 Weeks

PAY TUITION AFTER GRADUATION—YOUR GREATEST OPPORTUNITY!
Prepare for jobs in Service Work, Broadcasting, Talking Pictures, Television, Wireless, etc. by two weeks of practical shop work in the great O'Dell Radio Shop. Pay for your training after you graduate. You Employment Service. Write today for our Big Free Radio and Television Book.
RADIO DIVISION, COYNE ELECTRICAL SCHOOL
500 S. Paulina St., Dept. 61-5H, Chicago, Illinois

You Can Make BIG PROFITS

21 FOLDERS — ALL PARCHMENT IN A CHRISTMAS BOX ASSORTMENT
Exclusive—original—21 outstandingly beautiful Christmas Folders—each different in handsome Book Gift Box. Magnificent, multi-colored crayon and raised silver metallic designs. Each with an envelope. **COSTS YOU 50¢—SELLS FOR \$1.00**
—AMAZING VALUE. Write for free sample and combination offer immediately. A startling easy seller. **WALTHAM ART PUBLISHERS,**
7 Water Street, Dept. 49, Boston, Mass.

U. S. GOVERNMENT JOBS



Railway Postal Clerks
Many other Future Government Jobs coming. MEN—WOMEN 18 to 50

CHEMISTRY

Complete, practical home-study courses prepared by some of the best-known chemists in this country, including ALLEN ROGERS, B.S., M.S., Ph.D.—Head of Department of Industrial Chemistry, Pratt Institute; L. M. TOLMAN, Ph.D., Vice-president, United Chemical and Organic Products Co.; BRADLEY STODGTON, B.S.—Head of the Department of Metallurgy, Lehigh University; and OWEN L. STERN, Ph.D.—Professor of Applied Chemistry, University of Pennsylvania.

Mail Coupon for Free Booklet

INTERNATIONAL SCHOOL OF CHEMISTRY
Division of the International Correspondence Schools
Box 7435-G, Scranton, Penna.
Without cost or obligation, please send me full details of your home-study course in:
 Analytical Chemistry Industrial Chemistry
 Chemical Engineering Short Chemistry Course
 Pharmacy

Name _____
Address _____

Learn Photography at HOME

Make money taking pictures. Prepare quickly during spare time. Also earn while you learn. No experience necessary. New easy method. Nothing else like it. Send at once for free book. Opportunities in Modern Photography, and full particulars.
AMERICAN SCHOOL OF PHOTOGRAPHY
Dept. 1366, 3601 Michigan Ave. Chicago, U. S. A.

EARN UP TO \$25 A WEEK, OR MORE

Grow Mushrooms in your cellar or shed. Big demand. Experience unnecessary—we tell you how. Illustrated book free. Start NOW—write today.
American Mushroom Industries, Ltd.
Dept. 27 Toronto, Ont.

Always mention POPULAR SCIENCE MONTHLY when answering advertisements in this magazine.

\$158 to \$225 a Month

MAIL COUPON BEFORE YOU LOSE IT

FRANKLIN INSTITUTE, Dept. N275
Rochester, N. Y.

Write: Rush to me without charge—copy of 32-page book, "How to Get U. S. Government Jobs," with list of future jobs and full particulars telling how to get them.

Name _____
Address _____